

INTERNATIONAL BOUNDARY AND WATER COMMISSION  
UNITED STATES AND MEXICO

UNITED STATES SECTION

NARENDRA N. GUNAJI  
*Commissioner*  
El Paso, Texas

ALTON L. GOFF  
*Chief*  
Yuma, Arizona Hydro Office

MEXICAN SECTION

J. ARTURO HERRERA SOLIS  
*Commissioner*  
Cd. Juarez, Chihuahua

CECILIO LOMELI LOPEZ  
*Area Subdirector*  
Mexicali, Baja California

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WESTERN WATER BULLETIN 1993

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**Flow of  
The Colorado River  
and other  
Western Boundary Streams  
and  
Related Data**

COLORADO RIVER  
TIJUANA RIVER  
SANTA CRUZ RIVER  
SAN PEDRO RIVER  
WHITEWATER DRAW

**1993**

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## FOREWORD

This bulletin is the thirty-fourth annual compilation of stream discharges and other hydrographic data relating to international aspects of the Colorado River below Imperial Dam, the Tijuana River, and other streams crossing the western land boundary of the United States and Mexico. The compilation was prepared jointly by the United States and Mexican Sections of the International Boundary and Water Commission, solely for the purpose of presenting statistical data relating to stream flow and kindred subjects for the Colorado River from Imperial Dam to the Gulf of California, the Tijuana River and its important tributaries in the United States and Mexico, and other streams, including the Alamo and New Rivers which cross the California-Baja California boundary, and the Santa Cruz River and Whitewater Draw which cross the Arizona-Sonora boundary. This bulletin contains information for the year 1993.

Stream gaging on the Colorado River below Imperial Dam began in 1902 when the station at Yuma, Arizona was established. Stage records were obtained at this station from January 1878 until December 1973, when it was discontinued. Continuous stream gaging on the Tijuana River and its important tributaries in the United States and in Mexico began in 1936. Each government operates the gaging stations located within its own country.

## COLORADO RIVER BELOW IMPERIAL DAM

Below Imperial Dam, the Colorado River flows southward 16 kilometers to the mouth of the Gila River, thence westward 18 kilometers to Pilot Knob Mountain, and south 1.6 kilometers to the point where the northerly international land boundary, between California and Baja California, intersects the river. From this point the river continues to flow southward and forms the boundary between the United States and Mexico for a distance of about 35 kilometers to the point where the southerly international land boundary between Arizona and Sonora intersects the river. From this point the river continues to flow southward about 145 kilometers to discharge into the Gulf of California.

The ordinary flows of Colorado River below Imperial Dam are largely controlled by releases at Hoover Dam, completed in 1935. The releases are further regulated at Davis Dam, completed in 1950, and by Parker and Imperial Dams, completed in 1938. Small amounts of runoff may occasionally be contributed to the flow in the lower river from the usually dry arroyos draining the 28,200 square kilometers along the river from Hoover Dam to the mouth of the Gila River. In addition, flows ranging from usually minor amounts to infrequent torrential floods may enter the lower Colorado River from the Bill Williams River, draining about 1,857 square kilometers below Alamo Dam and Lake, completed in 1963; and from the Gila River, draining about 18,900 square kilometers below Painted Rock Dam and Reservoir, completed in January 1960.

At Imperial Dam, diversions are made to Gila Gravity Main Canal and All-American Canal for irrigation projects in Arizona, including the Yuma Valley, Gila and Wellton-Mohawk projects; and in California, including the Imperial Valley, Coachella Valley and Reservation Division of Yuma Project. Also, under the provisions of the 1944 Water Treaty, there may be diverted to the All-American Canal at Imperial Dam for delivery to Mexico in the Alamo Canal, or substitute canal, at the northerly boundary, a portion of Mexico's scheduled deliveries of waters of the Colorado River, which in 1993 amounted to 1,850,234 thousand cubic meters, in accordance with Article 10 of the 1944 Water Treaty. No diversions were made to a substitute canal in 1993.

Below Laguna Dam, measured and unmeasured flows are returned to the river principally as waste and drainage water from the irrigation projects in the United States. Waste and drainage waters from irrigation projects in the United States also cross the boundary into Mexico near San Luis, Arizona without returning to the river in the United States.

In the limitrophe section of the river, 1.8 kilometers downstream from the northerly boundary, Morelos Dam, the principal diversion structure for Mexico, was completed and placed in operation on November 8, 1950. Since that date, almost all Colorado River waters diverted by Mexico (except emergency deliveries to Tijuana from August 1972 to August 1980) have been diverted to the Alamo Canal at Morelos Dam.

## TIJUANA RIVER BASIN

The total drainage area of the Tijuana River basin is 4,483 square kilometers, of which 27 percent lies in the United States and 73 percent in Mexico. This river is formed by the principal tributaries, Cottonwood Creek, which rises in the United States and Rio de las Palmas, which rises in Mexico. Cottonwood Creek crosses the international land boundary 34 kilometers from the Pacific Ocean to join the Rio de las Palmas in Mexico. From the confluence of these tributaries, the Tijuana River flows northwesterly 8 kilometers to cross the land boundary into the United States near San Ysidro, California and Tijuana, Baja California, and then flows westerly 10 kilometers to discharge into the Pacific Ocean 3 kilometers north of the boundary. The flow of Cottonwood Creek is partially controlled by Barrett and Morena Reservoirs in the United States, and the flow of the Rio de las Palmas is partially controlled by Rodriguez Reservoir in Mexico.

## WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

Whitewater Draw rises in the United States and flows south into Mexico, crossing the international boundary near Douglas, Arizona, eventually discharging into the Gulf of California through the Yaqui River in Mexico. The total drainage area above the Douglas Gaging Station is 2,650 square kilometers. A number of mountain streams in the upper reaches of the basin are diverted for irrigation, but they would normally sink or go to ground water before reaching the main water course.

## FOREWORD

## SAN PEDRO RIVER AT PALOMINAS, ARIZONA

The San Pedro River rises in Mexico and flows north into the United States, crossing the boundary near Palominas, Arizona and thence northwesterly into the Gila River. The river in the vicinity of the international boundary drains an area of 1,919 square kilometers, of which 1,681 square kilometers are in Mexico.

## SANTA CRUZ RIVER NEAR NOGALES AND LOCHIEL, ARIZONA

The Santa Cruz River rises in the United States and flows south into Mexico, crossing the international boundary near Lochiel, Arizona and returning to the United States near Nogales, Arizona, eventually discharging into the Gila River southwest of Phoenix, Arizona. The drainage area of the Santa Cruz River above Nogales station is 1,380 square kilometers. Of this amount, 901 square kilometers lie in Mexico. There are a few ground water irrigation diversions above the Lochiel station in Arizona and an unknown amount of water diverted for irrigation in Mexico.

## ACKNOWLEDGMENTS

Other agencies which have contributed to the data published herein include the Bureau of Reclamation and the Geological Survey of the U. S. Department of the Interior; the National Weather Service, Department of Commerce; the Yuma County Water Users' Association; the Imperial Irrigation District; the city of San Diego, California; the Otay Municipal Water District; and the Ministry of Agriculture and Hydraulic Resources of Mexico. Specific notation is made of each of the above named agencies, where the data appear. The courtesy and cooperation of those who have made these contributions are acknowledged with appreciation.

## UNITS OF MEASURE

This Bulletin is 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

METRIC UNITS				ENGLISH UNITS	
<u>LENGTH</u>					
1	Millimeter	x	0.03937	=	Inch
1	Meter	x	3.28084	=	Feet
1	Kilometer	x	0.62137	=	Mile
<u>AREA</u>					
1	Square Meter	x	10.76391	=	Square Feet
1	Hectare	x	2.47105	=	Acre
1	Square Kilometer	x	0.38610	=	Square Mile
<u>VOLUME</u>					
1	Cubic Meter	x	35.31467	=	Cubic Feet
1,000	Cubic Meters	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 1993

## COLORADO RIVER

Normally, there is no measurable amount of runoff from the portion of the Colorado River basin in the United States and Mexico below Hoover Dam, not including Bill Williams and Gila Rivers. There was a significant amount in 1993 from the Gila River. In the lower basin of the Colorado River in Mexico, from Morelos Diversion Dam to the Gulf of California, the average precipitation during 1993 could not be determined due to incomplete records at several index stations.

The flow of the Colorado River reaching Imperial Dam was 5,870,008 thousand cubic meters, about 58% of the 59-year average (1935-1993) of 10,113,426 thousand cubic meters. At the Northerly International Boundary, the total flow of the river during 1993 was 6,260,648 thousand cubic meters, about 127% of the 1935-1993 average of 4,919,246 thousand cubic meters. At the Southerly International Boundary, the flow during 1993 was 4,135,710 thousand cubic meters, or about 119% of the 1935-1993 average of 3,484,592 thousand cubic meters.

The total of all flows of the Colorado River entering Mexico in 1993 amounted to 6,480,999 thousand cubic meters, 117% of the 1935-1993 average of 5,534,146 thousand cubic meters, as measured 1) in the Colorado River at the Northerly International Boundary, 2) in the Wellton-Mohawk Main Outlet Drain Extension near Morelos Dam, 3) in the wasteways that discharge into the limitrophe section of the river from the United States bank, 4) in the canal which discharges waste and drainage waters from the Yuma Project across the southerly land boundary into Mexico near San Luis, Arizona, 5) in the Wellton-Mohawk Bypass Drain at the southerly land boundary near San Luis, Arizona, and 6) from the 242 Well Field near San Luis, Arizona.

During 1993, other waters arrived at the Mexican points of diversion and amounted to 4,554,979 thousand cubic meters. These waters consisted mainly of flood waters released from reservoirs on the Gila River. A maximum instantaneous flow of 713 cubic meters per second occurred in the Colorado River at the Northerly International Boundary station on March 7, 1993.

Stored waters at the end of the year in the three major reservoirs on the Colorado River below Lee's Ferry amounted to 28,969.8 million cubic meters, 82% of the usable capacity of 35,263.2 million cubic meters. The greater part (26,302.7 million cubic meters) of the storage was contained in Lake Mead (Hoover Dam). There were no reported shortages of Colorado River water for irrigation during 1993 due to drought or accident to the irrigation system.

The total reported area irrigated from waters of the Colorado River below Imperial Dam in 1993 was 505,310 hectares; 300,453 hectares in the United States and 204,857 hectares in Mexico. An estimated 33% of the total area irrigated in Mexico is served by pumping from ground water.

## TIJUANA RIVER BASIN

During 1993, the temperatures at Barrett Dam, California (elevation 533.40 meters) in the upper portion of the basin in the United States averaged 17.3 degrees Celsius, 0.8 degree above the 63-year mean. In the extreme upper portion of the basin in Mexico at El Pinal, Baja California (elevation 1349.96 meters), the recorded temperatures during the year averaged 10 degrees Celsius, 3 degrees below the long-term average; and at Rodriguez Dam, Baja California (elevation 139.90 meters), the recorded temperatures averaged 14 degrees Celsius, 4 degrees below the normal for many years.

At Barrett Dam, in the upper portion of the basin in the United States, the recorded precipitation was 817 millimeters, 181% of normal; and at Lower Otay Dam near the lower end of the basin, 473 millimeters, or 166% of normal. The recorded precipitation at El Pinal in the upper portion of the basin in Mexico was 788 millimeters, approximately 154% of the normal during the 30-year period; and at Rodriguez Dam in the lower portion of the basin in Mexico, 457 millimeters, 200% of the 55-year average.

Runoff above Barrett and Rodriguez Reservoirs during 1993 was about 934% of normal. Above Morena Reservoir, the runoff was 62,820 thousand cubic meters, or about 470% of the 57-year 1937-1993 mean of 13,369 thousand cubic meters. Above Barrett Reservoir, the runoff was 57,088 thousand cubic meters, or about 370% of the 56-year 1937-1993 mean of 15,442 thousand cubic meters. At Rodriguez Reservoir, the runoff was 412,673 thousand cubic meters, or about 1,185% of the 56-year mean of 34,831 thousand cubic meters.

The flow of the Tijuana River at the international boundary was 605,644 thousand cubic meters during 1993.

## WHITEWATER DRAW

During 1993, the average annual temperature over the watershed was 0.1 degree Celsius above normal, while the annual precipitation was 94% of normal. Runoff for the year at the gaging station near Douglas, Arizona, was 726 thousand cubic meters, or about 10% of average.

## GENERAL HYDROLOGIC CONDITIONS FOR 1993

## SAN PEDRO RIVER

During 1993, the average annual temperature was 0.1 degree Celsius below normal. The annual precipitation, as measured at Coronado National Monument Headquarters, was 109% of the 1961-1993 mean of 533 millimeters. The stream flow at the international boundary was 41,507 thousand cubic meters, 154% of the 1951-1993 average.

## SANTA CRUZ

During 1993, the average annual temperature over the watershed was somewhat above normal, and the annual precipitation was about 168% of the 55-year 1939-1993 mean. Runoff measured at the Nogales gaging station, where the stream re-enters the United States, was 51,824 thousand cubic meters. The total runoff for the year measured at the gaging station near Lochiel, Arizona, where the stream enters Mexico from the United States, was 11,877 thousand cubic meters. Therefore, neglecting stream flow depletions in Mexico, the records indicate a contribution of about 39,947 thousand cubic meters from the loop of the river lying in Mexico, or approximately 77% of the flow reaching the Nogales station.

## ALAMO AND NEW RIVERS

During 1993, the average annual temperature over the drainage areas of the Alamo and New Rivers, as recorded at El Centro, California, was 22.9 degrees Celsius, 0.5 degree above normal; and over the drainage area of the New River as recorded at Mexicali, Baja California, it was 24 degrees Celsius, 1 degree above the 68-year average.

At El Centro, the precipitation was 134 millimeters, about 189% of the 63-year average; and in Mexicali, the annual precipitation record was incomplete. The total flow of the New River at the international boundary in 1993 was 234,938 thousand cubic meters, which was about 168% of the 1943-1993 average.

## SALTON SEA

During 1993, the average annual temperature around the Salton Sea was 0.1 degree Celsius below the long-term average, while the annual precipitation recorded at Brawley, California was approximately 200% of the long-term mean of 70 millimeters. The water surface of the Salton Sea rose slightly during the year. The maximum stage, 69.160 meters below mean sea level, was recorded on April 29, 1993 - May 28, 1993, inclusive. The minimum stage, 69.675 meters below mean sea level, was recorded on January 1 - 7, 1993, inclusive.

09-5300.00 RESERVATION MAIN DRAIN NO. 4 (CALIFORNIA DRAIN)

DESCRIPTION: Water-stage recorder (digital) located 152 meters upstream from railroad culvert and 1.6 kilometers northwest of Yuma, Arizona. Discharge measurements are made from a footbridge immediately below the gage. The drainage canal discharges into the outfall channel of the Yuma Main Canal Wasteway 61.0 meters downstream from the spillway structure, and thence into the Colorado River on the right bank, 305 meters upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometers upstream from the northerly international boundary. Prior to October 1955, published as "California Drainage Canal near Yuma, Arizona."

RECORDS: Based on current meter measurements and a continuous record of gage heights. Records are computed and furnished by the U. S. Geological Survey. Records available: Monthly discharge, January 1913 to April 1920, October 1921 to March 1925, and January 1934 to September 1947; daily and monthly discharge, October 1947 through 1993.

REMARKS: Reservation Main Drain No. 4 collects drainage and wastewater from the area east of the Yuma Main Canal on the Reservation Division of the Yuma Project, located in California. Since 1939, collection of seepage from the All-American Canal has caused large increases in drainage flows. Average annual flow prior to 1937 was 15,789 TCM. Monthly and annual averages since 1937 are shown in the table below. Average annual flow prior to 1937 was 15,789 TCM. Monthly and annual extremes: Prior to 1937: Maximum annual flow 24,904 TCM, 1916; minimum annual flow 11,003 TCM, 1913.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.21	2.41	1.42	1.84	2.15	1.76	2.52	1.56	1.76	2.38	2.55	2.10
2	2.15	2.24	1.19	1.84	2.18	1.81	2.69	1.56	1.78	2.58	2.49	2.10
3	1.87	1.67	1.47	1.84	2.24	1.95	2.63	1.61	1.95	2.41	2.46	2.10
4	1.98	1.33	1.50	1.84	2.29	2.12	2.29	1.61	1.47	2.38	2.46	2.10
5	1.95	1.53	1.53	1.84	2.29	2.24	2.18	1.56	1.61	2.41	2.44	2.10
6	2.01	1.33	1.53	1.76	2.29	2.41	2.32	1.53	1.22	2.52	2.44	2.10
7	1.93	1.33	1.56	1.78	2.27	2.41	2.29	1.50	1.47	2.41	2.41	2.10
8	1.87	1.33	1.59	1.78	2.27	2.63	2.29	1.50	1.59	2.38	2.41	2.10
9	1.76	1.33	1.61	1.70	2.27	2.80	2.18	1.44	1.67	2.41	2.38	2.07
10	1.70	1.36	1.61	1.73	2.27	2.89	2.10	1.44	1.70	2.24	2.38	2.07
11	1.84	1.42	1.64	1.78	2.27	2.72	2.24	1.47	1.64	2.24	2.35	2.07
12	1.90	1.30	1.67	1.84	2.24	2.61	2.18	1.59	1.59	2.29	2.35	2.07
13	1.87	1.30	1.73	1.84	2.24	2.55	1.95	1.61	1.59	2.46	2.35	2.07
14	1.84	1.27	1.76	1.84	2.24	2.35	1.98	1.50	1.50	2.44	2.32	2.07
15	1.87	1.27	1.81	1.87	2.24	2.32	1.98	1.42	1.44	2.35	2.32	2.07
16	1.84	1.27	1.81	2.01	2.24	2.29	1.93	1.33	1.44	2.46	2.29	2.07
17	1.84	1.30	1.81	1.78	2.21	2.29	2.07	1.42	1.56	2.35	2.29	2.07
18	1.81	1.27	1.81	1.78	2.27	2.29	2.27	1.50	1.76	2.18	2.27	2.07
19	1.67	1.50	1.81	1.81	2.24	2.21	1.98	1.13	1.78	2.10	2.27	2.07
20	1.78	1.47	1.81	1.81	2.21	2.15	1.93	1.44	1.73	2.12	2.24	2.07
21	1.76	1.27	1.81	1.84	2.21	2.15	2.04	1.33	1.73	2.24	2.24	2.07
22	1.73	1.25	1.81	2.01	2.18	2.10	2.07	1.30	1.64	2.27	2.21	2.07
23	1.76	1.25	1.81	2.18	2.15	2.12	2.07	1.53	1.84	2.32	2.21	2.07
24	1.56	1.30	1.81	2.21	2.15	2.18	1.98	1.30	2.12	2.27	2.18	2.07
25	1.81	1.27	1.81	2.24	2.15	2.29	1.87	1.39	2.18	2.24	2.18	2.07
26	2.07	1.22	1.84	2.15	1.81	2.38	1.76	1.61	2.15	2.29	2.15	2.07
27	2.10	1.25	1.84	2.10	2.15	2.52	1.73	1.81	2.18	2.21	2.15	2.07
28	2.15	2.29	1.84	1.90	2.21	2.38	1.67	1.70	2.21	2.29	2.15	2.07
29	2.35		1.84	1.95	2.07	2.41	1.76	1.70	2.21	2.29	2.12	2.07
30	2.63		1.84	2.04	1.64	2.41	1.76	1.98	2.29	2.41	2.12	2.07
31	2.55		1.84		1.59		1.67	1.73		2.52		2.07
Sum	60.16	40.13	52.76	56.93	67.23	69.74	64.38	47.10	52.80	72.46	69.18	64.41

Current Year 1993

Period 1937-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Volume-Thousand Cubic Meters					
	High	Low	Day	φ High	Day	φ Low	Average	Total	Average	Maximum	Minimum	
Jan.			30	2.63	24	1.56	1.94	5,198	4,044	5,896	711	
Feb.			1	2.41	26	1.22	1.43	3,467	3,750	5,493	456	
Mar.			126	1.84	2	1.19	1.70	4,558	4,617	6,476	1,005	
April			25	2.24	9	1.70	1.90	4,919	4,630	6,476	940	
May			1	4	29	31	1.59	2.17	5,809	4,789	6,895	804
June			10	2.89	1	1.76	2.32	6,026	4,624	6,883	717	
July			2	2.69	128	1.67	2.08	5,562	4,917	8,079	662	
Aug.			30	1.98	19	1.13	1.52	4,069	4,901	8,400	698	
Sept.			30	2.29	6	1.22	1.76	4,562	4,657	7,672	721	
Oct.			2	2.58	19	2.10	2.34	6,261	4,868	7,080	843	
Nov.			1	2.55	129	2.12	2.31	5,977	4,542	6,772	806	
Dec.			1	2.10	9	2.07	2.08	5,565	4,344	6,241	783	
Yearly						2.89	1.13	1.97	61,973	54,683	78,573	10,410

φ Mean daily

! And other days

09-5250.00 YUMA MAIN CANAL WASTEWAY TO COLORADO RIVER AT YUMA, ARIZONA

DESCRIPTION: The wasteway receives water from the Yuma Main Canal at the check structure on the canal, 501 meters upstream from the intake of the Colorado River siphon, and 5.1 kilometers downstream from the Siphon Drop Power Plant. This wasteway discharges into the Colorado River on the California side, 305 meters upstream from Colorado River below Yuma Main Canal Wasteway, and 10.5 kilometers upstream from the northerly international land boundary.

RECORDS: Discharge is computed as the difference between the measured discharge of the Yuma Main Canal at the Siphon Drop Power Plant upstream and that of the same canal below the Colorado River siphon, with deductions for small irrigation diversions from the canal between the two gaging stations. Records obtained and furnished by U. S. Geological Survey. Records available: April 1913 through 1993.

REMARKS: The wasteway discharges to the river the flow in excess of irrigation water in the Yuma Main Canal.

EXTREMES: Prior to 1935, when storage began in Lake Mead: Average annual flow, 367,333 TCM; maximum annual flow, 1,127,040 TCM, 1932; minimum annual flow, 141,728 TCM, 1917. Since 1935: Maximum mean daily discharge, 57.2 CMS, December 24-25, December 24-25, 1948; minimum mean daily discharge, no flow on numerous occasions.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.31	3.31	2.18	1.78	1.44	0.62	0.28	1.87	0.96	1.53	2.63	9.74
2	15.0	2.07	1.50	1.59	2.21	.48	.42	1.05	1.05	1.36	1.42	9.49
3	23.4	2.78	1.67	1.33	1.13	.37	1.27	.99	1.56	1.28	.96	9.83
4	5.58	3.09	2.92	1.76	.31	.82	1.73	.76	1.56	.14	.54	9.49
5	6.00	3.17	3.79	1.67	.28	1.44	1.67	.74	1.36	2.80	.57	10.1
6	6.26	2.52	1.61	1.44	.28	1.16	1.33	1.05	1.19	3.03	.88	9.86
7	6.43	3.74	2.52	1.02	.28	.88	.76	1.25	1.27	.59	1.90	8.61
8	6.66	5.89	1.81	1.13	.45	1.53	.91	1.67	1.81	.62	1.84	17.2
9	6.60	7.25	.99	1.47	.88	1.30	1.27	1.42	1.73	.54	1.36	23.2
10	6.74	8.58	.28	2.04	.85	.76	1.25	.93	1.42	.34	1.61	18.8
11	14.1	4.87	2.66	2.12	.54	.28	1.22	.76	1.13	.76	1.16	18.5
12	28.9	2.95	1.87	1.73	.42	.79	.96	.76	1.22	.93	1.25	17.1
13	20.6	2.66	1.59	1.47	.28	1.33	.45	1.56	1.16	1.10	1.61	16.5
14	12.8	3.43	1.76	1.30	.62	.99	.71	1.50	1.05	1.47	1.61	22.4
15	15.6	4.02	.28	1.36	1.59	.71	.28	1.70	.28	2.49	3.51	24.8
16	15.0	2.92	.28	.93	1.87	.71	.91	1.27	1.16	1.61	18.9	24.9
17	16.6	3.51	.28	1.50	1.56	.62	1.33	1.27	1.67	1.02	10.7	25.5
18	18.2	2.75	.28	1.95	1.59	.82	.28	1.33	1.95	.76	3.74	25.2
19	20.9	5.30	.28	1.39	.28	.93	.28	1.47	2.27	.57	1.08	25.7
20	8.81	7.16	.28	.82	.68	1.64	.28	1.33	1.39	.34	.28	15.0
21	6.34	6.94	1.19	1.19	1.05	.93	.28	1.25	.71	.42	.65	20.1
22	3.34	6.15	3.03	.28	.82	.54	1.95	1.16	.42	.40	1.16	22.7
23	8.18	3.46	1.87	.28	1.59	.65	.88	.99	.79	.37	1.64	12.8
24	6.66	1.87	.99	.28	1.05	.48	1.36	1.08	1.13	.48	3.12	29.5
25	4.90	1.50	.76	1.05	1.16	.40	1.78	1.02	1.05	.99	15.5	28.0
26	4.59	2.01	1.30	.99	1.02	.99	.28	1.22	1.30	1.61	9.83	29.5
27	3.17	3.03	2.58	.48	.31	1.67	1.36	1.42	1.53	.79	10.1	30.0
28	3.88	3.20	1.05	.28	.76	1.22	.88	1.16	1.81	.79	10.1	17.8
29	4.08	.79	.34	1.33	.59	.93	.93	1.25	2.35	.79	9.66	2.24
30	3.85	.96	.74	1.53	.28	1.53	.28	1.61	.28	1.25	9.71	2.21
31	4.42		1.81	.93	.93		1.67	1.13	1.95	1.95		9.18
Sum	314.90	110.13	45.16	35.71	29.09	25.93	30.57	36.64	39.87	32.12	129.02	545.95
Current Year 1993										Period 1935-1993		
Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.			12	28.9	27	3.17	10.2	27,207	55,304	136,546	550	
Feb.			10	8.58	25	1.50	3.93	9,515	47,387	109,952	444	
Mar.			5	3.79	110	.28	1.46	3,902	47,014	111,248	440	
April			11	2.12	122	.28	1.19	3,085	46,931	106,795	402	
May			2	2.21	115	.28	.94	2,513	55,780	108,892	411	
June			27	1.67	111	.28	.86	2,240	49,229	107,263	422	
July			22	1.95	11	.28	.99	2,641	45,905	112,518	455	
Aug.			1	1.87	30	.28	1.18	3,166	46,993	110,878	455	
Sept.			29	2.35	15	.28	1.33	3,445	51,726	103,193	440	
Oct.			6	3.03	4	.14	1.04	2,775	47,412	111,075	699	
Nov.			16	18.9	20	.28	4.30	11,147	47,802	125,198	882	
Dec.			27	30.0	30	2.21	17.6	47,170	54,790	134,203	570	
Yearly				30.0		0.14	3.77	118,806	596,273	1,286,335	8,226	

‡ Mean daily

! And other days

09-5211.00 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY  
AT YUMA, ARIZONA - DISCHARGES

DESCRIPTION: Water-stage recorder located in California on the right bank of the river, 305 meters downstream from the mouth of the Yuma Main Canal Wasteway, 1.0 kilometers downstream from the abandoned gaging station on the Colorado River at Yuma, 8.4 kilometers downstream from the mouth of the Gila River, 31.5 kilometers downstream from Imperial Dam, and 10.3 kilometers upstream from the northerly international boundary. Zero of the gage is 31.09 meters above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by U. S. Geological Survey. Records available: October 1963 through 1993. Records from January 1951 through September 1963 deduced from "Colorado River at Yuma" plus flows from "Reservation Main Drain No. 4" and "Yuma Main Canal Wasteway."

REMARKS: Reservoirs on the Colorado River, power developments, transmountain diversions, reservoirs on the Gila River, irrigation diversions, and return flows modify the river flow at this station.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	48.4	271	357	527	273	139	146	71.6	71.9	94.3	90.3	68.0
2	46.2	289	422	518	270	139	149	71.4	75.6	101	87.8	69.1
3	46.2	276	552	527	264	138	145	74.8	81.0	91.8	85.8	72.8
4	54.7	263	700	518	264	137	130	73.6	68.5	87.2	86.1	70.2
5	27.8	256	702	513	265	141	120	73.6	71.4	88.9	86.7	59.5
6	23.8	251	700	518	265	146	114	72.2	60.6	94.0	89.5	49.3
7	23.5	251	697	515	267	132	106	71.9	68.5	93.2	96.0	43.0
8	23.1	255	688	527	267	132	98.3	72.2	71.4	93.2	96.3	50.4
9	22.2	272	666	530	267	142	87.5	71.6	73.9	92.3	91.2	61.5
10	21.5	297	657	527	266	146	79.0	71.6	74.5	90.1	87.8	53.8
11	37.9	309	668	521	265	150	78.2	74.2	73.3	89.2	88.1	71.6
12	43.6	295	680	496	264	152	80.4	79.3	73.3	91.5	83.0	91.5
13	42.2	292	671	459	262	153	80.1	76.7	72.5	96.6	80.4	53.2
14	45.0	300	688	419	261	149	79.9	74.5	71.9	96.3	86.1	53.5
15	55.2	306	677	382	264	155	78.2	73.1	71.6	93.2	120	53.8
16	64.9	314	660	371	264	150	76.5	72.2	71.9	97.7	147	53.0
17	77.3	343	654	371	264	140	77.9	72.5	74.8	94.0	105	53.5
18	89.2	329	632	374	264	137	79.9	78.2	77.0	92.3	86.7	53.5
19	106	343	626	374	264	134	72.8	63.4	76.2	87.8	84.7	55.5
20	99.4	343	609	377	265	132	73.9	71.6	75.3	85.2	83.8	60.0
21	103	334	592	374	263	131	79.0	68.0	74.2	93.5	83.0	56.9
22	110	329	566	377	258	129	80.1	69.1	73.1	96.6	81.0	50.7
23	121	329	547	379	260	130	78.2	72.5	78.2	93.5	77.6	33.4
24	135	337	541	382	256	131	83.5	67.4	86.9	90.1	74.8	61.5
25	153	323	532	385	244	137	86.4	70.5	88.6	88.4	83.0	60.0
26	172	300	524	374	196	142	83.0	77.9	90.1	87.2	62.3	60.6
27	184	306	527	362	261	146	78.4	81.0	90.1	83.8	63.7	60.3
28	201	334	530	346	253	144	75.6	74.2	91.5	81.8	66.0	45.9
29	220		524	317	214	142	79.0	69.4	90.3	82.4	64.6	22.3
30	242		524	295	159	143	78.2	75.9	94.6	83.8	68.8	20.6
31	257		527		143		75.6	68.3		85.5		26.6
Sum	2,896.1	8,447	18,640	12,955	7,812	4,219	2,829.6	2,254.4	2,312.7	2,816.4	2,587.1	1,695.5

Current Year 1993

Period 1951-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	4.970	2.440	30	306	10	13.8	93.4	250,223	290,064	1,317,479	36,828
Feb.	5.440	4.600	17	450	1	248	302	729,821	231,813	1,228,424	41,679
Mar.	6.950	5.155	4	725	1	300	691	1,610,496	258,366	1,610,496	42,683
April	5.935	5.125	8	538	30	278	432	1,119,312	232,492	1,119,312	41,552
May	5.315	4.610	1	281	31	137	252	674,957	232,028	1,065,554	56,582
June	4.835	4.615	1	144	7	123	141	364,522	227,714	1,113,679	41,761
July	4.760	4.390	2	149	19	69.7	91.3	244,477	258,889	2,013,773	42,448
Aug.	4.735	4.480	27	83.8	19	58.9	72.7	194,780	264,102	2,073,958	41,457
Sept.	4.805	4.510	30	98.3	6	56.1	77.1	199,817	234,885	1,669,758	53,264
Oct.	4.870	4.650	2	109	28	79.6	90.9	243,337	202,452	1,789,911	43,129
Nov.	4.840	4.325	16	168	26	58.9	86.2	223,525	204,737	1,292,035	42,965
Dec.	4.580	3.820	12	105	30	19.1	54.7	146,491	237,905	1,374,775	40,733
Yearly	6.950	2.440		725		13.8	190	6,001,758	2,875,447	13,065,596	633,707

1 And other days

09-5211.01 COLORADO RIVER BELOW YUMA MAIN CANAL WASTEWAY  
AT YUMA, ARIZONA - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METERS 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.045	4.820	5.280	5.815	5.110	4.650	4.745	4.560	4.655	4.780	4.740	4.390
2	3.010	4.875	5.590	5.800	5.110	4.655	4.760	4.570	4.675	4.825	4.725	4.395
3	3.010	4.795	6.185	5.845	5.085	4.665	4.745	4.595	4.705	4.775	4.705	4.415
4	3.125	4.710	6.830	5.830	5.080	4.665	4.680	4.585	4.615	4.750	4.705	4.390
5	2.715	4.665	6.845	5.815	5.080	4.695	4.635	4.585	4.635	4.755	4.710	4.305
6	2.655	4.630	6.830	5.830	5.075	4.725	4.610	4.580	4.550	4.780	4.725	4.215
7	2.650	4.615	6.810	5.810	5.090	4.675	4.565	4.580	4.600	4.765	4.770	4.155
8	2.645	4.630	6.770	5.865	5.095	4.690	4.525	4.580	4.620	4.760	4.770	4.215
9	2.635	4.710	6.675	5.890	5.095	4.745	4.465	4.570	4.630	4.750	4.735	4.310
10	2.615	4.870	6.640	5.905	5.100	4.770	4.415	4.575	4.630	4.730	4.700	4.245
11	2.905	4.950	6.675	5.910	5.110	4.785	4.415	4.590	4.620	4.720	4.705	4.375
12	3.005	4.870	6.685	5.830	5.120	4.790	4.435	4.625	4.610	4.725	4.665	4.500
13	2.985	4.840	6.620	5.705	5.120	4.790	4.445	4.610	4.600	4.750	4.640	4.235
14	3.040	4.890	6.650	5.575	5.120	4.780	4.460	4.595	4.595	4.745	4.675	4.240
15	3.205	4.940	6.575	5.440	5.130	4.800	4.460	4.585	4.595	4.720	4.740	4.240
16	3.355	4.985	6.515	5.385	5.120	4.780	4.465	4.580	4.600	4.740	4.755	4.230
17	3.535	5.085	6.515	5.385	5.125	4.735	4.485	4.580	4.625	4.710	4.565	4.235
18	3.695	5.040	6.450	5.400	5.135	4.720	4.510	4.620	4.640	4.695	4.465	4.235
19	3.900	5.100	6.435	5.400	5.150	4.705	4.475	4.515	4.640	4.675	4.460	4.250
20	3.825	5.110	6.375	5.440	5.170	4.695	4.495	4.575	4.635	4.660	4.460	4.290
21	3.865	5.085	6.310	5.460	5.190	4.690	4.540	4.550	4.630	4.715	4.460	4.260
22	3.945	5.050	6.190	5.500	5.200	4.675	4.555	4.555	4.625	4.735	4.455	4.190
23	4.065	5.055	6.055	5.515	5.245	4.680	4.555	4.580	4.660	4.720	4.440	4.010
24	4.215	5.095	5.980	5.540	5.250	4.690	4.585	4.545	4.720	4.705	4.425	4.295
25	4.370	5.025	5.900	5.565	5.180	4.710	4.610	4.565	4.735	4.700	4.485	4.280
26	4.470	4.885	5.845	5.530	4.880	4.735	4.585	4.615	4.745	4.695	4.350	4.285
27	4.520	4.925	5.835	5.505	5.265	4.750	4.560	4.640	4.750	4.680	4.365	4.280
28	4.580	5.070	5.830	5.450	5.220	4.740	4.545	4.625	4.760	4.670	4.385	4.135
29	4.640		5.790	5.320	5.010	4.735	4.565	4.620	4.755	4.675	4.375	3.875
30	4.725		5.785	5.210	4.710	4.735	4.575	4.690	4.780	4.690	4.400	3.845
31	4.775		5.810		4.645		4.570	4.635		4.705		3.920
Avg.	3.540	4.905	6.300	5.615	5.095	4.720	4.550	4.590	4.655	4.725	4.585	4.235

09-5302.00 YUMA MESA OUTLET DRAIN  
TO COLORADO RIVER NEAR YUMA, ARIZONA

DESCRIPTION: Venturi meter with recorder 0.5 kilometer from outlet to Colorado River, 0.8 kilometer west of Joe Henry Memorial Park in Yuma, Arizona. Outlet is 2.7 kilometers downstream from the mouth of Yuma Main Canal Wasteway.  
RECORDS: Records are furnished by U. S. Geological Survey. Records available: July 1970 through 1993. Prior to July 21, 1972, records furnished by U. S. Bureau of Reclamation.  
REMARKS: Records show water pumped from wells on the Yuma Mesa and conveyed by underground conduit to Colorado River.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.68	1.13	1.13	1.33	1.36	1.36	1.36	1.36	0.57	0.93	0.79	0.37
2	.68	1.02	1.02	1.33	1.36	1.36	1.36	1.36	.57	.93	.79	.37
3	.68	.96	.96	1.33	1.36	1.36	1.36	1.36	.57	.93	.79	.37
4	.68	.91	.91	1.33	1.36	1.36	1.36	1.36	.57	.74	.79	.37
5	.68	.82	.82	1.33	1.36	1.36	1.36	1.36	.57	.62	.79	.37
6	.68	.82	.82	1.33	1.36	1.36	1.36	1.36	.57	.62	.79	.37
7	.68	.82	.82	1.33	1.22	1.27	1.36	1.36	.57	.62	.79	.37
8	.68	.82	.82	1.33	1.13	1.33	1.36	1.36	.57	.62	.79	.42
9	.68	.82	.82	1.33	1.13	1.36	1.36	1.36	.57	.62	.65	.40
10	.68	.82	1.10	1.33	1.13	1.36	1.36	1.36	.57	.62	.62	.37
11	.68	.82	1.25	1.33	1.13	1.36	1.36	1.05	.57	.62	.62	.37
12	.68	.82	1.25	1.33	1.10	1.36	1.36	.82	.57	.74	.62	.37
13	.68	.82	1.25	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.45
14	.74	.82	1.25	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.48
15	.82	.82	1.25	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.48
16	.82	.82	1.08	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.48
17	.82	.82	.82	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.48
18	.82	.82	1.10	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.48
19	.82	.82	1.33	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.48
20	.82	.82	1.33	1.33	1.16	1.36	1.36	.82	.57	.79	.62	.48
21	.82	.82	1.33	.96	1.16	1.36	1.36	.82	.45	.79	.62	.48
22	.82	.82	1.33	.54	1.16	1.36	1.36	.82	.40	.79	.62	.48
23	.82	.82	1.33	.54	1.16	1.36	1.36	.82	.45	.79	.62	.48
24	.82	1.02	1.33	.54	1.16	1.36	1.36	.82	.51	.79	.62	.48
25	.82	1.10	1.33	.54	1.25	1.36	1.36	.82	.51	.79	.62	.48
26	.82	1.10	1.33	.96	1.36	1.36	1.36	.82	.51	.79	.62	.48
27	.88	1.10	1.33	1.33	1.36	1.36	1.36	.82	.59	.79	.62	.59
28	1.05	1.10	1.33	1.33	1.36	1.36	1.36	.82	.62	.79	.62	.62
29	1.13		1.33	1.33	1.36	1.36	1.36	.82	.71	.79	.62	.62
30	1.13		1.33	1.33	1.36	1.36	1.36	.74	.82	.79	.62	.62
31	1.13		1.33		1.36		1.36	.57		.79	.62	.62
Sum	24.74	25.02	35.76	36.00	38.33	40.68	42.16	30.72	16.97	23.62	18.07	14.28
Current Year 1993										Period 1971-1993		
Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume- Thousand Cubic Meters				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.			129	1.13	1	0.68	0.80	2,138	2,794	7,204	0	
Feb.			1	1.13	1	.82	.89	2,162	2,691	5,958	0	
Mar.			119	1.33	1	.82	1.15	3,090	3,093	6,698	4.9	
April			1	1.33	122	.54	1.20	3,110	2,954	6,315	299	
May			1	1.36	12	1.10	1.24	3,312	2,907	6,085	0	
June			1	1.36	7	1.27	1.36	3,915	2,654	5,955	0	
July			1	1.36	1	1.36	1.36	3,643	2,936	6,796	854	
Aug.			1	1.36	31	.57	.99	2,654	3,080	7,401	222	
Sept.			30	.82	22	.40	.57	1,466	3,088	7,253	0	
Oct.			1	.93	1	.62	.76	2,041	3,076	6,611	194	
Nov.			1	.79	124	.37	.60	1,561	3,098	6,525	386	
Dec.			128	.62	1	.37	.46	1,234	3,277	7,364	0	
Yearly				1.36		0.37	0.95	29,926	35,648	72,381	2,162	

‡ Mean daily

! And other days

09-5305.00 DRAIN NO. 8-B (ARAZ DRAIN)

DESCRIPTION: This drain discharges into the Colorado River 6.4 kilometers downstream from Colorado River below Yuma Main Canal Wasteway, and 4.0 kilometers upstream from the northerly international boundary. Prior to October 1955, published as "Araz Drain."

RECORDS: Records are furnished by the U. S. Geological Survey from current meter measurements during the year. Records available: May 1948 through 1993.

REMARKS: Drain 8-B, which was constructed in February 1948, collects seepage water in the westerly section of the Reservation Division of the Yuma Project which lies in California. Flow in the drain between the mouth and the U. S. Highway No. 80 culvert, about 975 meters upstream, is affected by backwater from the river during ordinary high stages.

EXTREMES: Mean daily discharge: Maximum, 0.76 CMS on November 12, 1992; minimum no flow several days in February 1966.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.37	0.25	0.09	0.23	0.28	0.28	0.22	0.20	0.23	0.51	0.40	0.42
2	.37	.26	.08	.23	.28	.31	.22	.21	.24	.54	.45	.42
3	.37	.27	.22	.23	.27	.31	.22	.21	.24	.59	.42	.42
4	.37	.23	.37	.22	.27	.31	.22	.21	.24	.62	.42	.40
5	.37	.22	.37	.22	.27	.27	.22	.22	.24	.59	.42	.40
6	.37	.22	.34	.22	.27	.25	.23	.22	.24	.57	.40	.40
7	.40	.22	.34	.22	.27	.23	.23	.23	.24	.51	.40	.37
8	.40	.22	.34	.22	.27	.22	.23	.23	.23	.48	.40	.37
9	.40	.22	.34	.22	.28	.22	.23	.24	.23	.45	.37	.37
10	.40	.22	.31	.23	.28	.22	.23	.24	.23	.42	.37	.37
11	.40	.22	.31	.23	.28	.22	.22	.25	.23	.40	.37	.34
12	.21	.22	.31	.23	.27	.22	.22	.25	.23	.40	.37	.34
13	.21	.22	.31	.24	.27	.22	.22	.25	.23	.37	.37	.34
14	.21	.22	.28	.24	.27	.22	.22	.26	.24	.37	.34	.34
15	.21	.22	.28	.24	.26	.22	.21	.26	.25	.37	.34	.34
16	.21	.22	.28	.25	.26	.22	.21	.27	.27	.34	.34	.34
17	.21	.21	.28	.25	.25	.22	.22	.27	.28	.34	.34	.31
18	.20	.20	.27	.25	.25	.22	.20	.28	.31	.31	.34	.31
19	.20	.19	.27	.26	.25	.22	.20	.27	.31	.31	.34	.31
20	.20	.18	.27	.26	.24	.22	.20	.27	.34	.31	.31	.31
21	.20	.17	.27	.27	.24	.22	.20	.27	.34	.28	.31	.31
22	.20	.16	.26	.27	.24	.22	.20	.26	.37	.28	.31	.31
23	.20	.15	.26	.28	.23	.22	.20	.26	.37	.27	.31	.28
24	.20	.14	.26	.28	.23	.21	.20	.25	.40	.26	.31	.28
25	.20	.13	.25	.28	.22	.22	.20	.25	.40	.25	.31	.28
26	.21	.12	.25	.28	.22	.22	.20	.25	.42	.24	.34	.28
27	.22	.11	.25	.28	.21	.22	.20	.24	.42	.24	.34	.28
28	.22	.10	.24	.31	.23	.22	.20	.24	.45	.22	.37	.28
29	.23	.24	.31	.24	.24	.22	.20	.24	.45	.27	.37	.27
30	.24	.24	.28	.26	.26	.22	.20	.23	.48	.31	.40	.27
31	.25	.24	.24	.27	.27	.20	.20	.23	.34	.34	.27	.27
Sum	8.45	5.51	8.42	7.53	7.93	7.01	6.55	7.56	9.15	11.76	10.88	10.33

Current Year 1993

Period 1948-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	Cubic Meters per Second		Total		Average	Maximum	Minimum		
				Day	Low							
Jan.			1	7	0.40	118	0.20	0.27	730	447	1,109	48.5
Feb.			3	3	.27	28	.10	.20	476	383	920	50.0
Mar.			1	4	.37	2	.08	.27	727	451	1,052	77.3
April			1	28	.31	1	.22	.25	651	453	1,233	82.4
May			1	1	.28	27	.21	.26	685	476	1,192	71.9
June			1	2	.31	24	.21	.23	606	489	1,270	83.1
July			1	6	.23	117	.20	.21	566	557	1,554	89.8
Aug.			1	18	.28	1	.20	.24	653	616	1,665	91.0
Sept.			3	0	.48	1	.23	.31	791	616	1,690	66.1
Oct.			4	4	.62	28	.22	.38	1,016	664	1,505	68.2
Nov.			2	2	.45	120	.31	.36	940	616	1,530	71.2
Dec.			1	1	.42	129	.27	.33	893	530	12,295	52.1
Yearly					0.62		0.08	0.28	8,734	6,298	15,331	955

♦ Mean daily

! And other days

09-5270.00 PILOT KNOB POWER PLANT AND WASTEWAY  
NEAR PILOT KNOB, CALIFORNIA

DESCRIPTION: The Pilot Knob Power Plant and Wasteway is located on the All-American Canal, 33.5 kilometers downstream from the intake at Imperial Dam, 9.7 kilometers west of Yuma, about 1.6 kilometers north of the northerly international boundary and empties into the old Alamo Canal in the United States and thence into the Colorado River through Rockwood gates, about 1.6 kilometers upstream from the northerly international boundary. Water-stage recorder is located in forebay on right bank of the All-American Canal, 168 meters upstream from wasteway gates and 549 meters from the entrance to the power plant. Datum of gage is 45.72 meters above mean sea level. Tailrace gage is on left bank, 207 meters downstream from power plant with automatic recording equipment in control house. All bypass gates are equipped with calibrated openings which are read on all gate changes. Datum of tailrace gage is at mean sea level; elevation of sill of wasteway gates is 45.07 meters, U. S. C. & G. S. datum. Prior to October 1956, this station was published as "Pilot Knob Wasteway near Pilot Knob, California."

RECORDS: Daily discharge is computed from flowmeter equipment and head and openings on wasteway gates or from head and gate opening on wicket and wasteway gates. Records furnished by the U. S. Geological Survey. Records available: July 1944 through 1993. The wasteway was operated for the purpose of diverting Colorado River water to the Alamo Canal for use in Mexico from July 1944 to November 8, 1950 in accordance with arrangements between the United States and Mexico for emergency use of the All-American Canal facilities. Records since 1950 show water released through Pilot Knob Power Plant and Wasteway from the All-American Canal and returned to the Colorado River through Rockwood gates.

REMARKS: Pilot Knob Wasteway was completed in 1938, and the first flow occurred on February 5, 1939. Pilot Knob Power Plant was completed in January 1957, and the first flow occurred on January 14, 1957.

EXTREMES: Maximum mean daily discharge, 281 CMS on October 6, 1985; minimum daily discharge, no flow during long periods.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	51.3
2	0	0	0	0	0	0	0	0	0	0	0	41.9
3	0	0	0	0	0	0	0	0	0	0	0	45.9
4	12.0	0	0	0	0	0	0	0	0	0	0	51.3
5	32.0	0	0	0	0	0	0	0	0	0	0	36.8
6	71.4	0	0	0	0	0	0	0	0	0	0	28.3
7	73.3	0	0	0	0	0	0	0	0	0	0	28.3
8	34.6	0	0	0	0	0	0	0	0	0	0	14.8
9	26.8	0	0	0	0	0	0	0	0	0	0	0
10	24.2	23.0	0	0	0	0	0	0	0	0	0	0
11	10.5	13.0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	13.9	0	0	0	0	0	0	0	0	0	0	0
14	29.5	0	0	0	0	0	0	0	0	0	0	0
15	28.3	0	0	0	0	0	0	0	0	0	9.71	0
16	28.3	0	0	0	0	0	0	0	0	0	32.9	0
17	28.2	0	0	0	0	0	0	0	0	0	21.1	0
18	28.1	0	0	0	0	0	0	0	0	0	0	0
19	28.3	0	0	0	0	0	0	0	0	0	0	0
20	28.3	0	0	0	0	0	0	0	0	0	0	0
21	28.3	0	0	0	0	0	0	0	0	0	0	0
22	29.5	0	0	0	0	0	0	0	0	0	0	3.71
23	28.3	14.7	0	0	0	0	0	0	0	0	0	21.9
24	11.2	28.2	0	0	0	0	0	0	0	0	0	0
25	28.2	11.2	0	0	0	0	0	0	0	0	0	0
26	4.11	0	0	0	0	0	0	0	0	0	28.2	0
27	0	0	0	0	0	0	0	0	0	0	29.2	0
28	0	0	0	0	0	0	0	0	0	0	43.3	8.75
29	0	0	0	0	0	0	0	0	0	0	59.5	27.4
30	0	0	0	0	0	0	0	0	0	0	58.6	27.8
31	0	0	0	0	0	0	0	0	0	0	0	23.6
Sum	627.31	90.1	0	0	0	0	0	0	0	0	282.51	411.76

Current Year 1993

Period 1944-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	# High	Day	# Low		Total	Average	Maximum	Minimum
Jan.			7	73.3	1	0	20.2	54,200	105,617	643,620	0
Feb.			24	28.2	1	0	3.22	7,785	77,843	279,127	0
Mar.			1	0	1	0	0	0	140,939	501,939	0
April			1	0	1	0	0	0	155,437	447,013	0
May			1	0	1	0	0	0	72,797	454,461	0
June			1	0	1	0	0	0	117,044	501,523	0
July			1	0	1	0	0	0	170,098	512,385	0
Aug.			1	0	1	0	0	0	171,465	498,782	0
Sept.			1	0	1	0	0	0	98,327	591,679	0
Oct.			1	0	1	0	0	0	70,468	617,269	0
Nov.			29	59.5	1	0	9.42	24,409	67,365	609,196	0
Dec.			1	51.3	1	0	13.3	35,576	106,993	700,894	0
Yearly				73.3		0	3.87	121,970	1,354,393	6,000,505	0

# Mean daily

! And other days

09-5220.00 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

**DESCRIPTION:** Water-stage recorder on the left (Arizona) bank and cableway at the point where the northerly international land boundary (California-Baja California) intersects the Colorado River, about 10.3 kilometers downstream from Colorado River below Yuma Main Canal Wasteway, 8.0 kilometers west of Yuma, Arizona, 1.8 kilometers upstream from Morelos Diversion Structure, and about 1.6 kilometers downstream from Rockwood Gate. Zero of the gage is at mean sea level, U. S. C. & G. S. datum. On May 1, 1988, the gage was relocated 52 meters upstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is equal to that of the old gage. Station is operated by the United States Section of the Commission.

**RECORDS:** Based on 156 current meter measurements during the year, 86 by the United States Section, 68 by the Mexican Section of the Commission, 2 by the U. S. Geological Survey, and a continuous record of gage heights. Discharges are computed on the basis of a water-stage recorder 512 meters upstream from the northerly international boundary where the remains of an old weir serve as a partial controlling section. A continuous gage height record is available November 15, 1948 through 1993; daily discharge records available January 1, 1950 through 1993.

**REMARKS:** Reservoirs on the Colorado River, including Lake Mead above Hoover Dam, where storage began in 1935, reservoirs on the Gila River, and many irrigation diversions and return flows regulate the river flow at this station except for infrequent flood flows. During 1993 the flow at this point represented the total amount of the Colorado River water which crossed the northerly international boundary.

**EXTREMES:** Prior to January 1935: Maximum instantaneous discharge estimated about 7,080 CMS, January 22, 1916; minimum discharge, no flow several days during August and September 1934; average annual flow 16,581,806 TCM; maximum annual flow 31,429,325 TCM, 1907; minimum annual flow 1,448,117 TCM, 1934. Since January 1935: Maximum instantaneous discharge 1,150 CMS on August 20, 1983, minimum discharge, no flow during April 1935.

**SPECIAL NOTE:** During 1993, a major flood occurred on the Gila River watershed. This resulted in 5,831,986 TCM of Gila River flood waters arriving to the Colorado River system below Laguna Dam.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	56.4	274	374	554	284	150	145	75.3	81.9	89.6	92.2	119
2	53.8	284	426	545	277	146	149	75.8	80.7	94.6	88.9	114
3	52.6	284	537	542	270	142	151	78.3	84.6	91.6	88.3	115
4	67.4	264	672	534	265	142	145	77.4	74.9	91.5	88.2	114
5	66.9	250	702	529	260	148	142	76.6	77.8	89.7	87.5	99.5
6	82.9	245	700	527	261	156	137	75.2	69.4	91.8	87.5	85.6
7	93.1	238	709	520	264	157	120	74.9	74.7	92.3	90.8	86.7
8	69.2	250	694	524	265	155	106	74.7	78.3	93.7	95.8	76.0
9	56.2	271	676	524	266	151	98.6	73.1	79.9	94.4	96.7	58.1
10	52.9	317	673	523	270	152	91.7	72.8	80.0	91.8	97.5	55.0
11	55.1	321	688	522	269	153	87.2	74.4	79.2	91.7	98.5	67.8
12	56.6	290	691	501	270	150	86.4	78.2	77.8	92.8	97.6	86.2
13	64.2	283	680	469	270	148	85.8	78.4	78.7	92.0	95.7	55.0
14	87.1	296	681	435	270	150	85.2	79.2	77.2	91.7	92.8	53.0
15	91.8	305	681	403	267	144	82.9	78.7	75.3	91.1	108	54.5
16	95.7	313	670	397	267	140	81.7	78.2	76.3	95.0	166	54.0
17	99.8	313	663	396	269	138	82.0	79.0	79.6	94.6	140	53.9
18	112	308	651	390	270	134	82.4	81.9	82.7	93.4	106	54.8
19	135	322	634	379	273	134	82.7	71.3	82.8	92.6	100	54.9
20	136	335	626	385	276	138	83.3	79.0	82.6	91.9	96.0	59.5
21	138	335	612	386	271	144	84.1	76.3	83.9	91.6	94.8	56.3
22	149	326	587	388	266	148	79.8	74.9	78.6	92.8	93.2	53.6
23	155	335	561	390	266	149	78.0	78.7	82.0	94.4	88.7	65.1
24	149	353	544	386	264	150	75.7	75.0	87.1	94.2	85.9	58.4
25	183	336	534	384	244	149	73.8	75.0	86.7	95.0	90.9	57.8
26	179	299	542	376	175	149	72.1	79.6	86.1	94.1	99.2	58.2
27	191	303	562	367	257	148	73.2	81.7	87.7	89.0	102	58.8
28	209	333	564	350	247	145	75.0	80.1	89.4	87.5	113	59.1
29	224	559	559	328	199	146	76.3	78.7	88.4	88.0	124	60.1
30	241	558	558	304	161	146	78.2	88.2	90.4	92.8	126	60.2
31	259	558	558	304	155	146	77.2	82.5	90.4	93.4	124	61.0
Sum	3,661.7	8,383	19,009	13,258	7,888	4,402	2,968.3	2,403.1	2,434.7	2,860.6	3,027.7	2,165.1

Current Year 1993

Period 1935-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	33,940	31,835	31	263	11	46.7	118	316,371	514,540	2,027,841	39,348
Feb.	34,185	33,485	24	356	7	236	299	724,291	432,542	1,705,506	74,502
Mar.	35,470	34,145	7	713	1	350	613	1,642,378	468,053	1,642,378	23,950
April	34,960	34,260	1	562	30	288	442	1,145,491	387,876	1,322,616	0
May	34,325	33,520	1	288	31	154	254	681,523	371,427	1,419,735	88,077
June	33,575	33,395	6	161	118	133	147	380,333	371,287	1,629,906	10,485
July	33,525	33,070	3	153	26	70.8	95.8	256,461	394,553	2,303,937	30,097
Aug.	33,250	33,030	30	93.5	19	67.5	77.5	207,628	407,968	2,485,718	54,026
Sept.	33,285	33,060	30	91.6	6	64.6	81.2	210,358	354,192	2,286,076	66,424
Oct.	33,425	33,275	2	99.6	29	86.7	92.3	247,156	343,638	2,417,702	52,985
Nov.	33,635	33,215	16	177	24	81.4	101	261,593	384,638	1,889,976	51,070
Dec.	33,410	32,795	1	122	22	38.0	69.8	187,065	484,532	2,259,735	51,806
Yearly	35,470	31,835		713		38.0	199	6,260,648	4,919,246	19,033,104	890,696

! And other days

## 09-5220.01 COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page For Description)

## MEAN DAILY GAGE HEIGHT IN METERS 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.420	33.825	34.060	34.540	34.015	33.405	33.345	32.965	33.025	33.130	33.300	33.185
2	31.350	33.840	34.350	34.495	34.005	33.335	33.355	32.965	33.015	33.170	33.280	33.170
3	31.365	33.795	34.855	34.490	34.020	33.320	33.355	32.980	33.035	33.145	33.280	33.195
4	31.640	33.615	35.270	34.505	34.050	33.310	33.320	32.970	32.980	33.145	33.285	33.195
5	31.665	33.445	35.235	34.520	34.060	33.300	33.285	32.960	33.005	33.130	33.285	33.150
6	32.070	33.405	35.200	34.510	34.045	33.330	33.260	32.950	32.965	33.155	33.285	33.105
7	32.435	33.315	35.215	34.480	34.075	33.350	33.205	32.945	32.985	33.160	33.300	33.105
8	31.780	33.405	35.135	34.500	34.090	33.365	33.175	32.940	33.000	33.170	33.325	33.020
9	31.445	33.575	35.080	34.615	34.100	33.365	33.130	32.930	33.010	33.170	33.310	32.870
10	31.350	33.850	35.100	34.605	34.115	33.380	33.075	32.930	33.010	33.155	33.290	32.850
11	31.435	33.865	35.160	34.505	34.120	33.390	33.060	32.950	33.010	33.155	33.285	32.970
12	31.630	33.655	35.170	34.510	34.145	33.375	33.055	32.975	33.005	33.170	33.280	33.130
13	31.760	33.605	35.115	34.560	34.155	33.375	33.035	32.975	33.010	33.175	33.270	32.875
14	32.310	33.685	35.135	34.520	34.155	33.390	33.015	32.975	33.000	33.180	33.240	32.850
15	32.415	33.745	35.130	34.345	34.140	33.345	32.990	32.965	32.990	33.175	33.310	32.865
16	32.500	33.800	35.075	34.310	34.155	33.325	32.960	32.960	33.000	33.195	33.390	32.850
17	32.590	33.805	35.045	34.300	34.160	33.315	32.935	32.960	33.015	33.190	33.270	32.855
18	32.740	33.780	35.020	34.310	34.165	33.275	32.935	32.975	33.030	33.185	33.135	32.865
19	32.940	33.825	34.960	34.300	34.185	33.265	32.920	32.920	33.030	33.180	33.105	32.865
20	32.895	33.865	34.930	34.345	34.210	33.270	32.925	32.960	33.030	33.170	33.105	32.900
21	32.975	33.865	34.870	34.365	34.170	33.280	32.935	32.945	33.040	33.170	33.115	32.875
22	33.055	33.820	34.770	34.400	34.130	33.280	32.930	32.945	33.035	33.170	33.120	32.860
23	33.100	33.870	34.670	34.415	34.135	33.295	32.935	32.960	33.060	33.115	33.115	32.950
24	33.050	33.990	34.630	34.405	34.120	33.320	32.930	32.950	33.090	33.115	33.105	32.890
25	33.325	33.880	34.575	34.395	34.055	33.340	32.930	32.965	33.090	33.125	33.130	32.890
26	33.295	33.620	34.605	34.365	33.695	33.365	32.930	33.005	33.085	33.160	33.165	32.890
27	33.395	33.640	34.710	34.360	34.015	33.380	32.945	33.020	33.100	33.155	33.160	32.885
28	33.530	33.825	34.720	34.310	33.980	33.375	32.960	33.020	33.110	33.180	33.190	32.890
29	33.640		34.725	34.270	33.840	33.365	32.970	33.015	33.100	33.200	33.225	32.905
30	33.705		34.740	34.245	33.530	33.350	32.990	33.070	33.125	33.260	33.195	32.895
31	33.775		34.740		33.390		32.980	33.030		33.285		32.905
Avg.	32.470	33.720	34.905	34.425	34.040	33.340	33.055	32.970	33.035	33.170	33.230	32.960

09-5318.50 COOPER WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging regulatory waste water from the Cooper Canal to the Colorado River. This wasteway is located 0.8 kilometer downstream from the northerly international boundary and 1.0 kilometer upstream from Morelos Diversion Dam. Prior to July 14, 1971, the wasteway was located 0.6 kilometer downstream from Morelos Diversion Dam. This wasteway discharges waste water from the Valley Division of the Yuma Project in the United States into the Colorado River. Since July 14, 1971, zero of the gage is 35.86 meters above mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge March 1950 through 1993 obtained by the United States Section; monthly discharge, January 1934 through 1950 by the Bureau of Reclamation.

EXTREMES: Prior to March 1950, maximum monthly discharge 1,127 TCM in January 1940; minimum monthly discharge, zero for various months. Since March 1950, maximum instantaneous discharge, 2.25 CMS on June 19, 1965, at a maximum gage height of 34.79 meters (old datum); minimum instantaneous discharge, zero during parts of most months.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.15	0.08	0.08	0.01	0	0	0.04	0.12	0.08	0.19	0.07
2	0	.09	.04	.05	0	.02	.06	.02	.01	.16	.09	.01
3	.02	.04	.02	.02	.01	.13	.01	.02	.08	.05	.08	.09
4	.01	.13	.22	.02	.01	.05	0	.04	.06	.08	.09	.07
5	0	.02	.03	.01	0	.04	0	.04	.06	.03	.17	.07
6	.01	.01	.01	.01	0	.24	0	0	.04	.26	.06	.03
7	.01	.14	.07	.01	.02	.01	0	.06	.22	.10	.13	0
8	.01	.04	.11	.29	.01	.01	0	.01	.09	.03	.08	0
9	.01	.03	.09	.04	0	.01	0	0	.12	.03	.05	0
10	.01	.02	.07	.03	0	.06	.02	0	.12	.13	.01	.27
11	.01	.02	.20	.02	0	.05	0	.09	.29	.20	.04	.11
12	.01	.07	.15	.01	0	.05	0	0	.09	.06	0	.13
13	.01	.08	.04	.01	0	.03	0	0	.10	.05	.11	.02
14	0	.21	.12	.01	.05	.06	0	0	.26	.03	.13	.02
15	0	.25	.02	.01	.02	.01	.01	0	.15	.02	.09	.03
16	0	.21	.01	.05	.01	.01	0	.01	.11	.37	.01	0
17	.01	.16	.01	.02	0	.01	0	.08	.16	.42	.01	.04
18	0	.12	.01	.10	0	.01	0	.22	.02	.37	.01	.07
19	0	.09	.02	.10	.01	.01	0	.02	.03	.21	0	0
20	0	.07	.17	.05	0	.01	0	.05	.01	.21	.01	.14
21	0	.02	.11	.02	.04	0	0	.01	.03	.07	.10	.02
22	0	.02	.10	.01	.02	0	0	0	.09	.23	.06	.11
23	0	.04	.06	.01	.15	0	0	.10	.11	.15	.13	.08
24	0	.07	.01	.02	.02	.05	0	0	.04	.14	.12	.02
25	0	.16	.04	.20	.15	.02	0	0	.11	.05	.17	0
26	.03	.14	.12	.09	.01	.01	0	.05	.05	.01	.05	0
27	.03	.06	.01	.04	.15	.02	0	.12	.05	.13	.01	0
28	.02	.17	.01	.01	.15	.06	0	.05	0	.05	.04	.02
29	.05	.01	.23	.04	.01	0	0	.10	0	.02	.21	.06
30	.05	.01	.11	.01	0	0	0	.01	.05	.26	.08	.10
31	.10	.15	.15	.01	.01	0	0	.06	.10	.10	.08	.05
Sum	0.40	2.63	2.12	1.68	0.90	0.99	0.10	1.20	2.67	4.10	2.33	1.63

Current Year 1993

Period 1935-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	High		Day		Total	Average	Maximum	Minimum	
				Day	Low							
Jan.	0.325	0	30	0.45	1	0	0.01	34.6	187	1,127	0	
Feb.	.460	.020	7	.75	1	6	.09	227	166	493	7.4	
Mar.	.545	0	31	.96	1	1	.07	183	177	638	0	
April	.550	0	29	.97	129	0	.06	145	175	524	20.6	
May	.450	0	27	.75	1	1	0	.03	77.8	176	543	39.1
June	.480	0	6	.80	1	1	0	.03	85.5	158	734	27.9
July	.385	0	10	.57	1	1	0	0	8.6	150	636	0
Aug.	.425	0	31	.67	1	1	.04	104	122	761	0	
Sept.	.450	.005	11	.72	1	2	.09	231	127	570	0	
Oct.	.520	.005	6	.90	1	5	.13	354	163	604	0	
Nov.	.445	.005	3	.71	1	8	.08	201	182	570	11.1	
Dec.	.470	0	17	.77	1	3	.05	141	204	730	16.9	
Yearly	0.550	0		0.97		0	0.06	1,793	1,987	5,551	787	

1 And other days

## 09-5220.21 COLORADO RIVER IMMEDIATELY ABOVE MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico attached to the upstream abutment of the gates of the Intake Canal at Morelos Dam, 1.8 kilometers downstream from the northerly international boundary, and about 12.1 kilometers downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.05 meter below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage height records November 8, 1950 to June 3, 1951; a continuous record of gage heights June 4, 1951 through 1993.

REMARKS: Prior to June 4, 1951, when a continuous water-stage recorder was installed, mean daily gage height records were determined from hourly readings of a staff gage.

EXTREMES: Since November 8, 1950: Maximum mean daily elevation above mean sea level, 34.97 meters on March 5, 1993; minimum mean daily elevation above mean sea level, 30.94 meters on February 17, 1957.

## MEAN DAILY GAGE HEIGHT IN METERS 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	31.200	33.550	33.690	34.190	33.590	32.820	32.850	32.430	32.500	32.620	32.950	32.750
2	31.140	33.560	33.990	34.180	33.710	32.790	32.890	32.430	32.460	32.680	32.930	32.760
3	31.170	33.490	34.460	34.190	33.680	32.810	32.880	32.440	32.500	32.690	32.920	32.750
4	31.440	33.290	34.860	34.130	33.650	32.820	32.850	32.450	32.460	32.710	32.930	32.730
5	31.470	33.120	34.970	34.110	33.650	32.790	32.850	32.450	32.480	32.670	32.920	32.720
6	31.880	33.070	34.840	34.160	33.630	32.820	32.840	32.450	32.450	32.690	32.910	32.720
7	32.260	33.020	34.890	34.160	33.630	32.840	32.800	32.450	32.490	32.710	32.920	32.750
8	31.580	33.130	34.750	34.220	33.640	32.850	32.810	32.450	32.470	32.730	32.940	32.650
9	31.210	33.300	34.650	34.230	33.640	32.840	32.730	32.450	32.480	32.730	32.930	32.490
10	31.100	33.590	34.630	34.230	33.660	32.840	32.650	32.440	32.480	32.710	32.920	32.490
11	31.210	33.590	34.710	34.260	33.660	32.830	32.610	32.450	32.470	32.710	32.920	32.620
12	31.460	33.360	34.700	34.180	33.650	32.820	32.560	32.480	32.470	32.720	32.920	32.700
13	31.600	33.320	34.620	34.150	33.650	32.800	32.500	32.490	32.500	32.700	32.910	32.510
14	32.180	33.390	34.610	34.070	33.680	32.790	32.470	32.480	32.490	32.700	32.900	32.500
15	32.280	33.450	34.600	33.880	33.670	32.770	32.430	32.470	32.470	32.720	32.940	32.520
16	32.350	33.490	34.550	33.810	33.710	32.770	32.410	32.460	32.480	32.720	32.920	32.500
17	32.440	33.500	34.540	33.810	33.720	32.780	32.400	32.470	32.500	32.720	32.810	32.510
18	32.590	33.470	34.520	33.820	33.710	32.780	32.420	32.490	32.480	32.770	32.750	32.520
19	32.780	33.520	34.480	33.870	33.740	32.780	32.410	32.420	32.480	32.760	32.750	32.520
20	32.770	33.560	34.470	33.970	33.750	32.770	32.410	32.470	32.480	32.810	32.760	32.550
21	32.790	33.560	34.410	34.000	33.720	32.790	32.420	32.450	32.480	32.810	32.760	32.500
22	32.850	33.500	34.300	34.020	33.700	32.780	32.410	32.440	32.480	32.770	32.760	32.480
23	32.870	33.550	34.170	34.010	33.700	32.790	32.420	32.460	32.500	32.730	32.760	32.610
24	32.850	33.670	34.110	33.990	33.700	32.800	32.400	32.450	32.520	32.750	32.750	32.570
25	33.110	33.550	34.040	33.980	33.590	32.800	32.380	32.460	32.540	32.770	32.730	32.570
26	33.060	33.270	34.100	33.930	33.180	32.810	32.370	32.500	32.550	32.820	32.770	32.570
27	33.160	33.270	34.230	33.940	33.570	32.830	32.400	32.530	32.560	32.830	32.780	32.570
28	33.280	33.470	34.270	33.870	33.550	32.820	32.430	32.520	32.570	32.850	32.760	32.570
29	33.380		34.250	33.860	33.340	32.830	32.450	32.510	32.570	32.870	32.760	32.590
30	33.440		34.240	33.780	32.970	32.840	32.470	32.570	32.610	32.940	32.750	32.580
31	33.500		34.210		32.850		32.450	32.500		32.950		32.590
Avg.	32.270	33.415	34.445	34.035	33.590	32.805	32.560	32.470	32.500	32.755	32.850	32.595

09-5220.30 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - DISCHARGES

DESCRIPTION: Water-stage recorder and staff gage on left bank of Intake Canal, 61 meters downstream from the intake at Morelos Dam, 410 meters upstream from the point where it joins the old Alamo Canal, 3.5 kilometers upstream from Matamoros Check, and about 1.6 kilometers south of the northerly international boundary. The zero of the gage is 0.05 meter below mean sea level, U. S. C. & G. S. datum.

RECORDS: The records are deduced from the flows arriving in the limittrophe section of the Colorado River at the northerly international boundary, the flows that pass downstream from the structure, and leakage through the structure. Records available: November 8, 1950 through 1993. Records obtained and furnished by the Mexican Section of the Commission.

REMARKS: The canal is operated with a minimum hydraulic slope to permit the maximum retention of silt above Matamoros Check, and the lower velocities in the canal do not permit measuring the flow with a current meter. Records for this station show the amounts of Colorado River water diverted at Morelos Diversion Dam to the Intake Canal and thence to the Alamo Canal for use in Mexico. Under conditions set forth in the 1944 Water Treaty, water for use in Mexico may be diverted to the Alamo Canal in the United States directly from the river at Rockwood Heading or by means of Imperial Dam, the All-American Canal, and certain facilities of the Imperial Irrigation District. No diversions of this nature have been made during the years 1951 through 1993, and consequently the records reported below show the total water diverted from the Colorado River to the Alamo Canal during those years. Mexico occasionally pumps water from the Colorado River at other points below Morelos Dam when water is available in the channel.

EXTREMES: Maximum mean daily discharge, 187 CMS, July 12 and 14, 1983; maximum mean daily gage height, 32.96 meters October 30, 1993 and other days. Minimum daily discharge, no flow on various occasions.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	52.6	59.7	98.2	120	77.6	73.6	88.2	75.3	61.3	52.6	79.3	77.9
2	37.5	63.5	92.6	125	77.9	73.9	88.8	75.8	59.5	51.7	82.0	81.3
3	39.0	62.7	101	129	77.3	74.8	89.0	78.3	59.5	49.1	82.7	80.3
4	30.8	71.9	114	136	77.3	76.6	86.1	77.4	55.0	50.9	83.9	76.9
5	33.7	93.6	129	140	77.6	76.0	84.8	76.6	57.8	51.5	87.2	76.7
6	41.2	85.5	135	140	77.4	75.3	85.1	75.2	56.7	55.6	87.1	81.2
7	37.7	89.6	126	136	78.3	76.1	82.9	75.0	59.5	54.2	90.5	86.7
8	27.1	82.8	134	133	78.1	77.0	83.8	74.7	57.1	55.5	94.8	76.0
9	38.3	75.6	141	133	75.0	76.2	75.8	73.1	58.2	55.4	93.4	58.1
10	35.8	72.8	141	130	73.4	78.5	72.6	72.8	57.8	56.8	95.5	55.3
11	36.7	73.1	136	129	73.2	78.2	70.3	74.5	56.8	55.0	95.7	67.2
12	27.6	78.4	136	126	72.7	78.5	68.4	78.2	56.1	54.9	95.7	67.2
13	25.0	80.3	140	123	71.2	78.8	67.6	78.4	58.6	50.5	94.6	55.0
14	27.4	80.2	141	121	72.5	82.7	68.4	79.2	58.1	52.0	92.4	53.0
15	31.5	83.6	142	113	85.2	85.4	66.2	78.7	56.0	53.7	100	54.5
16	22.6	82.7	144	114	75.8	85.4	64.2	78.2	57.0	51.6	87.6	54.0
17	30.5	85.7	143	111	67.4	85.9	66.7	79.1	59.1	50.3	82.0	53.9
18	23.9	83.5	146	110	68.0	85.9	69.9	82.1	57.2	52.8	75.0	54.9
19	35.7	85.1	145	111	66.4	84.9	70.0	81.3	55.6	52.8	71.8	54.9
20	42.5	88.1	145	107	69.6	83.6	67.5	79.0	55.1	61.7	66.5	59.6
21	38.0	86.9	143	97.5	72.3	82.9	69.6	76.3	55.0	69.5	62.3	56.3
22	33.0	86.3	142	92.1	74.1	82.8	68.9	74.9	48.6	64.9	69.8	53.7
23	38.0	87.4	144	89.8	74.9	85.4	69.1	78.8	48.6	73.0	65.9	65.2
24	36.0	84.2	142	85.6	77.7	86.1	68.4	75.0	46.9	74.5	63.1	58.4
25	42.0	77.1	141	85.6	76.7	85.2	67.6	75.0	46.4	79.0	64.9	57.8
26	44.0	84.7	135	87.6	76.5	86.2	67.6	79.6	47.5	77.2	70.0	58.2
27	38.0	91.0	126	83.1	76.1	86.8	67.5	81.8	49.1	76.9	71.6	58.8
28	47.0	94.6	120	80.9	74.3	85.6	70.2	80.1	50.4	70.7	72.2	59.1
29	54.0		117	81.9	68.5	85.9	73.3	76.8	49.1	73.5	75.9	60.2
30	68.0		117	80.6	71.1	86.5	75.5	78.6	51.1	68.6	75.6	60.3
31	85.0		120		73.8		77.1	64.2		66.8		61.0
Sum	1,200.1	2,270.6	4,076.8	3,351.7	2,307.9	2,440.7	2,291.1	2,374.0	1,644.7	1,863.2	2,429.0	1,973.6

Current Year 1993

Period 1950-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	Cubic Meters per Second		Total		Average	Maximum	Minimum	
				High	Low						
Jan.			31	85.0	16	22.6	38.7	103,689	110,367	275,305	1,192
Feb.			28	94.6	1	59.7	81.1	196,180	111,278	251,580	11,387
Mar.			18	146	2	92.6	132	352,236	233,420	435,370	120,761
April			15	140	30	80.6	112	289,587	259,420	404,698	189,700
May			15	85.2	19	66.4	74.4	199,403	140,130	286,174	81,665
June			27	86.8	1	73.6	81.4	210,876	196,849	332,588	117,400
July			3	89.0	16	64.2	73.9	197,951	269,774	439,171	155,105
Aug.			18	82.1	31	64.2	76.6	205,114	265,899	420,673	145,930
Sept.			1	61.3	25	46.4	54.8	142,102	159,790	336,960	66,156
Oct.			25	79.0	3	49.1	60.1	160,980	89,493	280,817	12,894
Nov.			15	100	21	62.3	81.0	209,866	78,841	258,388	9,271
Dec.			7	86.7	14	53.0	63.7	170,519	113,647	247,899	10,886
Yearly				146		22.6	77.3	2,438,503	2,032,216	3,451,533	1,569,404

‡ Mean daily

! And other days

## 09-5220.31 INTAKE CANAL AT MORELOS DIVERSION STRUCTURE - STAGES

(See Preceding Page for Description)

MEAN DAILY GAGE HEIGHT IN METERS 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	30.920	31.160	31.680	32.160	31.870	32.240	32.480	32.340	32.470	32.530	32.730	32.650
2	30.880	31.180	31.660	32.210	31.850	32.250	32.500	32.340	32.420	32.540	32.730	32.650
3	30.870	31.180	31.740	32.250	31.840	32.260	32.490	32.360	32.420	32.500	32.720	32.650
4	30.920	31.290	31.860	32.250	31.840	32.280	32.470	32.360	32.390	32.520	32.710	32.640
5	30.840	31.510	31.990	32.270	31.840	32.300	32.460	32.350	32.420	32.530	32.710	32.640
6	30.870	31.540	32.050	32.310	31.850	32.330	32.440	32.350	32.390	32.580	32.710	32.640
7	30.830	31.630	32.060	32.270	31.860	32.350	32.420	32.350	32.430	32.610	32.720	32.670
8	30.810	31.510	32.080	32.230	31.870	32.360	32.450	32.360	32.400	32.620	32.730	32.580
9	30.840	31.430	32.150	32.220	31.840	32.350	32.400	32.350	32.400	32.620	32.710	32.430
10	30.800	31.400	32.150	32.190	31.840	32.340	32.340	32.350	32.400	32.610	32.690	32.430
11	30.820	31.390	32.090	32.180	31.860	32.330	32.310	32.350	32.390	32.610	32.690	32.550
12	30.780	31.460	32.140	32.160	31.860	32.340	32.290	32.390	32.390	32.620	32.680	32.640
13	30.790	31.540	32.210	32.120	31.850	32.330	32.270	32.390	32.420	32.600	32.690	32.450
14	30.770	31.500	32.210	32.120	31.860	32.370	32.260	32.390	32.400	32.600	32.670	32.430
15	30.790	31.530	32.210	32.110	32.010	32.430	32.250	32.380	32.390	32.610	32.700	32.440
16	30.800	31.500	32.260	32.110	32.130	32.430	32.230	32.370	32.390	32.610	32.640	32.430
17	30.820	31.540	32.220	32.100	32.140	32.450	32.240	32.370	32.410	32.600	32.630	32.430
18	30.770	31.510	32.230	32.080	32.140	32.450	32.270	32.390	32.390	32.640	32.640	32.440
19	30.690	31.510	32.230	32.060	32.130	32.450	32.280	32.320	32.390	32.620	32.640	32.450
20	30.710	31.590	32.220	32.030	32.150	32.460	32.280	32.370	32.380	32.670	32.650	32.500
21	30.680	31.580	32.210	32.030	32.180	32.440	32.320	32.350	32.390	32.700	32.650	32.480
22	30.700	31.540	32.230	32.000	32.200	32.450	32.300	32.340	32.380	32.650	32.650	32.460
23	30.710	31.570	32.280	31.980	32.210	32.470	32.290	32.360	32.400	32.640	32.640	32.560
24	30.770	31.490	32.210	31.930	32.220	32.460	32.280	32.350	32.410	32.660	32.640	32.500
25	30.750	31.450	32.210	31.920	32.220	32.450	32.270	32.360	32.430	32.770	32.630	32.500
26	30.770	31.500	32.140	31.930	32.240	32.440	32.250	32.400	32.440	32.810	32.660	32.500
27	30.790	31.620	32.020	31.880	32.280	32.450	32.280	32.430	32.450	32.830	32.670	32.490
28	30.830	31.660	32.000	31.880	32.270	32.450	32.340	32.420	32.480	32.850	32.650	32.490
29	30.870		32.020	31.900	32.250	32.440	32.360	32.410	32.470	32.870	32.650	32.520
30	30.930		32.060	31.890	32.240	32.460	32.380	32.520	32.510	32.940	32.630	32.500
31	31.040		32.110		32.250		32.370	32.480		32.950		32.510
Avg.	30.810	31.475	32.095	32.090	32.040	32.385	32.340	32.375	32.415	32.660	32.675	32.525

09-5220.41 COLORADO RIVER IMMEDIATELY BELOW MORELOS DAM - STAGES

DESCRIPTION: Water-stage recorder located on the right bank of the Colorado River in Mexico immediately downstream from Morelos Dam, 1.8 kilometers downstream from the northerly international boundary, and about 12.1 kilometers downstream from the Colorado River below Yuma Main Canal Wasteway. Since April 17, 1969, zero of the gage is at mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was 0.05 meter below mean sea level.

RECORDS: Records obtained and furnished by the Mexican Section of the Commission. Records available: Staff gage heights, February 20, 1951 to June 6, 1966; continuous record of gage heights June 7, 1966 through 1993.

REMARKS: On June 7, 1966 a continuous water-stage recorder was installed; prior to this date, mean daily gage heights were determined from hourly readings of staff gage.

EXTREMES: Maximum mean daily gage height, 34.87 meters on March 5, 1993; minimum mean gage height, 29.35 meter on several days during December 1993.

MEAN DAILY GAGE HEIGHT IN METERS 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	30.790	33.550	33.670	34.110	33.460	32.650	32.640	29.640	31.350	31.510	30.880	31.430
2	31.000	33.560	33.950	34.100	33.480	32.640	32.640	29.640	31.410	31.610	30.780	31.320
3	30.880	33.500	34.370	34.100	33.450	32.640	32.640	29.640	31.460	31.560	30.750	31.300
4	31.280	33.290	34.810	34.050	33.450	32.640	32.640	29.630	31.490	31.460	30.740	31.390
5	31.430	33.130	34.870	34.030	33.450	32.630	32.640	29.630	31.490	31.420	30.730	31.180
6	31.890	33.080	34.760	34.060	33.440	32.630	32.640	29.630	31.420	31.380	30.710	30.880
7	32.240	33.030	34.820	34.060	33.440	32.630	32.640	29.630	31.360	31.330	30.700	30.380
8	31.570	33.120	34.710	34.110	33.440	32.640	32.640	29.630	31.380	31.310	30.790	30.380
9	31.220	33.280	34.590	34.120	33.440	32.640	32.640	29.630	31.400	31.320	30.770	29.820
10	31.100	33.570	34.570	34.120	33.460	32.640	32.640	29.630	31.400	31.320	30.730	29.450
11	31.220	33.590	34.650	34.130	33.460	32.640	32.640	29.630	31.400	31.320	30.730	29.630
12	31.450	33.370	34.640	34.070	33.450	32.640	32.640	29.630	31.340	31.330	30.720	30.700
13	31.600	33.320	34.550	34.000	33.450	32.640	32.640	29.630	31.290	31.350	30.770	29.490
14	32.160	33.390	34.540	33.940	33.450	32.640	32.640	29.630	31.270	31.400	30.700	29.350
15	32.270	33.450	34.530	33.770	33.460	32.640	32.640	29.630	31.240	31.390	30.990	29.350
16	32.340	33.490	34.450	33.730	33.480	32.640	32.640	29.630	31.240	31.450	31.850	29.350
17	32.430	33.490	34.440	33.730	33.490	32.640	32.640	29.630	31.240	31.460	31.700	29.350
18	32.590	33.470	34.410	33.730	33.500	32.640	32.640	29.630	31.340	31.430	31.230	29.350
19	32.730	33.520	34.380	33.780	33.520	32.640	32.640	29.630	31.340	31.390	31.120	29.350
20	32.730	33.550	34.360	33.850	33.520	32.640	32.640	29.630	31.330	31.310	30.970	29.350
21	32.740	33.540	34.310	33.900	33.500	32.640	32.640	29.630	31.330	31.290	30.970	29.350
22	32.800	33.490	34.200	33.920	33.470	32.640	32.640	29.630	31.320	31.300	30.990	29.350
23	32.870	33.530	34.070	33.920	33.470	32.640	32.640	29.630	31.370	31.300	30.960	29.350
24	32.830	33.660	34.010	33.910	33.460	32.640	32.640	29.630	31.440	31.300	30.870	29.350
25	33.090	33.540	33.930	33.900	33.450	32.640	32.640	29.630	31.460	31.160	31.020	29.350
26	33.060	33.270	34.020	33.860	32.960	32.640	31.710	29.630	31.450	31.000	31.170	29.350
27	33.160	33.270	34.130	33.860	33.020	32.640	31.090	29.630	31.450	30.910	31.180	29.350
28	33.280	33.460	34.160	33.800	33.020	32.640	31.090	29.630	31.470	30.900	31.410	29.350
29	33.380		34.150	33.710	32.930	32.640	30.960	29.630	31.500	30.880	31.550	29.350
30	33.440		34.140	33.630	32.660	32.640	30.040	29.630	31.510	30.880	31.540	29.350
31	33.500		34.120		32.650		29.640	30.700		30.890		29.350
Avg.	32.230	33.410	34.365	33.935	33.350	32.640	32.275	29.665	31.385	31.285	31.000	29.860

09-5319.00 WELLTON-MOHAWK DRAINAGE WATER DISCHARGED  
TO COLORADO RIVER BELOW MORELOS DAM

DESCRIPTION: Water-stage recorder located on downstream end of the Wellton-Mohawk Drainage Extension Channel on the Arizona bank of the Colorado River at the east end of the weir section of Morelos Dam, 1.8 kilometers downstream from the northerly international boundary. The elevation of the zero of the gage has not been determined.

RECORDS: Based on discharge measurements and a continuous record of gage heights. Station is operated by the United States Section of the Commission. Records available: November 16, 1965 through 1993.

REMARKS: Pursuant to Minute 218 of the Commission, an extension to the Wellton-Mohawk Drainage Conveyance Channel was constructed along the left bank of the Colorado River to a point immediately below Morelos Dam, a distance of about 19.3 kilometers, and placed in operation on November 16, 1965. Drainage flows may be discharged on an emergency basis to the Gila River and thence to the Colorado River at the diversion structure, Main Outlet Drain Extension No. 1, at the upstream end of the extension; directly to the Colorado River at Main Outlet Drain Extension No. 2, 3.1 kilometers upstream from Morelos Dam; and directly to the Colorado River immediately below Morelos Dam at this station, Main Outlet Drain Extension No. 3. On July 14, 1972, Minute No. 241 of the Commission became effective. The Minute called for discharge of all Wellton-Mohawk drainage waters to be made below Morelos Dam. On August 30, 1973, Minute No. 242 of the Commission became effective. The Minute called for construction of a concrete-lined bypass drain from Morelos Dam to the Santa Clara Slough in Mexico. On June 23, 1977, the first flow was recorded in the bypass drain. Drainage flows through Main Outlet Extension No. 3 will be only on an emergency basis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0

Current Year 1993

Period 1966-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0	0	1 1	0	1 1	0	0	0	8,551	23,088	0
Feb.	0	0	1 1	0	1 1	0	0	0	6,656	20,959	0
Mar.	0	0	1 1	0	1 1	0	0	0	4,696	22,827	0
April	0	0	1 1	0	1 1	0	0	0	4,206	22,944	0
May	0	0	1 1	0	1 1	0	0	0	6,359	23,548	0
June	0	0	1 1	0	1 1	0	0	0	4,989	23,135	0
July	0	0	1 1	0	1 1	0	0	0	4,583	23,370	0
Aug.	0	0	1 1	0	1 1	0	0	0	4,659	23,668	0
Sept.	0	0	1 1	0	1 1	0	0	0	6,549	22,787	0
Oct.	0	0	1 1	0	1 1	0	0	0	9,216	23,683	0
Nov.	0	0	1 1	0	1 1	0	0	0	8,736	22,792	0
Dec.	0	0	1 1	0	1 1	0	0	0	8,035	23,585	0
Yearly	0	0		0		0	0	0	77,215	264,928	0

1 And other days

09-5325.00 ELEVEN MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway for discharging water from the West Main Canal to the Colorado River. This wasteway is located in Arizona, 6.9 kilometers downstream from the northerly international boundary and 5.1 kilometers downstream from Morelos Diversion Dam. It is the largest of three wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. Since June 1986, zero of the gage is 34.05 meters above mean sea level, U. S. C. & G. S. datum; prior to that date, zero of the gage was mean sea level, U. S. C. & G. S. datum.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1993, obtained by the United States Section; monthly discharge, January 1924 through 1950 by Bureau of Reclamation.

EXTREMES: Prior to January 1951, maximum monthly discharge, 12,014 TCM in August 1940; minimum monthly discharge, zero in April 1941. Since January 1, 1951, maximum instantaneous discharge, 22.7 CMS on December 3, 1961, at a maximum gage height of 35.84 meters; minimum instantaneous discharge, zero during parts of most years.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0.07	0.10	0.38	0.12	0.01	0.01	0	0	0	0.01	0.34
2	0	.12	.01	.01	0	.01	.01	0	0	0	0	.01
3	.01	.05	.16	.01	.04	.01	.01	0	.01	0	0	.01
4	.08	.03	.04	.31	.01	.03	.01	0	0	.02	0	.01
5	.16	.01	.11	.01	.02	.02	.03	0	.10	.02	0	0
6	.26	.13	.08	.01	.03	.05	.01	0	.27	0	0	0
7	.01	.01	.02	.01	.02	.01	0	.46	.01	.05	.20	.18
8	0	1.00	.01	.01	.01	.01	0	.63	.01	.23	0	.18
9	0	.28	.01	.01	.14	.01	0	.02	.01	.01	.31	.29
10	0	.03	.05	.01	.05	.01	.05	.25	.01	.02	.51	0
11	0	.01	0	.01	.05	.03	.03	.01	.01	.01	.04	0
12	0	.18	.18	.01	.37	.02	.05	0	0	0	.07	0
13	0	.15	.02	.01	.03	.05	.01	.06	0	.18	.04	.04
14	0	.02	.28	.09	.01	.19	.01	.34	0	.41	.25	.03
15	0	.16	1.53	.08	.05	.01	.02	.03	0	.87	.47	0
16	0	.02	.34	.36	.01	.01	.22	.01	0	1.09	.01	0
17	0	.05	.21	0	.01	.01	.28	.01	0	.58	.01	0
18	0	.01	.03	.18	.03	.10	0	.01	0	.01	0	0
19	0	.10	.05	0	.01	.17	.04	.17	0	.58	.25	.06
20	0	.16	.03	0	.02	0	.12	.48	0	.01	.75	.01
21	0	0	.01	0	.01	0	.01	.01	0	.01	1.22	.01
22	0	0	.01	.14	.01	.01	.09	.01	.01	.01	.73	.12
23	0	0	.02	.02	.01	.01	0	.90	0	.01	.11	.01
24	0	.08	.01	.01	.01	0	0	.25	0	.01	.02	.01
25	.02	.15	.01	0	.02	.13	0	.01	0	.11	.02	.01
26	.19	.11	.01	0	.02	.01	0	0	0	0	.02	.01
27	.20	.11	0	0	.02	.01	0	.01	0	0	.01	.01
28	.14	.27	.01	.01	.01	.05	0	.07	0	0	.01	.01
29	.20	.01	.01	.01	.26	.01	0	.01	.01	0	.01	.01
30	.01	.01	.01	.02	.08	.01	0	.05	0	0	.33	.01
31	.01	.01	.01	.01	.39	.01	0	.01	0	.40	.01	.01
Sum	1.29	3.31	3.37	1.72	1.87	1.01	1.01	3.81	0.45	4.64	5.40	1.38

Current Year 1993

Period 1935-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	High		Low		Total	Average	Maximum	Minimum	
				Day	Low							
Jan.	0.260	0	5	1.20	1	0	0.04	111	2,844	11,804	0	
Feb.	.610	0	8	2.56	1	3	0	.12	286	2,330	10,398	17.9
Mar.	.860	0	14	4.38	1	10	0	.11	291	2,195	7,685	72.9
April	1.145	0	22	6.88	1	10	0	.06	149	2,022	7,771	0
May	.415	.005	12	1.96	1	1	0	.06	162	2,385	11,496	10.2
June	.340	.005	19	1.79	1	18	0	.03	87.3	2,263	9,177	13.0
July	.440	0	22	2.02	1	1	0	.03	87.3	2,293	10,263	11.2
Aug.	.345	0	8	4.68	1	1	0	.12	329	1,981	12,014	39.7
Sept.	.230	0	6	1.00	1	1	0	.02	38.9	1,428	7,574	7.4
Oct.	.695	0	31	3.13	1	1	0	.15	401	1,958	7,006	14.7
Nov.	.630	0	7	2.68	1	2	0	.18	467	2,388	10,139	23.2
Dec.	.455	0	22	2.05	1	1	0	.04	119	3,107	11,632	76.4
Yearly	1.145	0		6.88		0	0.08	2,529	27,194	102,255	1,163	

1 And other days

## 09-5221.00 COLORADO RIVER AT ELEVEN MILE GAGE - STAGES

DESCRIPTION: Water-stage recorder on the left (Arizona) bank of the river, 6.9 kilometers downstream from northerly international boundary, 5.1 kilometers downstream from Morelos Dam, about 15 meters downstream from the mouth of Eleven Mile Wasteway of the Yuma Project, and 17.7 kilometers downstream from Yuma, Arizona, along the river levee. The zero of the gage is at mean sea level, U. S. C. & G. S. datum. On April 1, 1988, the gage was relocated 399 meters downstream of the old gage on the left bank. Zero of the new gage is at mean sea level, U. S. C. & G. S. datum. Elevation of the new gage is 0.12 meter lower than the old gage. On August 1, 1993, the gage was relocated 81.0 meters upstream of the original 1947 gage. The datum is equal to the 1947 gage.

RECORDS: Mean daily gage heights based on continuous water-stage records. Records available: Continuous record of gage heights, November 1947 through 1993; once weekly readings obtained by the U. S. Bureau of Reclamation, January 1940 through October 1947.

REMARKS: This station is maintained by the United States Section of the Commission as part of the continuing study of channel conditions in the limitrophe section of the river.

EXTREMES: Since November 1947, maximum mean daily gage height, 33.15 meters on June 28, 1983; minimum mean daily gage height, 28.65 meters on September 13, 1988 and other days since that time.

## MEAN DAILY GAGE HEIGHT IN METERS 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	29.775	31.655	31.985	32.220	31.485	30.710	30.640	29.715	30.310	30.560	30.125	30.525
2	29.800	31.845	32.215	32.180	31.410	30.700	30.630	29.680	30.360	30.595	30.050	30.450
3	29.815	31.840	32.535	32.185	31.370	30.705	30.615	29.655	30.410	30.560	30.015	30.405
4	29.900	31.680	32.870	32.155	31.410	30.705	30.545	29.645	30.355	30.530	30.015	30.425
5	30.105	31.545	32.855	32.120	31.420	30.695	30.465	29.640	30.350	30.510	29.985	30.290
6	30.240	31.570	32.820	32.145	31.410	30.725	30.385	29.670	30.310	30.495	29.960	30.055
7	30.685	31.595	32.845	32.125	31.415	30.775	30.335	29.680	30.295	30.485	29.990	29.735
8	30.305	31.585	32.770	32.160	31.420	30.775	30.205	29.685	30.360	30.475	30.030	29.685
9	29.960	31.490	32.680	32.170	31.420	30.750	30.185	29.680	30.365	30.470	30.030	29.695
10	30.860	31.840	32.670	32.195	31.420	30.740	30.155	29.680	30.375	30.460	30.030	29.665
11	29.875	31.895	32.720	32.235	31.400	30.735	30.140	29.665	30.380	30.460	30.055	29.695
12	30.005	31.705	32.710	32.195	31.415	30.715	30.125	29.665	30.365	30.470	30.085	30.060
13	30.090	31.650	32.645	32.085	31.430	30.710	30.095	29.655	30.310	30.505	30.100	29.690
14	30.525	31.715	32.625	32.005	31.415	30.650	30.080	29.680	30.310	30.525	30.125	29.660
15	30.740	31.790	32.605	31.795	31.430	30.610	30.060	29.650	30.295	30.505	30.305	29.650
16	30.705	31.830	32.560	31.735	31.420	30.610	30.055	29.645	30.295	30.545	30.635	29.645
17	30.725	31.840	32.560	31.740	31.450	30.625	30.040	29.640	30.305	30.570	30.500	29.640
18	30.780	31.845	32.530	31.750	31.475	30.620	30.045	29.640	30.375	30.485	30.390	29.635
19	30.820	31.895	32.470	31.735	31.500	30.615	30.000	29.650	30.385	30.505	30.275	29.645
20	30.860	31.890	32.430	31.740	31.525	30.625	29.965	29.680	30.385	30.450	30.160	29.635
21	30.900	31.880	32.365	31.790	31.470	30.615	29.960	29.635	30.390	30.430	30.190	29.635
22	30.975	31.860	32.310	31.810	31.435	30.600	29.955	29.635	30.390	30.465	30.200	29.640
23	31.015	31.880	32.235	31.835	31.415	30.610	29.955	29.710	30.430	30.460	30.475	29.625
24	30.975	31.990	32.170	31.855	31.430	30.635	29.945	29.665	30.600	30.420	30.075	29.625
25	31.265	31.905	32.145	31.870	31.380	30.645	29.935	29.635	30.500	30.350	30.235	29.625
26	31.265	31.655	32.170	31.885	31.015	30.665	29.935	29.635	30.500	30.250	30.325	29.630
27	31.315	31.625	32.315	31.875	31.385	30.680	29.905	29.665	30.515	30.165	30.330	29.625
28	31.365	31.785	32.305	31.755	31.365	30.685	29.765	29.665	30.525	30.180	30.475	29.615
29	31.420		32.290	31.640	31.225	30.665	29.705	29.665	30.550	30.155	30.625	29.615
30	31.455		32.285	31.560	30.925	30.655	29.605	29.680	30.550	30.075	30.680	29.615
31	31.515		32.245		30.740		29.600	30.255		30.105		29.615
Avg.	30.615	31.760	32.480	31.950	31.370	30.675	30.100	29.690	30.395	30.425	30.215	29.800

09-5330.00 TWENTY-ONE MILE WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir on wasteway from West Main Canal to Colorado River. Located on east side of levee at site used prior to May 1, 1971. The site used May 1, 1971 to September 20, 1977 was located 61 meters downstream from present site on west side of levee. This wasteway is located in Arizona, 29.8 kilometers downstream from the northerly international boundary, 28.0 kilometers downstream from Morelos Diversion Dam, and 3.5 kilometers upstream from the southerly international boundary. It is the farthest downstream of the two wasteways discharging waste water from the Valley Division of the Yuma Project in the United States into the limitrophe section of the Colorado River. The elevation of the zero of the gage at the new location has not been determined.

RECORDS: Flow is computed from head on the weir measured by the water-stage recorder and weir rating determined by current meter measurements. Station operated by the United States Section of the Commission. Records available: Daily discharge, January 1951 through 1993, obtained by the United States Section; monthly discharge, March 1939 through 1950, by Bureau of Reclamation.

REMARKS: This wasteway was completed and flow began March 14, 1939. Since May 13, 1944, waste water from the West Main Canal which previously discharged across the southerly land boundary has been returned to the Colorado River through this wasteway. The West Main Canal Wasteway was completed in February of 1971, and the waste water from the West Main Canal is normally discharged across the southerly land boundary.

EXTREMES: Prior to January 1951, maximum monthly discharge 3,528 TCM in January 1946; minimum monthly discharge, 150 TCM in September 1950. Since January 1, 1951, maximum instantaneous discharge, 2.89 CMS on January 24, 1954, at a maximum gage height of 29.10 meters (old datum); minimum instantaneous discharge, zero during a part of most months.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	.05
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	.19	0
16	0	0	0	0	.04	0	0	0	0	0	0	0
17	0	0	0	0	.14	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	.08
19	0	0	0	0	0	0	0	0	0	0	0	.46
20	0	0	0	0	0	0	0	0	0	0	0	.47
21	0	0	0	0	0	0	0	0	0	0	.72	0
22	0	0	0	0	0	0	0	0	0	0	.44	0
23	0	0	0	0	0	0	0	0	0	0	.27	0
24	0	0	0	0	0	0	0	0	0	0	.13	0
25	0	0	0	0	0	0	0	0	0	.06	.17	0
26	0	0	0	0	0	0	0	0	0	0	.08	0
27	0	0	0	0	0	0	0	0	0	0	.05	0
28	0	0	0	0	0	0	0	0	0	0	.19	0
29	0	0	0	0	0	0	0	0	0	0	.13	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0.18	0	0	0	0	0.06	3.38	0.05

Current Year 1993

Period 1939-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0	0	11	0	11	0	0	699	3,528	0	
Feb.	0	0	11	0	11	0	0	599	3,096	0	
Mar.	0	0	11	0	11	0	0	545	2,048	0	
April	0	0	11	0	11	0	0	584	2,393	0	
May	.535	0	16	1.13	11	0	.01	15.6	707	3,047	0
June	0	0	11	0	11	0	0	622	2,899	0	
July	0	0	11	0	11	0	0	540	2,405	0	
Aug.	0	0	11	0	11	0	0	563	3,121	0	
Sept.	0	0	11	0	11	0	0	502	2,689	0	
Oct.	.405	0	25	.71	11	0	0	5.2	624	2,590	0
Nov.	.435	0	21	.80	11	0	.11	292	752	2,936	0
Dec.	.305	0	3	.45	11	0	0	4.3	794	3,306	0
Yearly	0.535	0		1.13		0	0.01	317	7,531	30,060	0

1 And other days

09-5345.00 EAST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder and control weir located about 91 meters north of the international boundary near San Luis, Arizona and 2.4 kilometers east of the Colorado River. From September 28, 1977 to April 6, 1978, recorder was moved west 31 meters to a temporary bypass channel. On April 7, 1978, recorder was moved back to original site. On August 17, 1992, flow ceased through the wasteway due to construction upstream of the gage. The gage was relocated 20 meters west of the original site providing continuous record since December 21, 1992.

RECORDS: Wasteway discharges computed by United States Section of the Commission beginning November 1, 1953, from head on control weir as measured by water-stage recorder and weir ratings as determined by current meter measurements. Records available: October 1946 through 1993. Records of monthly discharges also are available for the periods January 1924 through June 1928, January 1932 through 1933, and April 1935 through September 1946.

REMARKS: Wasteway discharges from the East Main Canal comprise regulatory waste and drainage waters from the eastern half of the Valley Division of the Yuma Project and are considered as part of the volumes arriving at the land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.61	0.39	0.54	0.34	0.50	0.35	0.18	0.23	0.57	0.33	0.39	0.23
2	.70	.29	.41	.55	.41	.02	.10	.03	.61	.06	.11	.16
3	.78	.39	.41	.13	.83	.20	.06	.08	.54	.14	.09	.23
4	.36	.23	.07	.27	.60	.02	.21	.17	.39	.58	.33	.14
5	.41	.28	.01	.36	.36	.01	.16	.20	.25	.80	.08	.30
6	.16	.37	.02	0	.37	0	.09	.24	.46	.61	.35	.68
7	.59	.23	.12	.03	.62	.14	.18	.29	.21	.34	.25	.28
8	.48	.14	.29	.19	.46	.01	.17	.06	.07	.23	.48	.15
9	.35	.09	.19	.11	0	.12	.45	.12	.07	.41	.22	.11
10	.32	.15	.22	.23	.46	.16	.31	.25	.46	.82	.47	.28
11	.33	.37	.31	.08	.08	.30	.11	.23	.32	.23	.10	.35
12	.34	.67	.08	.21	.01	.17	.32	.20	.06	.37	.20	.43
13	.35	.62	.31	.33	.16	.13	.05	.32	.44	.51	.49	.81
14	.33	.76	.07	.41	.12	.40	.07	.18	.21	.23	.01	.35
15	.33	.77	.15	.51	.45	.59	.17	.17	0	.30	.42	.55
16	.31	.38	.08	.26	.71	.24	.09	.20	.30	.35	.66	.62
17	.32	.52	0	.12	.94	.38	.12	.29	.36	.41	.46	.83
18	.30	.31	.11	.27	.69	.58	.55	.21	.01	.53	.90	.47
19	.30	.34	.58	.15	.53	.24	.43	.50	.12	.27	.85	.70
20	.30	.41	.38	.32	.61	.45	.20	.33	0	.67	.61	.44
21	.34	.37	.69	.25	.57	.35	.35	.36	.05	.30	.54	.29
22	.61	.34	.34	.25	.47	.17	.36	.24	.26	.16	.45	.71
23	.45	.48	.20	.19	.19	.05	.11	.98	.34	.10	.57	.39
24	.30	.36	.25	.07	.07	.02	.19	.67	.01	.56	.59	.35
25	.27	.18	.12	.38	.13	.27	.34	.33	.25	.52	.19	.94
26	.19	.34	.16	.09	.31	.34	.19	.33	.40	.29	.05	.81
27	.08	.38	.48	.32	.27	.14	.38	.19	.35	.11	.49	.60
28	.07	.36	.69	.04	.14	.11	.11	.41	.43	.16	.25	.73
29	.08	.76	.24	.03	.03	.29	.04	.31	.34	.15	.38	.64
30	.08	.69	.84	.08	.06	.18	.75	.36	.28	.09	.18	.45
31	.24	.66	.66	.22	.22	.22	.50	.27	.27	.09	.09	.41
Sum	10.68	10.52	9.39	7.54	11.37	6.43	7.34	8.75	8.16	10.72	11.16	14.43

Current Year 1993

Period 1935-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.355	0.020	3	0.93	127	0.02	0.34	923	1,150	4,144	111
Feb.	.330	0	14	.85	25	0	.38	909	962	3,910	164
Mar.	.390	0	19	1.07	15	0	.30	811	1,105	3,602	175
April	.335	0	30	.86	16	0	.25	651	1,071	3,910	165
May	.375	0	17	1.00	19	0	.37	982	1,205	3,750	281
June	.335	0	15	.86	12	0	.21	556	1,007	4,515	157
July	.405	0	30	1.12	13	0	.24	634	1,079	4,428	216
Aug.	.375	0	23	1.01	12	0	.28	756	1,115	4,885	196
Sept.	.365	0	22	.98	110	0	.27	705	1,053	3,910	0
Oct.	.380	0	5	1.02	31	0	.35	926	1,107	4,046	0
Nov.	.385	0	18	1.05	12	0	.37	964	1,201	4,404	0
Dec.	.380	.005	13	1.04	18	0	.47	1,247	1,170	3,799	51.0
Yearly	0.405	0		1.12		0	0.32	10,064	13,225	47,255	3,733

! And other days

09-5340.00 YUMA MAIN DRAIN (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorders located in the forebay and afterbay, with flow meters in the four discharge pipes at the Boundary Pumping Plant on the Main Drain about 61 meters north of the international boundary near San Luis, Arizona, 2.1 kilometers east of the Colorado River.

RECORDS: Main Drain discharges are lifted 3.05 to 3.66 meters at the pumping plant. Prior to April 1, 1969, discharges were computed from pump ratings and the differential head measured by the two gages. Beginning April 1, 1969 discharges were computed from flow meter charts. Pump ratings and flow meter discharges are checked by current meter measurements. Records obtained and computed by the United States Section of the Commission. Records available: Monthly measurements, June 1919 through 1951; daily discharges January 1952 through 1993.

REMARKS: Flows in the Main Drain are principally drainage waters from the Valley Division of the Yuma Project. The Main Drain, the East Main Canal Wasteway, West Main Canal Wasteway, and 242 Lateral discharge into Mexico at the international land boundary near San Luis, Sonora. The water is used for irrigation in Mexico on the left (Sonora) bank of the Colorado River and is considered as part of the volumes arriving at the land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.51	3.09	3.26	3.14	3.84	3.40	3.10	3.03	3.08	4.07	5.20	4.29
2	3.43	3.20	3.12	3.49	3.75	3.51	3.24	3.23	3.34	4.03	4.99	4.54
3	3.31	3.31	2.89	3.47	3.70	3.67	3.43	3.14	3.29	4.11	4.81	4.44
4	3.77	3.34	3.03	3.40	3.73	3.62	3.26	2.92	3.28	4.07	5.10	4.22
5	3.26	3.00	2.78	3.45	3.71	3.73	3.14	3.21	3.30	4.47	5.17	4.91
6	3.34	3.12	2.80	3.25	3.82	3.27	2.95	3.03	3.39	4.71	5.19	4.36
7	3.60	2.95	3.43	3.33	3.80	3.25	2.99	3.13	3.30	4.72	5.37	4.42
8	3.34	3.68	3.20	3.51	3.93	3.20	3.23	3.20	3.12	4.70	5.27	3.84
9	3.23	3.40	3.03	3.33	3.75	3.18	2.98	3.01	3.66	4.56	5.30	3.82
10	3.48	3.29	2.83	3.63	3.83	3.14	3.00	3.09	3.44	4.84	5.13	4.62
11	3.46	2.92	2.78	3.48	3.93	3.46	3.06	3.25	3.69	4.71	5.10	4.67
12	3.43	2.95	3.29	3.10	3.96	3.39	3.07	3.18	3.18	5.02	5.20	4.31
13	3.43	3.17	3.40	3.39	3.85	3.59	3.11	2.91	3.20	4.86	5.30	4.46
14	3.48	3.74	3.60	3.73	3.96	3.61	2.93	3.02	3.37	4.64	4.98	4.15
15	3.17	2.92	3.48	3.30	3.89	3.28	3.03	3.11	3.33	4.60	5.81	4.17
16	3.26	2.74	3.00	3.42	4.07	3.26	2.98	3.23	2.90	4.94	5.25	4.41
17	3.23	2.89	2.75	3.77	3.74	3.28	3.48	3.25	3.13	4.71	5.14	4.32
18	3.03	2.78	2.82	3.55	3.62	3.31	3.42	3.16	3.48	4.69	5.36	4.46
19	3.06	3.26	2.83	3.33	3.82	3.33	3.32	2.97	3.77	4.68	5.32	4.52
20	4.11	3.06	2.92	3.45	3.81	3.13	3.26	3.35	3.62	4.78	4.98	4.46
21	3.20	2.86	3.31	3.43	3.80	3.17	3.12	3.00	3.50	4.95	4.80	3.97
22	3.03	2.78	3.29	3.33	3.74	2.99	2.95	3.36	3.55	5.28	4.24	4.09
23	3.06	3.00	3.17	3.08	3.83	2.94	2.87	2.99	3.82	5.00	4.41	4.04
24	2.51	2.69	3.20	3.36	3.98	3.06	3.12	2.75	3.98	5.25	4.55	4.00
25	2.31	3.23	3.31	3.44	3.69	3.47	3.42	2.87	3.83	5.12	4.36	3.99
26	3.14	2.97	3.31	3.52	3.64	3.10	3.12	2.95	3.75	5.15	4.28	3.75
27	3.29	2.95	3.43	3.67	3.65	3.36	3.16	3.08	4.19	4.84	4.17	3.92
28	3.40	3.03	3.34	3.46	3.69	3.38	3.15	3.26	3.84	4.89	4.52	3.77
29	2.65	3.29	3.70	3.87	3.09	3.13	3.13	3.53	3.70	5.14	4.63	3.78
30	2.69	3.46	3.73	3.90	2.99	3.01	2.94	3.81	3.81	4.69	4.51	3.75
31	2.83	3.31	3.31	3.66	3.66	3.12	3.12	3.09	3.09	4.92	4.92	4.05
Sum	100.04	86.32	97.66	103.24	117.96	99.16	97.15	96.24	104.84	147.14	148.44	130.50

Current Year 1993

Period 1935-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Volume-Thousand Cubic Meters				
	High	Low	Day	Cubic Meters per Second		Average	Total	Average	Maximum	Minimum	
				High	Low						
Jan.			20	4.11	25	2.31	3.23	8,643	9,348	13,819	2,146
Feb.			14	3.74	24	2.69	3.08	7,458	9,046	14,787	2,023
Mar.			14	3.60	17	2.75	3.15	8,438	10,364	15,332	2,393
April			17	3.77	23	3.08	3.44	8,920	10,245	14,666	2,368
May			16	4.07	18	3.62	3.81	10,192	10,513	16,208	2,405
June			5	3.73	23	2.94	3.51	8,567	9,717	14,851	2,825
July			17	3.48	23	2.87	3.13	8,394	9,661	14,715	3,121
Aug.			29	3.53	24	2.75	3.10	8,315	9,654	14,752	3,158
Sept.			27	4.19	16	2.90	3.49	9,058	9,707	14,269	2,812
Oct.			22	5.28	2	4.03	4.75	12,713	11,121	15,277	3,626
Nov.			15	5.81	27	4.17	4.95	12,825	10,611	14,814	3,454
Dec.			5	4.91	126	3.75	4.21	11,275	10,049	14,160	3,022
Yearly				5.81		2.31	3.64	114,798	120,036	171,922	33,353

‡ Mean daily

! And other days

09-5343.00 WEST MAIN CANAL WASTEWAY (VALLEY DIVISION, YUMA PROJECT)

DESCRIPTION: Water-stage recorder located about 0.5 kilometer upstream from outlet to Yuma Main Drain, which is 53 meters upstream from East Main Canal Wasteway outlet and 0.6 kilometer west of San Luis, Arizona. Prior to August 1, 1975, the recorder was located about 46 meters upstream from outlet to Yuma Main Drain.

RECORDS: Wasteway discharges computed by United States Section of the Commission beginning February 23, 1971, from water-stage recorder and ratings as determined by current meter measurements. Records available: February 23, 1971 through 1993.

REMARKS: Wasteway discharges from West Main Canal Wasteway comprise regulatory waste from the West Main Canal and this water is considered as part of the volumes arriving at the land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.02	0.06	0.17	0.15	0.52	0.12	0.53	0.29	0.15	0.19	0.08	0.12
2	.02	.22	.22	.07	.10	.28	.30	.15	.09	.25	.16	.12
3	.02	.33	.24	.17	.17	.40	.09	.10	.54	.14	.08	.12
4	.01	.19	.06	.32	.29	.29	.22	.22	.64	.09	.09	.12
5	.30	.18	.26	.15	.25	.11	.18	.19	.25	.07	.21	.12
6	.57	.35	.19	.19	.22	.17	.10	.01	.23	.02	.32	.12
7	.34	.28	.17	.16	.19	.09	.10	.08	.13	.15	.16	.12
8	.47	.41	.33	.52	.16	.05	.17	.22	.10	.03	.14	.28
9	.45	.19	.21	.64	.36	.12	.17	.39	.18	.11	.16	.23
10	.39	.17	.11	.60	.26	.19	.14	.24	.69	.30	.16	.14
11	.33	.11	.15	.51	.06	.39	.22	.30	.46	.32	.16	.25
12	.27	.03	.01	.21	.20	.27	.15	.35	.32	.25	.16	.17
13	.26	.03	.11	.64	.32	.08	.06	.26	.20	.04	.16	.03
14	.24	.31	.37	.67	.45	.17	.10	.43	.24	.14	.16	.03
15	.23	.33	.03	.57	.30	.27	.19	.27	.02	.30	.16	.01
16	.25	.37	.22	.49	.54	.13	.25	.23	.17	.09	.06	.11
17	.25	.21	.10	.43	.16	.26	.19	.28	.27	.27	.23	.12
18	.22	.21	.03	.22	.26	.32	.09	.11	.27	.27	.17	.12
19	.16	.34	.18	.94	.22	.32	.07	.19	.17	.21	.06	.12
20	.20	.46	.17	.31	.09	.23	.24	.24	.11	.10	.06	.02
21	.15	.20	.08	.83	.06	.15	.33	.19	.23	.37	.01	.02
22	.14	.23	.03	.98	.28	.05	.39	.02	.16	.22	.05	.05
23	.22	.07	.25	1.15	.03	.10	.30	.04	.03	.30	.06	.09
24	.22	.06	.43	.37	.28	.19	.08	.01	.13	.23	.04	.06
25	.21	.21	.33	1.10	.19	.28	.03	.18	.37	.50	.02	0
26	.32	.08	.25	.77	.06	.40	.06	.10	.10	.30	.01	.22
27	1.05	.30	.28	.47	.03	.34	.33	.07	.08	.13	.01	.35
28	.22	.26	.23	.29	.05	.36	.18	.07	.18	.23	.03	.38
29	.48		.32	.48	.10	.29	.17	.04	.29	.11	.08	.06
30	.79		.07	.41	.05	.37	.33	.05	.20	.11	.42	.15
31	.78		.08		.33		.27	.13		.10		.19
Sum	9.58	6.19	5.68	14.81	6.58	6.79	6.03	5.45	7.00	5.94	3.67	4.04

Current Year 1993

Period 1971-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day			Total	Average	Maximum	Minimum
					Day	Low					
Jan.	0.865	0.015	27	1.58	1	0.01	0.31	828	536	1,376	48.7
Feb.	.670	.010	15	.83	24	0	.22	555	531	840	196
Mar.	.540	0	14	.88	1	0	.18	491	568	1,158	250
April	.770	.010	25	1.47	1	0	.49	1,280	505	1,280	202
May	.580	0	9	.97	1	0	.21	569	431	707	183
June	.560	0	3	.82	1	0	.23	587	404	699	55.8
July	.620	.005	1	.95	113	0	.19	521	409	763	77.3
Aug.	.515	0	14	.72	6	0	.18	471	464	950	121
Sept.	.605	.005	3	.91	111	0	.23	605	488	947	234
Oct.	.600	0	21	.90	5	0	.19	513	468	898	164
Nov.	.765	0	17	1.30	1	0	.12	317	441	845	32.3
Dec.	.560	0	26	.84	110	0	.13	349	532	1,204	43.5
Yearly	0.865	0		1.58		0	0.22	7,066	5,777	8,934	3,179

1 And other days

09-5345.50 242 WELL FIELD NEAR SAN LUIS, ARIZONA

DESCRIPTION: Water-stage recorder and 3.7-meter Parshall flume located 31 meters upstream from confluence of East Main Canal Wasteway, 34 meters north of the southerly land boundary, and 2.3 kilometers east of the Colorado River.

RECORDS: Based on current meter measurements and a continuous record of gage heights. The station is operated by the United States Section of the Commission. Records available: October 18, 1978 through 1993.

REMARKS: Records show the pumping of ground water from the 242 well field east of San Luis, Arizona. This water is considered as part of the volumes arriving at the land boundary at San Luis.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1		0.26	0.20	0.06	0.06	0.16	0.59	0.14	0.37	0.19	0	0.20	0.20
2		.26	.21	.06	.05	.17	.80	.20	.29	.19	0	.20	.20
3		.26	.22	.06	.06	.17	.86	.19	.22	.19	0	.20	.20
4		.24	.22	.06	.06	.17	.59	.19	.21	.19	0	.20	.21
5		.24	.21	.06	.05	.17	.59	.19	.22	.18	0	.14	.21
6		.25	.21	.07	.05	.18	.58	.17	.22	.18	0	0	.22
7		.27	.21	.07	.05	.19	.58	.15	.22	.19	0	0	.23
8		.26	.22	.07	.06	.20	.58	.15	.23	.19	0	.07	.23
9		.26	.18	.07	.06	.19	.24	.15	.23	.19	0	.17	.23
10		.26	.14	.07	.06	.19	.10	.14	.24	.19	0	.17	.60
11		.25	.14	.06	.06	.22	.18	.14	.24	.18	0	.18	1.14
12		.25	.13	.06	.06	.10	.18	.13	.24	.18	.07	.18	1.14
13		.24	.13	.06	.06	.46	.19	.08	.23	.18	.42	.18	1.15
14		.24	.13	.07	.06	1.06	.12	.08	.23	.18	.66	.18	.93
15		.24	.12	.07	.06	1.07	.09	.13	.22	.19	.66	.18	.73
16		.25	.13	.06	.06	1.07	.21	.12	.22	.18	.66	.18	.73
17		.25	.13	.06	.07	1.05	.22	.13	.21	.18	.66	.18	.72
18		.24	.12	.06	.07	1.07	.22	.13	.21	.18	.66	.17	.71
19		.24	.12	.06	.06	1.14	.23	.14	.22	.18	.66	.19	.71
20		.24	.11	.06	.06	1.18	.24	.14	.22	.17	.62	.20	.70
21		.24	.10	.06	.06	1.18	.24	.15	.23	.16	.46	.20	.69
22		.25	.09	.06	.06	1.18	.23	.15	.23	.15	.17	.20	.69
23		.25	.09	.07	.06	1.18	.23	.16	.23	.14	.16	.20	.67
24		.26	.09	.06	.06	1.17	.24	.17	.23	.13	.16	.20	.67
25		.26	.08	.05	.06	1.17	.24	.16	.22	.14	.16	.20	.68
26		.25	.08	.06	.06	1.17	.25	.16	.21	.14	.16	.20	.68
27		.24	.07	.06	.06	1.18	.24	.16	.21	.14	.15	.20	.50
28		.23	.07	.06	.06	.86	.23	.07	.21	.16	.16	.20	.09
29		.21		.05	.07	.59	.16	.05	.21	.16	.18	.20	.48
30		.21		.05	.05	.59	.01	.24	.21	.12	.19	.20	.61
31		.22		.05		.59		.36	.19		.20		.58
Sum		7.62	3.95	1.90	1.78	21.07	9.46	4.72	7.07	5.12	7.22	5.17	17.53

Current Year 1993

Period 1979-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.105	0.085	7	0.28	29	0.19	0.25	658	979	3,406	0
Feb.	.100	.075	4	.25	28	.06	.14	341	1,234	3,677	0
Mar.	.095	.070	10	.11	130	.04	.06	164	1,188	4,717	0
April	.120	.030	29	.18	7	0	.06	154	1,379	4,265	0
May	.305	0	28	1.48	112	.01	.68	1,820	1,572	4,269	13.9
June	.250	0	2	1.10	9	.01	.32	817	1,511	4,272	26.4
July	.140	0	31	.38	113	0	.15	408	1,800	5,868	20.1
Aug.	.140	.095	11	.38	3	.19	.23	611	1,506	4,988	0
Sept.	.135	.020	15	.30	30	0	.17	442	1,328	3,397	0
Oct.	.240	0	19	.85	1	0	.23	624	1,047	3,344	0
Nov.	.110	0	3	.23	16	0	.17	447	480	2,101	0
Dec.	.305	.005	13	1.31	128	0	.57	1,515	971	3,654	0
Yearly	0.305	0		1.48		0	0.25	8,001	14,995	38,461	201

1 And other days

09-5348.00 TOTAL FLOWS CROSSING INTERNATIONAL BOUNDARY  
INTO MEXICO NEAR SAN LUIS, SONORA

DESCRIPTION: The tabulated data below are the combined flows of the East Main Canal Wasteway, West Main Canal Wasteway, 242 Lateral, and the Yuma Main Drain and represent the total water crossing the international land boundary into the Sanchez Mejorada Canal near San Luis, Arizona. The mean daily discharges are combined and rounded and the monthly volumes are obtained by adding the volumes of the four stations.

RECORDS: Records obtained and computed by the United States Section of the Commission. Records available: February 23, 1971 through 1993; 242 Lateral from November 1978 through 1993.

REMARKS: Descriptions and flows of the individual stations, East Main Canal Wasteway, West Main Canal Wasteway, the Yuma Main Drain, and 242 Lateral are published separately on preceding pages of this bulletin.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.40	3.74	4.03	3.69	5.02	4.46	3.95	3.92	3.99	4.59	5.87	4.84
2	4.41	3.92	3.81	4.16	4.43	4.61	3.84	3.70	4.23	4.34	5.46	5.02
3	4.37	4.25	3.60	3.83	4.87	5.13	3.77	3.54	4.56	4.39	5.18	4.99
4	4.38	3.98	3.22	4.05	4.79	4.52	3.88	3.52	4.50	4.74	5.72	4.69
5	4.21	3.67	3.11	4.01	4.49	4.44	3.67	3.82	3.98	5.34	5.60	5.54
6	4.32	4.05	3.08	3.49	4.59	4.02	3.31	3.50	4.26	5.34	5.86	5.38
7	4.80	3.67	3.79	3.57	4.80	4.06	3.42	3.72	3.83	5.21	5.78	5.05
8	4.55	4.45	3.89	4.28	4.75	3.84	3.72	3.71	3.48	4.96	5.96	4.50
9	4.29	3.86	3.50	4.14	4.30	3.66	3.75	3.75	4.10	5.08	5.85	4.39
10	4.45	3.75	3.23	4.52	4.74	3.59	3.59	3.82	4.78	5.96	5.93	5.64
11	4.37	3.54	3.30	4.13	4.29	4.33	3.53	4.02	4.65	5.26	5.54	6.41
12	4.29	3.78	3.44	3.58	4.27	4.01	3.67	3.97	3.74	5.71	5.74	6.05
13	4.28	3.95	3.88	4.42	4.79	3.99	3.30	3.72	4.02	5.83	6.13	6.45
14	4.29	4.94	4.11	4.87	5.59	4.30	3.18	3.86	4.00	5.67	5.33	5.46
15	3.97	4.14	3.73	4.44	5.71	4.23	3.52	3.77	3.54	5.86	6.57	5.46
16	4.07	3.62	3.36	4.23	6.39	3.84	3.44	3.88	3.55	6.04	6.15	5.87
17	4.05	3.75	2.91	4.39	5.89	4.14	3.92	4.03	3.94	6.05	6.01	5.99
18	3.79	3.42	3.02	4.11	5.64	4.43	4.19	3.69	3.94	6.15	6.60	5.76
19	3.76	4.06	3.65	4.48	5.71	4.12	3.96	3.88	4.24	5.82	6.42	6.05
20	4.85	4.04	3.53	4.14	5.69	4.05	3.84	4.14	3.90	6.17	5.85	5.62
21	3.93	3.53	4.14	4.57	5.61	3.91	3.95	3.78	3.94	6.08	5.55	4.97
22	4.03	3.44	3.72	4.62	5.68	3.44	3.85	3.85	4.12	5.83	4.94	5.54
23	3.98	3.64	3.69	4.48	5.23	3.32	3.44	4.24	4.33	5.56	5.24	5.19
24	3.29	3.20	3.94	3.86	5.50	3.51	3.56	3.66	4.25	6.20	5.38	5.08
25	3.05	3.70	3.81	4.98	5.18	4.26	3.95	3.60	4.59	6.30	4.77	5.61
26	3.90	3.47	3.78	4.44	5.18	4.09	3.53	3.59	4.39	5.90	4.54	5.46
27	4.66	3.70	4.25	4.52	5.13	4.08	4.03	3.55	4.76	5.23	4.87	5.37
28	3.92	3.72	4.32	3.85	4.74	4.08	3.51	3.95	4.61	5.44	5.00	4.97
29	3.42		4.42	4.49	4.59	3.83	3.39	4.09	4.49	5.58	5.29	4.96
30	3.77		4.27	5.03	4.60	3.55	4.33	3.56	4.41	5.08	5.31	4.96
31	4.07		4.10		4.80		4.25	3.68		5.31		5.23
Sum	127.92	106.98	114.63	127.37	156.99	121.84	115.24	117.51	125.12	171.02	168.44	166.50

Current Year 1993

Period 1935-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters					
	High	Low	Day	φ High		Day		φ Low	Total	Average	Maximum	Minimum	
				Day	φ								Day
Jan.			20	4.85	25	3.05	4.13	11,052	12,013	14,963	2,619		
Feb.			14	4.94	24	3.20	3.82	9,243	11,773	15,998	2,495		
Mar.			29	4.42	17	2.91	3.70	9,904	13,225	16,904	2,864		
April			30	5.03	6	3.49	4.25	11,005	13,200	16,013	2,611		
May			16	6.39	12	4.27	5.06	13,564	13,721	17,145	3,050		
June			3	5.13	23	3.32	4.06	10,527	12,639	15,505	3,115		
July			30	4.33	14	3.18	3.72	9,957	12,949	15,320	3,610		
Aug.			23	4.24	6	3.50	3.79	10,153	12,739	15,612	3,687		
Sept.			10	4.78	8	3.48	4.17	10,810	12,576	15,357	3,210		
Oct.			25	6.30	2	4.34	5.52	14,776	13,743	17,143	4,248		
Nov.			18	6.60	26	4.54	5.61	14,553	12,733	15,680	4,202		
Dec.			13	6.45	9	4.39	5.37	14,386	12,722	14,863	3,562		
Yearly							6.60	2.91	4.44	139,930	154,033	183,801	39,274

φ Mean daily

09-5222.00 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - DISCHARGES

DESCRIPTION: Water-stage recorder was located in Mexico on the right bank of the river about 305 meters upstream from the southerly international boundary, 3.2 kilometers west of San Luis, Arizona, and 35 kilometers downstream from Morelos Dam. The zero of the gage was at mean sea level, U. S. C. & G. S. datum. This gage was destroyed on January 19, 1983. Between January 19, 1983 and December 10, 1985, temporary gages were installed on the United States side and levels were established to ensure continuous record. On December 10, 1985 a permanent water-stage recorder was relocated on the left bank of the river about 24 meters upstream from the southerly international boundary.

RECORDS: Records obtained and furnished by the United States Section of the Commission. Computations by shifting control methods. Records available: Daily discharges, January 1950 through 1993; continuous record of gage heights, January 1947 through 1993. During 1993, from January 1 to February 4 and May 1 to December 31, the gage was inoperative. Records of gage height and discharge were estimated from instantaneous observations and discharge measurements. Monthly flows for this station have been derived for the period January 1935 through 1949 based on the computed records of monthly flows of the Colorado River at the northerly international boundary combined with the measured flows from the wasteways discharging into the boundary section of the river from the Yuma Project in Arizona.

REMARKS: Reservoirs, diversions in the United States and Mexico, drainage returns, and waste flows modify the river flow at this station.

EXTREMES: Since January 1950: Maximum instantaneous discharge, 937 CMS on August 19, 1983; maximum gage height, 25.86 meters on November 29, 1957. Minimum discharge, no flow on several occasions since September 1, 1956.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	153	331	436	238	88.9	83.3	1.68	15.8	38.2	9.32	58.3
2	0	208	396	425	220	84.1	85.8	1.23	17.9	36.0	9.43	51.3
3	0	185	476	430	205	80.7	83.5	1.22	16.4	32.3	7.31	43.0
4	0	159	578	436	203	79.0	73.6	1.21	16.5	30.9	6.43	36.0
5	11.4	151	634	442	205	75.3	56.1	1.16	15.8	29.7	6.15	23.9
6	20.7	152	637	447	210	70.5	40.2	1.11	15.2	29.2	5.32	11.4
7	19.5	155	646	442	214	72.2	31.4	1.07	16.7	27.9	4.64	3.26
8	18.9	164	646	442	214	76.7	23.4	1.02	17.0	27.8	5.32	1.40
9	19.7	185	640	447	217	76.2	20.1	.97	17.1	27.1	6.66	1.26
10	18.8	205	629	445	221	75.3	19.7	.78	17.5	26.9	7.31	1.40
11	17.2	231	629	450	221	75.0	19.6	.54	18.7	27.3	8.72	5.61
12	22.5	225	629	450	215	73.1	19.5	.61	17.2	29.2	10.6	2.23
13	24.1	216	615	422	218	74.2	17.6	.78	17.7	30.0	12.2	1.69
14	26.4	222	603	382	224	73.6	16.4	.80	18.3	34.0	12.9	1.35
15	36.2	233	600	323	228	62.6	15.2	.90	18.4	35.1	17.5	1.08
16	48.7	242	586	289	231	61.7	13.5	.82	18.7	33.4	54.1	1.00
17	62.9	245	578	282	232	62.9	12.1	.66	19.3	37.7	35.7	1.00
18	78.7	246	569	277	237	68.0	11.4	.59	22.0	39.9	22.1	1.06
19	98.6	248	561	282	242	69.7	9.80	.57	22.0	32.9	18.6	.94
20	106	248	552	309	240	71.6	10.0	.59	22.3	34.6	15.4	.77
21	105	249	541	312	231	75.0	10.3	.61	22.5	32.6	12.2	.62
22	108	250	527	312	225	77.0	10.5	.60	22.5	28.9	13.2	.58
23	109	252	504	323	225	76.7	10.2	.56	25.9	26.5	14.1	.56
24	110	271	490	334	221	78.2	9.91	.70	27.5	25.5	13.6	.56
25	117	278	479	326	225	78.7	10.0	.57	27.5	22.5	10.8	.54
26	127	264	470	329	176	84.4	9.88	.55	27.5	19.2	15.9	.54
27	127	253	479	317	175	86.7	9.74	.48	28.3	15.5	18.2	.36
28	128	276	476	309	209	87.8	9.29	.48	29.5	13.8	18.4	.45
29	133		467	289	201	86.1	8.50	.42	30.6	12.6	24.9	.44
30	138		459	260	157	83.3	5.95	.52	30.9	11.8	42.8	.44
31	143		453		112		3.29	11.8		8.67		.43
Sum	1,975.3	6,166	16,880	10,969	6,592	2,285.2	759.76	35.60	633.2	857.67	459.81	253.47
Current Year 1993									Period 1935-1993			
Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume- Thousand Cubic Meters				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
Jan.	24.365	21.975	31	145	1	0	63.7	170,666	437,426	2,062,379	0	
Feb.	25.100	24.130	28	303	1	148	220	532,742	358,976	1,708,370	0	
Mar.	25.245	24.485	17	649	1	303	545	1,458,432	304,725	1,458,432	0	
April	24.825	24.310	111	453	30	246	366	947,722	202,121	947,722	0	
May	24.310	23.380	19	242	31	112	213	569,549	272,210	1,430,837	0	
June	23.380	23.145	1	90.9	16	57.8	76.2	197,441	232,724	1,455,506	0	
July	23.215	22.200	2	86.1	31	2.33	24.5	65,643	200,341	1,821,962	0	
Aug.	22.590	22.060	31	14.2	30	.30	1.15	3,076	214,646	2,103,318	0	
Sept.	22.870	22.550	29	32.0	6	13.9	21.1	54,708	240,244	1,956,768	0	
Oct.	22.995	22.380	1	45.3	30	8.18	27.7	74,103	285,456	2,144,909	0	
Nov.	23.285	22.265	16	73.1	7	4.28	15.3	39,728	330,835	1,761,469	0	
Dec.	23.145	21.960	1	65.1	27	.25	8.18	21,900	404,888	2,268,370	0	
Yearly	25.245	21.960		649		0	131	4,135,710	3,484,592	15,656,495	1,398	

1 And other days

## 09-5222.01 COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY - STAGES

(See Preceding Page for Description)

## MEAN DAILY GAGE HEIGHT IN METERS 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	21.975	24.460	24.560	24.790	24.255	23.370	23.200	22.175	22.635	22.935	22.430	23.110
2	21.975	24.990	24.765	24.770	24.145	23.355	23.215	22.165	22.690	22.920	22.435	23.065
3	21.975	24.745	24.910	24.770	24.060	23.350	23.200	22.160	22.640	22.880	22.370	23.010
4	21.975	24.425	25.175	24.770	24.050	23.350	23.135	22.160	22.635	22.860	22.340	22.950
5	22.510	24.270	25.225	24.770	24.060	23.335	23.030	22.160	22.610	22.850	22.330	22.765
6	22.810	24.195	25.175	24.770	24.075	23.315	22.920	22.155	22.585	22.835	22.300	22.420
7	22.780	24.145	25.190	24.770	24.090	23.340	22.845	22.150	22.625	22.815	22.280	22.140
8	22.770	24.145	25.165	24.775	24.080	23.375	22.715	22.145	22.630	22.810	22.305	22.060
9	22.785	24.250	25.120	24.795	24.090	23.360	22.655	22.145	22.625	22.795	22.350	22.055
10	22.765	24.380	25.090	24.800	24.115	23.340	22.655	22.130	22.630	22.790	22.370	22.060
11	22.725	24.555	25.120	24.820	24.100	23.325	22.660	22.110	22.660	22.795	22.425	22.220
12	22.850	24.470	25.145	24.800	24.055	23.300	22.670	22.110	22.610	22.825	22.490	22.090
13	22.880	24.365	25.110	24.720	24.070	23.295	22.625	22.115	22.620	22.835	22.540	22.070
14	22.910	24.380	25.090	24.655	24.095	23.275	22.600	22.110	22.630	22.880	22.565	22.055
15	23.070	24.425	25.095	24.555	24.115	23.190	22.570	22.110	22.630	22.890	22.700	22.045
16	23.250	24.470	25.065	24.495	24.120	23.175	22.535	22.100	22.630	22.870	23.160	22.040
17	23.435	24.480	25.050	24.495	24.120	23.170	22.500	22.085	22.645	22.910	23.005	22.040
18	23.615	24.485	25.050	24.505	24.145	23.185	22.490	22.075	22.710	22.930	22.815	22.040
19	23.825	24.490	25.030	24.535	24.185	23.185	22.450	22.070	22.705	22.855	22.715	22.035
20	23.880	24.480	25.025	24.615	24.180	23.185	22.465	22.070	22.705	22.885	22.610	22.025
21	23.875	24.480	25.000	24.635	24.135	23.190	22.475	22.075	22.705	22.875	22.505	22.015
22	23.910	24.485	24.955	24.645	24.115	23.190	22.475	22.075	22.705	22.835	22.530	22.015
23	23.935	24.490	24.870	24.685	24.120	23.185	22.465	22.075	22.775	22.810	22.550	22.010
24	23.955	24.595	24.820	24.720	24.110	23.190	22.450	22.090	22.805	22.800	22.530	22.010
25	24.035	24.605	24.800	24.715	24.140	23.190	22.450	22.085	22.800	22.750	22.435	22.005
26	24.150	24.460	24.785	24.675	23.860	23.220	22.440	22.080	22.800	22.675	22.590	22.005
27	24.150	24.340	24.865	24.605	23.860	23.230	22.435	22.075	22.820	22.575	22.655	21.990
28	24.175	24.420	24.885	24.550	24.065	23.235	22.425	22.075	22.840	22.535	22.655	21.990
29	24.225		24.865	24.465	24.025	23.225	22.405	22.070	22.850	22.505	22.805	21.985
30	24.285		24.840	24.360	23.770	23.205	22.325	22.080	22.855	22.490	22.990	21.980
31	24.340		24.820		23.505		22.235	22.515		22.400		21.970
Avg.	23.285	24.445	24.985	24.665	24.060	23.260	22.635	22.120	22.695	22.785	22.560	22.200

09-5333.00 WELTON-MOHAUK BYPASS DRAIN AT SOUTHERLY INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder and Parshall flume located 24 meters upstream from the southerly land boundary, 168 meters east of the Colorado River, and 2.9 kilometers west of San Luis, Arizona. The zero of the gage has not been determined.

RECORDS: Based on current meter measurements and a continuous record of gage heights. Station is operated by United States Section of the Commission. Records available: June 23, 1977 through 1993.

REMARKS: Pursuant to Minute No. 242 of the Commission, a bypass drain of the Welton-Mohawk extension channel was constructed from Morelos Dam to the Santa Clara Slough in Mexico along the left bank of the Colorado River.

SPECIAL NOTE: Due to the Gila River flood during 1993, the Welton-Mohawk groundwater wells were turned off on February 21, 1993. For the period of February 21 to May 30, 1993, the recorded flow was Gila River flood waters entering the channel. For the period of May 31 to November 4, 1993, flow is from the Yuma Valley D-W groundwater wells. For the period of November 5 to December 31, 1993, flow is San Luis, Arizona Wastewater Treatment Plant Effluent water.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.78	3.13	2.66	5.99	4.20	0.85	1.09	2.57	0.94	0.73	0.31	0.06
2	.85	3.14	2.71	5.58	4.14	.72	.95	2.56	.99	.75	.29	.07
3	.91	3.36	3.07	5.56	3.91	.95	1.00	1.58	1.01	.81	.28	.07
4	.90	6.20	7.87	5.55	3.82	.68	.92	2.82	1.31	.81	.25	.07
5	1.41	6.06	8.40	5.56	4.26	.65	.87	2.30	1.03	.80	.09	.07
6	1.40	6.06	8.18	5.54	4.36	.74	.80	2.28	.90	.76	.05	.07
7	1.73	5.97	8.28	5.52	4.38	.80	.45	2.30	.74	.77	.05	.05
8	1.95	6.02	8.02	5.52	4.36	.88	.20	2.31	.62	.85	.05	.04
9	3.11	6.26	7.67	5.59	4.32	.88	.85	2.29	.88	1.04	.05	.04
10	3.85	6.33	7.55	5.59	4.18	.75	1.40	2.15	.86	.93	.05	.05
11	3.82	6.13	7.70	5.59	4.25	.90	1.09	1.62	.79	.88	.05	.05
12	3.99	6.21	7.62	5.58	4.22	.72	.96	1.06	.32	.84	.05	.05
13	4.11	6.14	7.32	5.40	4.17	.35	.89	1.08	.11	.82	.05	.05
14	3.84	6.03	7.10	5.16	4.22	.56	1.35	.95	.10	.81	.05	.06
15	3.67	6.23	6.92	4.90	4.23	.95	2.45	.94	.25	.78	.09	.06
16	4.78	6.24	6.75	4.92	4.21	1.36	1.89	.94	.22	.63	.09	.05
17	4.63	6.24	6.53	4.98	4.28	1.21	1.77	.93	.08	.10	.06	.05
18	4.72	5.98	6.68	4.96	4.53	.84	1.96	.90	.17	.07	.05	.05
19	4.76	6.13	7.01	4.80	4.43	.74	2.05	.83	.06	.05	.05	.05
20	4.71	6.04	6.99	4.41	4.49	.74	2.52	.81	.26	.05	.05	.05
21	4.60	5.38	6.92	4.48	4.45	.72	2.50	.83	.25	.06	.05	.05
22	4.57	5.00	6.79	4.82	4.21	.86	1.63	.83	.14	.38	.05	.05
23	4.47	3.60	6.52	4.88	4.28	.74	1.22	.79	.60	.84	.05	.05
24	4.44	3.34	5.95	4.87	4.38	.98	1.20	.44	.76	.85	.06	.05
25	5.31	2.34	5.54	4.85	4.41	.90	1.13	1.19	.74	.84	.05	.05
26	3.40	2.80	5.70	4.83	3.36	.90	1.11	.83	.74	.61	.05	.04
27	2.81	2.87	5.97	4.91	4.09	.90	1.13	.77	.72	.33	.05	.04
28	1.66	2.86	6.06	4.94	4.36	1.17	1.10	.77	.71	.34	.05	.04
29	3.84		6.13	4.92	3.39	1.19	1.29	.78	.68	.33	.05	.04
30	3.11		5.88	4.54	2.00	1.14	2.65	.77	.69	.31	.05	.04
31	3.10		6.26		.98		2.61	1.10		.30		.04
Sum	101.23	142.09	202.75	154.74	124.87	25.77	43.03	42.32	17.67	18.47	2.57	1.60

Current Year 1993

Period 1977-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	0.580	0.195	29	5.93	1	0.72	3.27	8,746	14,869	21,638	7,412
Feb.	.650	.235	22	7.28	22	1.35	5.07	12,277	13,819	18,374	8,506
Mar.	.750	.350	4	9.14	1	2.60	6.54	17,518	15,622	21,496	11,420
April	.615	.490	1	6.46	20	4.32	5.16	13,370	14,286	20,613	3,445
May	.510	.185	18	4.59	31	.88	4.03	10,789	14,359	20,732	5,215
June	.265	.085	16	1.59	13	.23	.86	2,227	13,160	19,842	2,227
July	.515	.080	15	4.67	17	.16	1.39	3,718	14,256	22,235	3,718
Aug.	.485	.095	4	4.18	24	.19	1.37	3,656	14,416	22,444	3,656
Sept.	.265	.040	4	1.46	118	.04	.59	1,527	13,226	23,538	51.4
Oct.	.215	.030	9	1.20	119	.04	.60	1,596	13,846	23,600	23.9
Nov.	.105	.030	2	.33	16	.04	.09	222	12,622	20,944	59.2
Dec.	.045	.030	1	.07	17	.04	.05	138	13,256	22,518	138
Yearly	0.750	0.030		9.14		0.04	2.40	75,784	167,737	222,488	75,784

1 And other days

## 09-5350.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 27 IN MEXICO

**DESCRIPTION:** Water-stage recorder and cableway located on the left bank of the canal wasteway immediately upstream from where it discharges into the Colorado River, 1.0 kilometer downstream from the wasteway gates on the Central Feeder Canal on the right bank of the Colorado River, 27 kilometers downstream from Morelos Dam, and 250 meters south of the junction of the Mexicali-San Luis and Algodones-Pescaderos highways.

**RECORDS:** Data obtained and computed by the Colorado River Irrigation District of the Ministry of Agriculture and Hydraulic Resources and furnished by the Mexican Section of the Commission. Records shown in table below are waste returns to the Colorado River. Records available: April 1956 through 1993.

**REMARKS:** The Colorado River Irrigation District transports water for irrigation of land on the left bank of the Colorado River by the Central Feeder Canal to a point called Kilometer 27. At this point, flows may be returned to the river through the wasteway or diverted to the Bacanora-Monumentos Canal system through the Sanchez Mejorada Siphon, which was placed in operation on June 28, 1963. As part of the rehabilitation works, started in 1968, of the Colorado River Irrigation District, the Canal de Conexion was enlarged and lined, and is now known as the Central Feeder Canal.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1956 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	8,673	11,447	85,761	0
February	22,723	5,854	50,898	0
March	24,727	8,584	72,049	0
April	25,746	14,624	85,372	0
May	37,128	13,873	99,576	0
June	42,267	12,066	61,705	0
July	15,609	12,996	56,912	0
August	56,177	18,559	132,183	0
September	23,837	14,620	83,943	0
October	17,662	13,247	136,198	0
November	45,507	13,134	122,170	0
December	23,530	11,368	86,607	0
Yearly	343,586	153,735	628,347	0

## 09-5365.00 WASTEWAY TO COLORADO RIVER AT KILOMETER 38 IN MEXICO

DESCRIPTION: Wasteway to the Colorado River on the left bank of new Barrote Canal at old dam and bridge at Kilometer 18+251 (old Kilometer 38+000). The wasteway is located in the Colonia Bojorquez 1.3 kilometers upstream from the Sonora-Baja California railroad bridge, 5.9 kilometers downstream from the Miguel C. Rodriguez gaging station, and 45 kilometers downstream from the southerly international boundary.

RECORDS: The records are computed by the Ministry of Agriculture and Hydraulic Resources and are based upon gate openings. Records available: January 1964 through 1993.

REMARKS: The wasteway structure on the left bank of the Colorado River has two manually operated radial gates 3.0 meters wide. It discharges into a dirt canal 200 meters long with a total capacity of 13.0 CMS which discharges to the river.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1964 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	0	1,850	10,541	0
February	0	1,459	12,035	0
March	0	762	5,932	0
April	0	406	5,555	0
May	0	1,504	14,246	0
June	0	867	8,585	0
July	0	727	9,114	0
August	0	1,179	17,765	0
September	0	2,291	16,855	0
October	0	4,703	28,669	0
November	0	2,929	25,263	0
December	0	2,428	13,380	0
Yearly	0	21,103	103,228	0

## STORED WATER IN LARGE RESERVOIRS OF THE COLORADO RIVER

Data are presented below for all large storage reservoirs in the Colorado River basin below Lee's Ferry, all of which are located in the United States. The monthly figures represent usable contents on the last day of the month, in million cubic meters. The capacities indicated are usable capacities at the top of the spillway gates in closed position for those dams having controlled spillways; for all others, capacities indicated are at spillway level. Records furnished by the U.S. Geological Survey.

## IN MILLION CUBIC METERS

Month	LAKE MEAD (Capacity 32,267)		LAKE MOHAVE (Capacity 2,233)		HAVASU LAKE (Capacity 764)		TOTAL IN UNITED STATES RESERVOIRS (Capacity 35,263)	
	1993	Average 1935-1993	1993	Average 1951-1993	1993	Average 1939-1993	1993	Estimated Average
Jan.	25,443.0	22,813.5	2,139.8	2,054.8	703.3	682.6	28,286.1	25,550.9
Feb.	26,538.3	22,650.7	2,107.9	2,069.1	739.3	685.5	29,385.5	25,405.3
Mar.	27,113.1	22,365.1	2,085.6	2,070.2	705.2	703.8	29,903.9	25,139.1
April	27,040.3	22,412.9	1,908.3	2,050.4	733.6	739.3	29,682.2	25,202.6
May	26,545.7	23,202.9	2,118.0	2,124.8	753.9	744.2	29,417.6	26,071.9
June	26,221.3	24,387.0	2,050.7	2,015.3	740.1	740.4	29,012.1	27,142.7
July	26,040.0	24,544.7	2,012.4	1,869.5	722.6	727.3	28,775.0	27,141.5
Aug.	26,244.8	24,327.6	1,860.8	1,814.2	732.2	709.3	28,837.8	26,851.1
Sept.	26,370.6	24,082.7	1,696.3	1,777.1	713.8	701.8	28,780.7	26,561.6
Oct.	26,184.3	23,828.1	1,781.0	1,787.5	677.3	699.2	28,642.6	26,314.8
Nov.	26,252.2	23,646.9	1,861.1	1,869.0	666.6	687.9	28,779.9	26,203.8
Dec.	26,302.7	23,449.2	1,987.9	1,974.3	679.2	686.4	28,969.8	26,109.9
Avg.	26,358.0	23,475.9	1,967.5	1,956.4	713.9	709.0	29,039.4	26,141.3
Max.	27,113.1	134,266.1	2,139.8	1 2,230.1	753.9	! 849.5	29,903.9	135,934.1
Min.	25,443.0	*13,231.5	1,696.3	111,462.9	666.6	!! 94.9	28,286.1	1116,112.5

I Maximum end of month storage for period of record

!! Minimum end of month storage for period of record

\* Minimum end of month storage since 1940

SUSPENDED SILT - 1993

The following tables are based on determinations of gravimetric percentages of dry silt in water samples taken at each station by one of the following methods.

A. By lowering a D-43 depth integrating sampler at verticals located at centers of sections of equal discharge in the river cross section, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

B. By lowering a D-43 depth integrating sampler at verticals located at centers of each span of the service bridge across the Alamo Canal, being careful to approach but not strike the bottom. The samples obtained in the section are combined to comprise a composite sample for that date.

C. By sampling at the stream surface with a separate bottle at each of three points, spaced 1/6, 1/2, and 5/6 of the stream width. The gravimetric percentage in each sample is determined, a coefficient of 1.10 is applied to the average of the three, and the product applied to the volume of the stream flow represented by that set of samples.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momentary CMS	Gravimetric Percent	Date	Time Std.	Stream-flow, Momentary CMS	Gravimetric Percent	Date	Time Std.	Stream-flow, Momentary CMS	Gravimetric Percent
Jan. 7	0900	150	0.0053	May 6	1003	281	0.2570	Sep. 2	0955	82.4	0.0606
14	1040	173	0.0283	13	0930	271	0.3215	9	0711	80.3	0.0590
21	0900	202	0.1235	20	1113	277	0.3082	13	0825	79.2	0.0535
Feb. 3	0835	265	0.1157	27	0925	262	0.3534	22	1000	78.5	0.0835
11	0925	338	0.0952	June 3	0958	142	0.2042	30	0745	90.3	0.1409
18	0815	316	0.1166	10	0850	145	0.2423	4	0825	95.3	0.0590
25	0835	362	0.1454	17	1223	137	0.1836	14	1125	92.8	0.0818
Mar. 4	1055	631	0.2839	24	0930	151	0.1955	21	0800	101	0.0732
12	1046	677	0.1411	30	0940	146	0.1437	28	0825	97.9	0.0755
18	1030	641	0.2684	July 8	0849	105	0.0825	4	0805	92.0	0.0234
25	0946	538	0.4267	15	0910	90.8	0.0938	10	1015	90.9	0.0684
Apr. 2	0938	547	0.5001	22	0850	86.0	0.1012	18	0910	111	0.0815
8	1140	542	0.3772	29	0910	84.0	0.0683	23	1050	92.8	0.1289
15	0930	451	0.5058	Aug. 5	0900	76.5	0.0964	2	0825	120	0.0711
22	0925	388	0.5998	12	0900	79.0	0.0765	9	0900	59.5	0.0271
29	1055	327	0.4405	19	0840	70.7	0.0739	16	1051	55.8	0.0156
				26	0930	80.9	0.0611	23	0825	65.6	0.0130
								29	0905	66.0	0.0102

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

Month	Monthly Weight Megagrams		Number of Samples	Gravimetric Percentages			* Silt Volume - Thousand Cubic Meters	Period 1952 - 1993			
	Water	Silt		Average	Maximum Sample	Minimum Sample		Total 1993	Average	Maximum	Minimum
Jan.	103,689	50,693	4	0.0489	0.0909	0.0011	37.2	11.0	62.2	0.30	
Feb.	196,180	174,037	4	0.0887	0.1188	0.0604	127.8	16.8	127.8	1.10	
Mar.	352,236	824,046	5	0.2339	0.3088	0.1334	605.2	58.5	605.2	3.32	
April	289,587	1,166,659	4	0.4029	0.6936	0.1960	856.8	64.2	856.8	4.49	
May	199,403	433,296	4	0.2173	0.2692	0.1800	318.2	20.9	318.2	1.36	
June	210,876	349,428	5	0.1657	0.2532	0.1061	256.6	35.3	256.6	2.53	
July	197,951	123,764	4	0.0625	0.1500	0.0119	90.9	42.5	192.3	4.14	
Aug.	205,114	66,848	4	0.0326	0.0527	0.0258	49.1	40.5	166.9	4.02	
Sept.	142,102	28,673	5	0.0202	0.0364	0.0122	21.1	17.9	79.8	1.78	
Oct.	106,980	168,860	4	0.1049	0.2810	0.0192	124.0	9.00	124.0	0.40	
Nov.	209,866	121,357	4	0.0578	0.0886	0.0404	165.2	9.40	165.2	0.30	
Dec.	170,519	74,028	5	0.0434	0.0716	0.0184	54.4	9.50	54.4	0.84	
Year	2,438,503	3,581,689	52	0.1232	0.6536	0.0011	2,706.5	332.4	2,706.5	40.2	

\* Volume calculated at 1.362 megagrams per cubic meter

COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

Date	Time Std.	Stream-flow, Momentary CMS	Gravimetric Percent	Date	Time Std.	Stream-flow, Momentary CMS	Gravimetric Percent	Date	Time Std.	Stream-flow, Momentary CMS	Gravimetric Percent
Feb. 2	1315	243	0.0867	May 18	1140	237	0.2152	Sep. 21	1052	22.6	0.0190
Mar. 5	1345	594	0.1655	June 8	1038	76.6	0.0809	Oct. 19	1105	33.8	0.0227
Apr. 20	1120	321	0.4464	July 6	1100	39.1	0.0419	Nov. 16	1235	59.6	0.1003

Samples by U. S. Section and analyses by United States Bureau of Reclamation, Method A

CHEMICAL ANALYSES OF WATER SAMPLES  
1993

The tables below are based on chemical analyses of samples from the Colorado River at the Northerly International Boundary taken by the United States Section of the Commission and analyzed under a contract with the U. S. Bureau of Reclamation.

Colorado River at Northerly International Boundary

1993	Time	Streamflow Momentary	Specific Conductance	pH	Hardness, Total (as CaCO <sub>3</sub> )	Hardness, Noncarbonate CaCO <sub>3</sub>	Calcium ion (Ca), Dissolved	Magnesium ion (Mg), Dissolved
Date	Standard	CMS	Microsiemens	Units	mg/L	mg/L	mg/L	mg/L
Jan. 4	0845	61.7	1,530	8.21	403.38	224.38	99.6	37.2
20	0900	122	1,020	8.04	230.49	82.49	57.2	21.1
Feb. 1	0830	245	940	7.97	175.91	44.91	43.5	16.2
16	0800	318	848	7.79	167.70	44.90	44.2	13.8
Mar. 1	0800	377	943	7.84	174.93	47.93	45.6	14.7
15	0800	669	877	7.91	160.34	34.34	40.6	14.2
Apr. 5	0745	540	852	7.87	174.06	48.06	44.6	15.1
19	0810	379	879	7.97	170.58	32.58	44.2	14.5
May 3	0800	271	894	8.12	188.46	63.46	49.2	15.8
17	0800	268	926	8.17	202.45	73.45	52.8	17.0
June 7	0745	153	1,070	8.17	231.73	91.73	60.2	19.6
21	0730	142	1,100	8.19	233.23	94.33	60.8	19.6
July 6	0800	141	1,180	8.26	253.76	107.76	66.2	21.3
19	0800	80.7	1,370	8.38	286.56	131.56	74.0	24.5
Aug. 2	0835	80.6	1,360	8.12	282.90	123.90	72.2	24.7
16	0930	77.8	1,380	8.46	289.32	131.32	74.1	25.1
Sept. 7	0745	73.8	1,460	8.23	304.35	144.35	77.3	26.8
21	0745	79.6	1,460	8.36	301.11	148.11	76.0	26.8
Oct. 4	0900	93.7	1,480	8.09	299.45	149.45	75.0	27.0
18	0745	93.7	1,540	8.39	296.97	144.97	74.0	27.0
Nov. 1	0845	92.3	1,620	8.18	296.96	139.96	74.0	27.0
15	0800	101	1,670	8.22	342.62	180.62	84.0	32.0
Dec. 6	0800	85.4	2,020	8.30	430.47	260.47	101	42.9
20	0800	54.8	2,000	8.11	474.16	290.36	114	45.6

1993	Sodium ion (Na), Dissolved	Potassium ion (K), Dissolved	Sulfate ion (SO <sub>4</sub> ), Dissolved	Chloride ion (Cl), Dissolved	Carbonate (as CO <sub>3</sub> )	Bicarbonate (as HCO <sub>3</sub> )	Nitrate (as NO <sub>3</sub> )	Total Solids Dissolved (Calculated)
Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Jan. 1	175	5.0	367	168	N/A	218	1.5	975
20	126	4.0	162	149	N/A	181	3.6	628
Feb. 1	121	3.8	126	138	N/A	160	2.9	544
16	107	3.5	103	122	N/A	150	2.2	485
Mar. 1	123	4.0	115	140	N/A	155	3.5	539
15	114	3.5	103	131	N/A	154	2.7	504
Apr. 5	120	3.4	99	112	N/A	154	2.9	493
19	111	3.4	106	131	N/A	168	4.2	513
May 3	107	3.3	109	130	N/A	153	2.8	512
17	113	3.6	115	133	N/A	157	2.5	533
June 7	131	4.0	146	159	N/A	171	2.2	623
21	135	4.4	144	164	N/A	169	1.6	631
July 6	139	4.4	163	174	N/A	178	0.6	671
19	169	5.0	199	198	1.3	186	N/A	778
Aug. 2	174	5.6	196	199	N/A	194	N/A	781
16	173	4.7	205	204	3.1	186	N/A	796
Sept. 7	193	5.5	217	208	N/A	195	N/A	840
21	194	4.7	212	241	N/A	187	N/A	860
Oct. 4	200	6.1	222	248	N/A	183	0.6	882
18	200	4.9	213	258	1.4	183	N/A	882
Nov. 1	199	4.6	217	285	N/A	192	0.7	917
15	230	4.6	234	290	N/A	198	0.9	989
Dec. 6	256	6.2	356	328	N/A	207	2.7	1,210
20	268	5.9	404	300	N/A	224	2.7	1,270

N/A NOT ANALYZED

SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following tables show specific conductance of individual water samples taken at Colorado River stations and in Mexican canals. Samples were taken at the northerly international boundary Commission and at the southerly international boundary by the United States Section. Determinations for the northerly international boundary were made by the Bureau of Reclamation and the United States Section of the Commission (jointly); and for the southerly international boundary, by the United States Section of the Commission. Samples for the Intake Canal at Morelos Dam were taken by the Mexican Section of the Commission, and determinations were made by the Ministry of Agriculture and Hydraulic Resources of Mexico.

COLORADO RIVER AT NORTHERLY INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,460*	944	943	872	901*	1,080	1,110	1,360*	1,370	1,480	1,620	1,900
2	1,490*	945	1,000	863	895*	1,090	1,090	1,360	1,400	1,480*	1,660	1,840
3	1,520*	960	1,010	859*	888	1,080	1,110*	1,360	1,380	1,480*	1,630	1,900
4	1,530	918	968	856*	893	1,090	1,140*	1,360	1,400*	1,480	1,640	1,940*
5	1,660	900	930	852	894	1,080*	1,160*	1,350	1,420*	1,470	1,660	1,980*
6	1,550	892*	916*	849	882	1,080*	1,180	1,350	1,440*	1,470	1,660*	2,020
7	1,500	884*	903*	862	895	1,070*	1,190	1,350*	1,460	1,470	1,670*	2,030
8	1,520	876	890	891	893*	1,080	1,240	1,350*	1,410	1,480	1,670	1,890
9	1,520*	849	890	901	891*	1,080	1,270	1,350	1,450	1,490*	1,690	1,910
10	1,520*	847	870	892*	889	1,070	1,290*	1,350	1,460	1,500*	1,700	1,890
11	1,520	858	861	882*	904	1,070	1,300*	1,360	1,460*	1,520*	1,710*	1,870*
12	1,650	841	873	873	934	1,070*	1,320	1,390	1,470*	1,530	1,720	1,860*
13	1,710	843*	874*	862	926	1,080*	1,350	1,400	1,470	1,520	1,700*	1,840
14	1,550	844*	816*	912	906	1,080	1,360	1,390*	1,460	1,500	1,690*	1,870
15	1,470	846*	877	892	913*	1,080	1,320	1,390*	1,460	1,520	1,670	1,900
16	1,380*	848	857	867	919*	1,090	1,340	1,380	1,460	1,530*	1,620	1,900
17	1,290*	844	860	871*	926	1,090	1,350*	1,380	1,460	1,530*	1,600	1,850
18	1,200*	851	848	875*	927	1,090	1,360*	1,400	1,460*	1,540	1,650	1,900*
19	1,110	864	853	879	905	1,090*	1,370	1,390	1,460*	1,530	1,710	1,950*
20	1,020	867*	853*	876	944	1,100*	1,330	1,400	1,460	1,550	1,740*	2,000
21	989	870*	852*	860	921	1,100	1,340	1,410*	1,460	1,550	1,770*	1,860
22	974	873	852	864	924*	1,090	1,340	1,410*	1,480	1,560	1,800	1,840
23	963*	873	874	869	927*	1,110	1,380	1,420	1,490	1,570*	1,840	1,770
24	951*	861	857	872*	930	1,100	1,390*	1,430	1,460	1,570*	1,930	1,800*
25	940	877	854	875*	944	1,090	1,390*	1,440	1,460*	1,570	1,940*	1,840*
26	985	860	853	878	1,180	1,090*	1,400	1,430	1,450*	1,570	1,950	1,880*
27	1,810	884*	865*	851	928	1,100*	1,420	1,430	1,450	1,600	1,930*	1,910
28	986	907*	878*	863	957	1,100	1,370	1,400*	1,450	1,600	1,900*	2,000
29	995		890	918	988*	1,100	1,350	1,380*	1,460	1,620	1,880	1,910
30	977*		882	908	1,020*	1,100	1,360	1,350	1,460	1,620*	1,900	1,910
31	958*		857		1,050		1,350*	1,360		1,630*		1,940*

\* Estimated

## SPECIFIC CONDUCTANCE OF WATER SAMPLES

## INTAKE CANAL AT MORELOS DIVERSION STRUCTURE

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,440	1,000	1,000	900	950	1,110	1,130	1,290	1,420	1,520	1,480	2,200
2	1,470	1,000	1,000	910	940	1,160	1,120	1,290	1,410	1,520	1,500	1,780
3	1,530	990	1,000	900	940	1,130	1,130	1,300	1,410	1,510	1,520	1,780
4	1,570	890	1,000	900	950	1,130	1,140	1,300	1,420	1,520	1,500	1,840
5	1,650	880	1,000	900	950	1,110	1,190	1,310	1,440	1,510	1,460	2,800
6	1,490	880	1,000	910	990	1,100	1,190	1,290	1,460	1,510	1,520	2,300
7	1,480	890	1,000	920	1,000	1,090	1,220	1,290	1,430	1,520	1,520	2,100
8	1,500	880	1,000	910	1,010	1,090	1,240	1,290	1,440	1,520	1,520	1,900
9	1,560	880	980	900	1,000	1,100	1,260	1,290	1,430	1,520	1,520	1,960
10	1,600	880	990	900	1,000	1,100	1,300	1,300	1,400	1,530	1,560	1,940
11	1,570	940	850	900	1,010	1,100	1,330	1,300	1,410	1,530	1,580	1,930
12	1,710	930	850	910	1,010	1,100	1,310	1,410	1,400	1,520	1,600	1,890
13	1,730	950	830	910	920	1,100	1,320	1,430	1,400	1,530	1,580	1,890
14	1,610	920	860	900	1,010	1,100	1,280	1,400	1,400	1,540	1,610	1,930
15	1,580	930	900	920	930	1,100	1,210	1,400	1,400	1,540	1,500	1,960
16	1,500	930	900	910	930	1,100	1,220	1,410	1,410	1,560	1,500	1,960
17	1,410	900	840	930	940	1,090	1,330	1,400	1,400	1,570	1,500	2,100
18	1,330	880	900	900	980	1,090	1,230	1,420	1,480	1,570	1,730	2,000
19	1,320	860	900	920	930	1,110	1,300	1,420	1,480	1,580	1,730	2,000
20	1,240	860	910	900	960	1,100	1,340	1,420	1,500	1,580	1,780	2,000
21	1,150	880	900	890	1,020	1,100	1,310	1,430	1,450	1,560	2,200	1,900
22	1,120	880	920	890	1,040	1,090	1,230	1,470	1,480	1,560	2,200	1,880
23	1,100	880	900	900	1,040	1,090	1,230	1,440	1,500	1,500	1,870	1,910
24	1,000	880	910	910	1,110	1,090	1,230	1,440	1,470	1,500	1,950	1,870
25	1,000	900	900	900	1,110	1,090	1,230	1,450	1,440	1,500	2,200	1,900
26	1,000	900	890	920	1,220	1,100	1,270	1,450	1,470	1,500	2,200	1,880
27	1,000	900	920	890	1,000	1,100	1,270	1,450	1,470	1,500	2,200	1,940
28	1,000	1,000	920	930	1,000	1,100	1,230	1,480	1,470	1,500	2,200	2,100
29	1,000		950	940	1,040	1,100	1,260	1,450	1,470	1,500	2,000	2,100
30	990		920	940	1,040	1,100	1,270	1,420	1,510	1,500	2,100	2,100
31	990		910		1,120		1,270	1,410		1,500		1,980

## COLORADO RIVER AT SOUTHERLY INTERNATIONAL BOUNDARY

## SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 1993

January	March	May	July	September
13 1,610	5 940	4 886	12 1,320	5 1,460
27 1,000	9 880	18 922	20 1,370	
February	30 877	June	August	
2 935	April	1 1,080	7 1,460	
16 853	6 840	8 1,100	31 1,290	
23 881	27 860	22 1,100		

RAINFALL ON THE COLORADO RIVER WATERSHED  
IN MILLIMETERS

Tabulated below are monthly records of rainfall at stations located in California and Arizona in the United States and in Baja California and Sonora in Mexico, with averages for their periods of record. Records of daily rainfall amounts, where available, are on file in the offices of the United States or Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listings of these stations on following page in this bulletin.

IN THE UNITED STATES

Month	Brawley, California		El Centro, California		Blythe, California		Yuma Citrus Station, Arizona		Bullhead City, Arizona	
	1993	Average 1931-1993	1993	Averages 1931-1993	1993	Averages 1931-1993	1993	Averages 1931-1993	1993	Averages 1978-1993
Jan.	88	10	88	11	66	12	42	11	85	31
Feb.	21	9	21	9	46	11	32	9	88	25
Mar.	3	7	5	6	1	10	10	7	50	32
April	0	2	0	2	0	3	0	3	0	5
May	1	1	0	0	0	1	1	1	T	3
June	0	0	0	0	0	1	0	1	2	0
July	0	1	0	2	0	5	0	6	0	12
Aug.	8	10	0	9	0	20	3	14	11	24
Sept.	0	8	0	7	0	9	1	8	0	12
Oct.	0	6	1	8	0	7	3	10	1	13
Nov.	19	5	19	5	16	7	28	5	8	14
Dec.	0	11	0	12	1	14	T	11	0	19
Yearly	140	70	134	71	130	100	120	86	245	190

T Trace

IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		Delta Baja California		Riito, Sonora	
	1993	Average 1948-1993	1993	Averages 1926-1993	1993	Averages 1948-1993	1993	Averages 1948-1993	1993	Averages 1949-1993
Jan.	5	10	#	9	51	10	#	8	6	6
Feb.	2	5	8	8	25	6	#	7	3	6
Mar.	1	4	0	6	0	5	#	5	3	4
April	0	2	0	2	#	3	#	2	0	1
May	0	T	0	T	#	T	#	T	0	T
June	0	T	0	T	#	1	#	T	0	T
July	0	3	0	3	#	2	#	2	#	2
Aug.	3	9	0	10	#	6	#	7	#	7
Sept.	0	4	0	9	#	4	0	6	#	11
Oct.	0	6	3	9	2	7	0	8	#	8
Nov.	24	4	20	4	15	4	0	3	#	5
Dec.	#	9	0	18	#	7	#	11	#	10
Yearly		58		84		50		55		65

Month	San Felipe, Baja California		El Centinela, Baja California						
	1993	Average 1948-1993	1993	Averages 1975-1993					
Jan.	0	7	3	6					
Feb.	0	3	0	5					
Mar.	0	3	0	4					
April	0	1	0	2					
May	0	1	#	0					
June	0	2	#	T					
July	0	3	#	T					
Aug.	0	10	#	6					
Sept.	0	8	#	1					
Oct.	0	5	#	7					
Nov.	0	5	#	1					
Dec.	0	10	#	10					
Yearly	0	60		43					

T Trace # Missing Data

## LOCATION OF RAINFALL STATIONS ON THE COLORADO RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1993.

## IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	Ø ELEV. (Meters)	RECORD BEGAN	OBSERVER
* Blythe, California	33° 37'	114° 36'	81.69	1909	State Division of Forestry
Brawley, California	32° 57'	115° 33'	30.48	1908	Agricultural Research Service
Bullhead City, Arizona	35° 07'	114° 36'	176.78	1980	Bullhead City Fire Department
El Centro, California	32° 46'	115° 34'	9.14	1930	El Centro Water Department
Yuma Citrus Station, Arizona	32° 37'	114° 39'	58.22	1923	University of Arizona Experimental Farm

## IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	Ø ELEV. (Meters)	RECORD BEGAN	OBSERVER
Bataques, Baja California	32° 34'	115° 00'	**20.12	1948	# S. A. R. H.
Delta, Baja California	32° 21'	115° 11'	**11.89	1948	S. A. R. H.
El Centinela, Baja California	32° 35'	115° 45'	49.99	1978	S. A. R. H.
Los Algodones, Baja California	32° 42'	114° 44'	35.05	1948	S. A. R. H.
Mexicali, Baja California	32° 40'	115° 28'	3.96	1926	S. A. R. H.
Riito, Sonora	32° 13'	115° 01'	13.11	1959	S. A. R. H.
San Felipe, Baja California	31° 01'	114° 51'	21.95	1969	S. A. R. H.

\* Not shown on rainfall map

Ø Elevation above mean sea level except Brawley and El Centro, which are elevations below mean sea level

\*\* Elevation obtained from International Boundary and Water Commission topographic maps

# Ministry of Agriculture and Hydraulic Resources

EVAPORATION IN THE COLORADO RIVER BASIN  
IN MILLIMETERS

Tabulated below are records of evaporation observed at one station in Arizona and at two stations in Baja California. The station in the United States is operated by the University of Arizona Experimental Farm. The stations in Mexico are operated by the Ministry of Agriculture and Hydraulic Resources. The type of pan used at all these stations was the National Weather Service standard pan of 1.22 meters diameter. For specific location of these stations, refer to data opposite the same station name shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

Month	Yuma Citrus Station, Arizona	
	1993	Average 1931-1993
Jan.	75	99
Feb.	78	120
Mar.	10	184
April	239	253
May	297	326
June	325	359
July	389	385
Aug.	322	338
Sept.	251	267
Oct.	181	189
Nov.	119	124
Dec.	104	93
Yearly	2,390	2,737

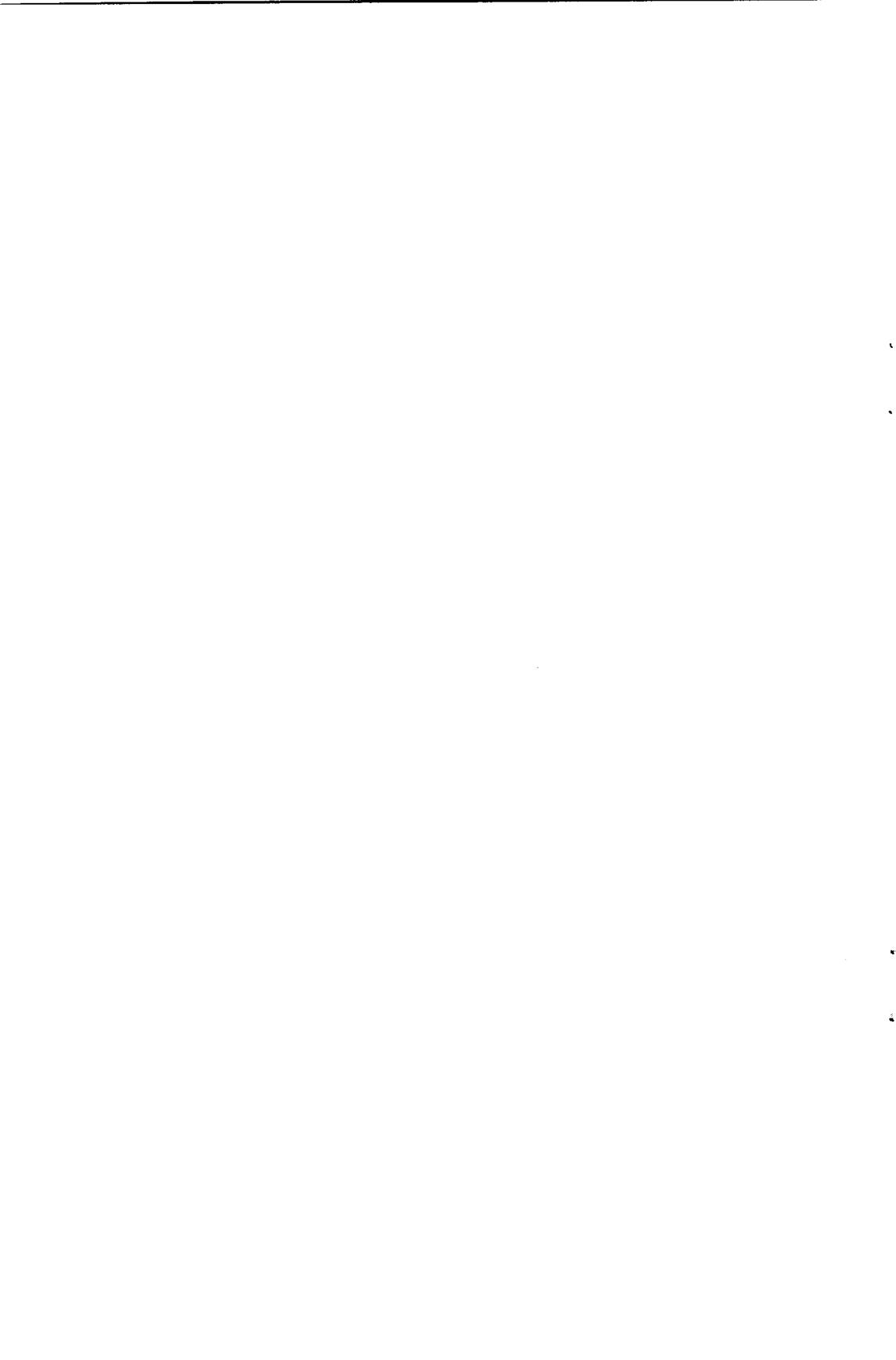
IN MEXICO

Month	Los Algodones, Baja California		Mexicali, Baja California		Bataques, Baja California		Riito, Sonora		San Felipe, Baja California	
	1993	Average 1949-1993	1993	Average 1926-1993	1993	Average 1959-1993	1993	Average 1962-1993	1993	Average 1952-1993
Jan.	#	109	#	65	#	83	#	76	#	120
Feb.	#	129	#	87	#	101	#	98	#	139
Mar.	#	184	#	147	#	150	#	146	#	168
April	#	254	#	198	#	205	#	187	#	195
May	#	318	#	268	#	269	#	256	#	239
June	#	343	#	293	#	305	#	286	#	254
July	#	356	#	298	#	290	#	315	#	280
Aug.	#	317	#	256	#	251	#	266	#	264
Sept.	#	262	#	205	#	206	#	215	#	236
Oct.	#	206	#	145	#	147	#	153	#	205
Nov.	#	134	#	85	#	109	#	95	#	152
Dec.	#	108	#	60	#	78	#	77	#	123
Yearly		2,785		2,122		2,226		2,246		2,520

Month	Delta, Baja California							
	1993	Average 1959-1993						
Jan.	#	86						
Feb.	#	110						
Mar.	#	154						
April	#	198						
May	#	253						
June	#	284						
July	#	294						
Aug.	#	267						
Sept.	#	216						
Oct.	#	157						
Nov.	#	109						
Dec.	24	95						
Yearly		2,241						

# Missing record





TEMPERATURE IN THE COLORADO RIVER BASIN  
IN DEGREES CELSIUS

The maximum, minimum, and monthly mean temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located approximately one meter above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations," in this bulletin.

IN THE UNITED STATES

Month	Brawley, California				El Centro, California				Blythe, California			
	1993				1993				1993			
	Mean	Max.	Min.	Average 1931-93	Mean	Max.	Min.	Average 1931-93	Mean	Max.	Min.	Average 1931-93
Jan.	#	#	#	12.2	12.9	23.3	-0.6	12.3	12.6	24.4	-1.1	11.5
Feb.	#	#	#	14.6	#	#	#	14.7	15.7	26.1	3.3	14.2
Mar.	18.7	31.7	4.4	17.4	19.9	32.2	6.1	17.4	19.4	33.9	6.1	17.3
April	21.8	37.2	8.3	21.1	22.9	37.2	11.1	21.0	23.2	40.6	7.8	21.3
May	25.4	37.8	10.0	25.1	26.4	37.2	11.7	25.1	28.4	41.7	13.9	25.4
June	28.9	44.4	12.8	29.4	30.0	45.0	12.8	29.6	30.7	47.8	14.4	29.8
July	30.4	43.3	17.8	33.1	31.7	43.9	18.9	33.1	32.6	46.1	20.6	33.6
Aug.	32.2	46.7	16.7	32.8	32.4	46.1	17.8	32.8	32.7	47.8	18.9	32.7
Sept.	29.6	46.1	13.3	30.0	29.7	43.9	14.4	29.8	29.3	44.4	11.1	29.4
Oct.	25.0	41.7	9.4	23.9	25.2	40.0	11.7	23.8	23.3	41.1	8.3	22.9
Nov.	16.0	30.0	0.0	16.9	16.3	30.6	3.3	16.8	14.3	31.1	1.7	15.6
Dec.	12.6	25.0	-2.2	12.7	13.1	25.0	1.1	12.7	10.5	23.3	-2.2	11.7
Yearly				22.4				22.4	22.7	47.8	-2.2	22.1

Month	Yuma Citrus Station, Arizona				Bullhead City, Arizona							
	1993				1993							
	Mean	Max.	Min.	Average 1931-93	Mean	Max.	Min.	Average 1978-93				
Jan.	13.3	23.3	0.0	11.8	11.8	21.1	-0.6	12.0				
Feb.	13.8	25.0	3.9	14.0	13.7	21.7	3.3	14.7				
Mar.	18.6	32.2	3.9	16.8	17.9	32.8	5.0	17.5				
April	22.2	37.8	6.7	20.5	22.4	38.3	8.3	22.4				
May	26.3	39.4	12.2	24.4	27.9	41.1	13.3	27.1				
June	29.2	46.7	11.7	28.8	31.4	47.8	13.3	32.3				
July	31.4	45.0	19.4	32.7	33.3	46.7	20.0	35.0				
Aug.	32.4	48.3	17.8	32.3	33.8	47.8	18.3	34.2				
Sept.	29.8	44.4	13.3	29.4	30.1	44.4	15.6	30.3				
Oct.	24.4	41.1	10.6	23.1	23.9	40.6	8.9	23.9				
Nov.	15.5	30.6	2.8	16.3	14.9	28.3	2.2	16.5				
Dec.	12.4	24.4	0.0	12.4	11.9	22.8	1.7	11.7				
Yearly	22.4	48.3	0.0	21.9	22.8	47.8	-0.6	23.1				

# Missing Data

IN MEXICO

Month	Los Algodones, Baja California				Mexicali, Baja California				Bataques, Baja California			
	1993		1948-1993		1993		1926-1993		1993		1948-1993	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	26	0	31	-5	#	#	34	-7	23	-4	45	-9
Feb.	24	6	35	-2	#	#	34	-5	27	4	37	-6
Mar.	33	9	38	0	30	10	38	-1	32	4	45	-4
April	40	10	43	3	35	12	41	1	#	#	48	-9
May	42	17	47	6	41	14	47	6	#	#	51	1
June	47	17	52	11	44	15	49	9	#	#	57	6
July	45	21	50	13	47	20	48	13	#	#	56	7
Aug.	46	18	49	16	44	20	49	12	#	#	54	8
Sept.	45	16	50	10	44	8	50	9	46	12	57	4
Oct.	45	16	44	0	40	13	44	0	44	11	48	0
Nov.	33	7	38	-3	21	5	40	-2	32	2	46	0
Dec.	24	2	32	-5	25	4	32	-5	24	4	36	-4
Yearly	47	0	52	-5			50	-7			57	-9

# Missing Data

TEMPERATURE IN THE COLORADO RIVER BASIN  
IN DEGREES CELSIUS

## IN MEXICO

Month	Riito, Sonora				San Felipe, Baja California				Delta, Baja California			
	1993		1949-1993		1993		1948-1993		1993		1948-1993	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	30	1	33	-7	23	5	37	-1	#	#	40	-3
Feb.	29	6	35	-6	23	5	39	0	#	#	40	-2
Mar.	35	4	38	-7	33	5	40	0	#	#	45	-2
April	41	9	43	2	37	11	45	1	#	#	48	0
May	41	12	46	5	39	16	49	5	#	#	54	0
June	49	17	51	7	45	15	51	10	#	#	56	2
July	#	#	60	11	40	20	51	10	#	#	57	7
Aug.	#	#	50	8	45	22	57	5	#	#	60	16
Sept.	#	#	48	4	43	17	52	3	41	24	57	4
Oct.	#	#	46	-1	41	12	47	-5	37	19	47	1
Nov.	#	#	48	-3	32	9	48	-6	28	14	50	0
Dec.	#	#	30	-6	29	3	36	-2	31	20	40	-3
Yearly			60	-7	45	3	57	-6			60	-3

Month	El Centinela, Baja California											
	1993		1975-1993									
	Max.	Min.	Max.	Min.								
Jan.	28	1	30	1								
Feb.	29	6	35	-4								
Mar.	38	6	38	4								
April	40	12	46	8								
May	#	#	45	11								
June	#	#	48	11								
July	#	#	50	20								
Aug.	#	#	47	18								
Sept.	#	#	50	11								
Oct.	#	#	46	3								
Nov.	#	#	40	3								
Dec.	#	#	29	-3								
Yearly			50	-4								

# Missing Data

## IRRIGATED AREAS ALONG COLORADO RIVER BELOW IMPERIAL DAM

1993

The total drainage area within the Colorado River basin is about 637,100 square kilometers, of which 478,100 square kilometers lie above Imperial Dam and about 159,000 square kilometers, are below the dam. Of the area below Imperial Dam, 153,800 square kilometers are in the United States and about 5,180 square kilometers are in Mexico. The area below Imperial Dam includes the Gila River watershed with a total area of about 150,700 square kilometers, of which about 2,850 square kilometers are in Mexico.

The irrigated areas tabulated below comprise the areas in the United States and Mexico which are served by diversions from the Colorado River at or below Imperial Dam. The diversions are supplemented by some pumping from wells in both countries. The areas in the United States include: 1) those within the U. S. Bureau of Reclamation Projects and in the North and South Gila Valleys located near Yuma, Arizona, the data for which are furnished by the U. S. Bureau of Reclamation; 2) those within the Coachella Valley, California, the data for which are furnished by the U. S. Bureau of Reclamation; and 3) those within the Imperial Valley, California, the data for which are furnished by the U. S. Bureau of Reclamation. The areas in Mexico include those in the Mexicali Valley located in the states of Baja California and Sonora, the data for which are furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico. The areas tabulated below refer to the total areas farmed, and insofar as possible, duplication of irrigated areas because of double cropping has been eliminated.

Point of Diversion from Colorado River and Designation of Areas	Total Irrigated Areas Hectares
<b>IN THE UNITED STATES:</b>	
Imperial Dam	
Yuma Valley Diversion	18,400
Reservation Diversion	5,211
Yuma Mesa	7,027
Yuma Aux. Project Unit "B" (Yuma Mesa)	1,175
South Gila Valley	3,902
North Gila Valley	2,571
Wellton-Mohawk	22,992
Coachella Valley	23,706
Imperial Valley	210,354
Warren Act	32
Non-Project lands adjacent to Colorado River	5,083
<b>Total in United States</b>	<b>300,453</b>
<b>IN MEXICO:</b>	
Morelos Dam	
Mexicali Valley *	204,857
<b>Total in United States and Mexico</b>	<b>505,310</b>

\* An estimated 34% of total hectares is served by pumping groundwater in the Mexicali Valley

10-2545.80 ALAMO RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Staff gage located on the right bank of the river, about 11.3 kilometers east of Calexico, California, immediately downstream from the international land boundary between the United States and Mexico and approximately three meters upstream from a 1.22-meter Cipolletti weir in the throat of a twin-tube concrete culvert which carries the river flow under the All-American Canal.

RECORDS: Computed on the basis of head on the Cipolletti weir from daily staff gage readings, and weir ratings as determined by monthly current meter measurements. Records obtained and furnished by Imperial Irrigation District. Records available June 1942 through 1993.

REMARKS: The flow at this station normally comprises seepage from the All-American Canal and drainage water from the Mexicali Valley which enters the United States.

EXTREMES: Maximum mean daily discharge, 7.31 CMS (estimated), April 13, 1946; minimum discharge, no flow July 22-23, 29-30, 1949. Prior to the period of record, and since 1900, considerably higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a part of its flow passed through the Alamo River channel.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.06	0.07	0.09	0.13	0.07	0.06	0.07	0.05	0.05	0.03	0.06	0.05
2	.05	.06	.08	.15	.06	.06	.06	.05	.05	.03	.05	.05
3	.06	.07	.08	.10	.08	.09	.06	.05	.04	.04	.06	.05
4	.06	.07	.08	.09	.08	.06	.06	.07	.06	.04	.06	.05
5	.06	.07	.08	.09	.07	.06	.06	.06	.05	.04	.06	.07
6	.06	.07	.08	.09	.07	.07	.07	.06	.05	.04	.06	.07
7	.10	.06	.08	.09	.06	.07	.06	.06	.04	.04	.14	.07
8	.09	.07	.08	.09	.06	.07	.07	.06	.05	.04	.06	.07
9	.08	.07	.08	.08	.06	.07	.06	.05	.06	.05	.07	.07
10	.07	.07	.08	.08	.06	.07	.07	.05	.04	.05	.07	.06
11	.07	.07	.08	.08	.07	.07	.05	.04	.04	.05	.06	.06
12	.07	.07	.08	.07	.08	.07	.05	.05	.05	.06	.06	.06
13	.07	.07	.08	.08	.06	.09	.06	.04	.04	.06	.06	.17
14	.07	.07	.09	.09	.06	.07	.06	.03	.04	.05	.09	.05
15	.07	.06	.08	.08	.11	.06	.06	.04	.04	.05	.08	.05
16	.07	.06	.08	.09	.08	.08	.05	.06	.04	.05	.07	.05
17	.07	.06	.08	.09	.06	.09	.05	.05	.04	.05	.07	.05
18	.08	.07	.08	.10	.06	.07	.06	.06	.04	.06	.06	.05
19	.07	.07	.08	.13	.06	.06	.06	.05	.03	.06	.06	.05
20	.07	.08	.08	.10	.06	.08	.05	.05	.03	.05	.06	.05
21	.07	.08	.08	.10	.06	.07	.06	.07	.04	.05	.06	.06
22	.07	.07	.08	.12	.06	.06	.06	.06	.03	.05	.05	.05
23	.07	.08	.09	.08	.07	.06	.05	.06	.03	.05	.05	.05
24	.07	.08	.08	.08	.07	.06	.06	.06	.04	.06	.06	.05
25	.07	.08	.08	.08	.06	.07	.05	.06	.04	.06	.06	.11
26	.07	.08	.08	.08	.07	.05	.05	.06	.03	.05	.06	.05
27	.07	.07	.09	.08	.07	.05	.06	.06	.04	.05	.09	.06
28	.07	.08	.09	.07	.06	.05	.05	.05	.04	.05	.06	.06
29	.07	.09	.08	.08	.06	.06	.05	.05	.04	.06	.06	.09
30	.07	.10	.08	.08	.06	.07	.05	.05	.04	.05	.05	.06
31	.07	.12	.08	.08	.06	.06	.04	.05	.05	.05	.05	.05
Sum	2.17	1.98	2.60	2.75	2.07	2.03	1.77	1.66	1.25	1.52	1.96	1.94

Current Year 1993

Period 1943-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day		φ High			Total	Average	Maximum	Minimum	
			Day	φ High	Day	φ Low						
Jan.	0.160	0.105	7	0.10	2	0.05	0.07	187	354	3,441	122	
Feb.	.145	.120	120	.08	1	2	.06	.07	171	324	3,481	111
Mar.	.175	.135	31	.12	1	2	.08	.08	225	371	3,890	107
April	.205	.130	2	.15	112	2	.07	.09	238	390	2,741	120
May	.170	.110	15	.11	1	2	.06	.07	179	311	2,219	90.0
June	.145	.100	1	.09	126	5	.05	.07	175	299	2,080	75.2
July	.125	.090	1	.07	31	4	.04	.06	153	277	2,112	72.8
Aug.	.120	.075	1	.07	14	3	.03	.05	143	323	2,062	81.0
Sept.	.110	.075	1	.06	119	3	.03	.04	108	299	1,734	103
Oct.	.115	.080	112	.06	1	1	.03	.05	131	317	2,276	76.0
Nov.	.200	.105	7	.14	1	2	.05	.07	169	329	2,566	77.0
Dec.	.225	.100	13	.17	1	1	.05	.06	168	316	2,080	98.7
Yearly	0.225	0.075		0.17		0.03	0.06	2,047	3,910	27,317	1,321	

φ Mean daily

! And other days

10-2549.70 NEW RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder located on the left (west) bank of the river in the limits of the City of Calexico, California, 427 meters downstream (north) from the international land boundary between the United States and Mexico. Measurements are made from a foot bridge at the gage.

RECORDS: Based on a continuous record of gage heights and current meter measurements by the Imperial Irrigation District. Records computed and furnished by the District. Records available: June 1942 through 1993.

REMARKS: The New River flows northward from Mexico into the United States and thence into the Salton Sea. The flow at this station normally comprises 1) a portion of the waste and drainage water from the irrigation system in the Mexicali Valley, and 2) sewage and other wastes from Mexicali, Baja California. Flood waters enter the river from local drainage in Mexico, and such waters can reach damaging rates during violent desert storms. Waste flows from the Mexican system of canals are limited to an average annual quantity of 43,172 TCM during any successive five-year period under the provisions of Minute No. 197 of the Commission.

EXTREMES: Maximum mean daily discharge, 29.2 CMS on December 9, 1982; minimum mean daily discharge, 0.06 CMS on May 14, 1945. Prior to the period of record, and since 1900, much higher flows occurred. During the years 1905 to 1907, when the Colorado River flowed into the Salton Sea, a considerable part of its flow passed through the New River channel.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.0	6.40	8.01	12.0	8.33	6.85	6.00	6.46	7.16	5.61	5.49	5.47
2	10.1	6.17	8.38	11.3	8.01	6.57	6.03	6.03	7.33	5.52	5.66	5.66
3	9.06	6.37	9.01	11.0	8.01	6.46	5.66	6.88	6.88	5.52	5.72	6.06
4	8.84	6.46	8.84	9.49	8.27	6.51	5.49	5.64	6.54	5.92	5.83	6.15
5	8.67	6.20	8.13	9.03	8.38	6.71	5.49	5.30	6.34	5.86	5.81	6.68
6	7.79	5.92	7.70	9.52	8.16	6.71	6.00	5.47	6.23	5.38	5.81	6.80
7	15.5	6.57	8.64	10.1	7.73	6.77	6.17	5.72	6.17	5.04	6.03	7.16
8	11.5	7.56	9.52	10.3	7.45	6.83	6.54	5.69	6.34	4.98	6.37	7.53
9	11.2	8.01	10.5	10.4	7.87	6.57	6.17	5.55	6.00	4.90	6.80	8.47
10	11.1	9.40	11.3	10.1	7.96	6.20	5.86	5.52	5.78	4.70	6.54	9.03
11	10.3	9.46	11.4	10.5	9.09	5.78	5.38	5.55	5.78	4.90	6.12	8.35
12	10.9	8.52	10.7	11.0	9.46	5.72	5.30	5.55	5.69	5.44	5.64	7.82
13	9.26	7.56	10.1	11.5	9.18	5.61	5.32	5.44	5.58	5.78	5.72	7.45
14	8.61	7.33	10.9	11.6	8.86	5.69	5.61	5.21	5.78	5.92	8.92	7.99
15	9.94	7.25	11.3	11.6	8.58	5.64	5.75	5.10	5.47	5.58	7.28	8.44
16	13.1	7.22	10.9	11.6	8.44	5.49	5.69	5.04	5.49	5.72	8.58	8.01
17	10.7	7.28	10.7	11.7	8.38	5.32	5.78	5.27	5.83	5.64	9.35	7.62
18	10.7	7.79	10.5	11.5	8.21	5.13	5.38	5.07	5.86	5.66	9.01	7.48
19	9.49	8.21	10.3	11.4	8.67	5.21	5.58	5.69	6.23	5.72	8.30	7.22
20	9.37	7.39	9.94	11.8	8.92	5.30	6.17	5.83	6.32	5.78	8.30	7.16
21	9.57	7.39	9.60	12.2	7.59	5.24	6.43	6.17	6.32	5.69	8.41	7.14
22	9.01	7.82	9.26	12.5	6.97	5.55	6.57	6.40	6.09	5.66	8.07	6.68
23	8.35	7.67	9.80	12.3	7.25	5.98	6.68	6.15	5.81	5.41	7.42	6.74
24	7.70	7.73	9.91	11.4	7.16	6.09	6.43	6.29	5.81	5.41	6.66	7.11
25	7.45	7.59	9.52	10.2	6.85	5.66	6.34	7.19	5.95	5.47	6.57	7.67
26	7.11	7.53	10.4	9.40	7.22	5.55	6.37	8.21	5.55	5.44	6.09	8.41
27	6.68	7.59	11.2	8.98	7.99	5.52	6.51	6.94	5.47	5.18	5.61	8.98
28	6.88	7.67	12.7	8.92	7.48	5.32	6.60	7.05	5.52	5.13	5.55	9.35
29	6.74	13.4	9.03	9.03	6.77	5.52	6.68	6.68	5.32	5.21	5.55	8.92
30	6.57	13.3	8.72	8.72	6.54	5.89	6.68	6.71	5.47	5.44	5.49	8.07
31	6.54	12.9			6.71		6.66	6.85		5.52		7.19
Sum	289.73	208.06	318.76	321.09	246.49	177.39	187.32	185.60	180.11	169.13	202.70	232.81
Current Year 1993									Period 1943-1993			
Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum	
Jan.	11.525	12.440	7	15.5	31	6.54	9.35	25,033	12,694	27,387	2,160	
Feb.	12.135	12.510	11	9.46	6	5.92	7.43	17,976	11,152	26,416	1,552	
Mar.	11.740	12.320	29	13.4	6	7.70	10.3	27,541	12,702	31,213	1,243	
April	11.830	12.215	22	12.5	30	8.72	10.7	27,742	13,081	34,066	1,715	
May	12.135	12.440	12	9.46	30	6.54	7.95	21,297	11,814	29,740	776	
June	12.410	12.595	1	6.85	18	5.13	5.91	15,326	9,931	25,024	1,341	
July	12.425	12.575	123	6.68	12	5.30	6.04	16,184	10,527	28,368	1,008	
Aug.	12.270	12.605	26	8.21	16	5.04	5.99	16,036	12,165	34,066	1,405	
Sept.	12.360	12.575	2	7.33	29	5.32	6.00	15,562	11,354	29,251	2,214	
Oct.	12.510	12.635	! 4	5.92	10	4.70	5.46	14,613	11,304	28,072	2,567	
Nov.	12.150	12.555	17	9.35	! 1	5.49	6.76	17,513	10,722	25,310	3,063	
Dec.	12.150	12.560	28	9.35	1	5.47	7.51	20,115	12,439	28,104	2,175	
Yearly	11.525	12.635		15.5		4.70	7.45	234,938	139,885	330,444	30,310	

φ Mean daily

! And other days

10-2549.60 WASTES FROM MEXICALI POTABLE WATER PLANT TO NEW RIVER IN MEXICO

DESCRIPTION: A 3.5-meter Parshall flume, installed by the State Commission of Public Services of Mexicali, is located 2.0 kilometers upstream of the pumping plant on the supply canal. Excess water discharges into an open channel, thence into a 91 centimeter diameter pipe that empties into Rivera Drain (Drain 134), which is 2.0 kilometers below the plant and 2.0 kilometers south of the international boundary. From this point the waste is carried by a closed concrete box conduit into New River.

RECORDS: During 1993 the mean daily flows were computed from the total inflow to the potable water plant as measured at the Parshall flume, less the water pumped to the city and the water used in the maintenance of the plant. The records are obtained and furnished by the State Commission of Public Services of Mexicali. Records available: January 1968 through December 1993.

REMARKS: The plant began operation on September 28, 1963 by the State Commission of Public Services of Mexicali. Before 1968 the flow was small and infrequent. The potable water plant obtains water from the West Main Canal, which is a part of Mexico's system of canals in the Colorado Irrigation System. Excess water discharges into a closed conduit that empties into New River 1.4 kilometers upstream of the international boundary.

EXTREMES: Maximum instantaneous discharge, 2.32 CMS on March 26, 1969; minimum instantaneous discharge, zero during several days in the years 1977 through 1993.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.04	0.04	0.05	0.04	0.03	0.04	0.02	0.03	0.04	0.04	0.04	0.04
2	0	.04	.05	.05	.04	.04	.02	.01	.04	.05	.04	.04
3	.04	.04	.05	.04	.04	.03	.03	.04	.04	.06	.04	.04
4	.04	.04	.04	.04	.04	.04	.03	.04	.02	.04	.04	.04
5	.04	.03	.04	.04	.04	.03	.03	.02	.04	.06	.04	.04
6	.04	.04	.05	.04	.04	.04	.05	.02	.04	.06	.04	.04
7	.04	.04	.04	.04	.04	.03	.03	.02	.03	.07	.04	.04
8	.04	.04	.03	0	.04	.04	.05	.02	.04	.06	.04	.04
9	.04	.03	.05	.04	0	.04	.03	.04	.04	.07	.04	.04
10	.04	.05	.05	.04	.03	.02	.03	.04	.04	.04	.04	0
11	.04	.02	.04	.04	.03	.02	.05	.04	.04	.04	.04	.04
12	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
13	.04	.02	.04	0	.03	.04	.02	.05	.06	.04	.04	.04
14	.04	.04	.04	.02	0	0	.04	.04	.04	.04	.04	.04
15	.04	.03	.04	.03	.04	.04	.03	.04	.04	.03	.04	.04
16	0	.05	.01	.01	.04	.04	.04	.04	.04	.04	.04	.04
17	0	.04	0	.01	.04	.04	.04	.05	.04	.05	.04	.04
18	.04	.06	.02	.05	.03	0	.04	.04	.04	.04	.03	.03
19	.04	.04	.04	0	.04	.02	.04	.04	.05	.04	.03	.03
20	.04	.04	.03	.02	.04	.02	.04	.03	.06	.06	.04	.04
21	.04	.04	.03	.04	.04	.02	.06	.03	.06	.04	.04	.04
22	.04	.04	.04	.04	.04	.03	.04	.04	.07	.04	.03	.03
23	.04	.04	.04	.03	.04	.04	.04	.07	.04	.05	.04	.04
24	.04	.05	.05	0	.04	.02	0	.07	.04	.05	.04	.04
25	.03	.04	.04	0	.04	.02	.04	.05	.04	.04	.03	.03
26	.04	.04	.04	0	.04	0	.04	.04	.04	.05	.03	.03
27	.04	.04	.04	.03	.04	.03	.04	.04	.04	.04	.03	.03
28	.04	.04	.04	.04	.04	.02	.04	.04	.05	.05	.04	.04
29	.04	.04	.04	.04	.04	.02	.02	.04	.06	.03	.07	.07
30	.04	.04	.04	.03	.04	.04	.02	.04	.04	.07	0	0
31	.04	.05	.04	.04	.02		0	0	.06	.06	0	0
Sum	1.11	1.10	1.20	0.84	1.08	0.85	1.04	1.15	1.30	1.49	1.13	1.09

Current Year 1993

Period 1968-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum	
												Day
Jan.			1	0.04	1	2	0	0.04	95.9	170	641	0
Feb.			18	.06	11		.02	.04	95.0	110	384	0
Mar.			1	.05	17		0	.04	104	215	1,074	0
April			1	.05	8		0	.03	72.6	207	532	0
May			2	.04	1	9	0	.03	93.3	223	537	54.4
June			1	.04	114		0	.03	73.4	204	504	25.9
July			21	.06	124		0	.03	89.9	251	651	0
Aug.			123	.07	31		0	.04	99.4	272	735	95.0
Sept.			1	.07	15		.02	.04	112	256	677	71.7
Oct.			9	.07	15		.03	.05	129	240	625	110
Nov.			29	.07	30		0	.04	97.6	211	622	67.4
Dec.			29	.07	130		0	.04	94.2	195	737	8.6
Yearly				0.07			0	0.04	1,156	2,597	6,610	854

♦ Mean daily

! And other days

10-2549.65 WASTE WATERS FROM MEXICAN SYSTEM OF CANALS  
ENTERING THE UNITED STATES

DESCRIPTION: During 1993 the flow to the New River in Mexico included waste from the City of Mexicali Potable Water Plant, which discharges into Rivera Drain and then to New River, and drainage water coming from the Colorado River District system of canals that enter the New River below Laguna Xochimilco, and starting January 1988, the north irrigation district watershed is included.

RECORDS: Records of the Potable Water Plant are based on flows measured on a Parshall flume less pumping to the city. Records obtained and furnished by the State Commission of Public Services of Mexicali. Records available: Wisteria Wasteway, January 1951 through 1975; Sifon Wasteway, January 1952 to April 30, 1964; Pueblo Nuevo Wasteway, January 1956 through 1965; and the Potable Water Plant, January 1968 through December 1993.

REMARKS: To obtain data for Sifon and Pueblo Nuevo Wasteways, see bulletins 1 to 6 (1960-1965); and for Wisteria Wasteway, bulletins 1 to 16 (1960-1975). For data on wastes from Potable Water Plant, see previous page of this bulletin.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1956 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	932	1,061	10,803	7.8
February	3,573	823	8,981	7.8
March	5,506	684	5,506	26.8
April	3,551	578	3,940	19.9
May	3,174	410	3,174	11.2
June	2,298	480	6,994	0
July	2,884	697	12,644	0
August	2,702	685	5,103	0
September	2,911	551	3,966	25.9
October	1,736	650	4,285	10.0
November	2,949	704	4,668	0
December	2,737	1,071	10,720	0
Yearly	34,953	8,394	34,953	492

10-2540.05 SALTON SEA - ELEVATIONS OF WATER SURFACE

**DESCRIPTION:** Water-stage recorder and staff gage located on the western shore of the Salton Sea, 24.9 kilometers northwest of Westmorland, Imperial County, California. The Salton Sea is the sink of a closed basin which has a drainage area of 21,652 square kilometers. Zero of the gage is 76.2 meters below mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Records of water surface elevations available from November 1904 through 1993. From January 1925 to October 22, 1951, once monthly records of elevations were collected by Imperial Irrigation District from a bench mark at Figtree John's Spring, about 35.4 kilometers northwest along the western shore from the present gage. Since October 24, 1951, a continuous record of gage heights has been obtained by the U. S. Geological Survey at new gaging station published as "Salton Sea near Westmorland, California." The elevation of the old station is at a datum of 0.30 meter higher than that of the present station. All records reported below and the area and capacity table are adjusted to the datum of the present station.

**REMARKS:** Runoff from the basin, irrigation drainage and waste water from Imperial and Coachella Valleys in the United States, and drainage and waste water from part of the Mexicali Valley in Mexico discharge into the Salton Sea. Water from Mexico enters the United States in the Alamo and New River channels. The bottom of the sea is 84.6 meters below mean sea level, U. S. C. & G. S. datum.

**EXTREMES:** Maximum elevation during 1993 was 69.16 meters below mean sea level. Minimum elevation during 1993 was 69.68 meters below mean sea level. Extremes for period of record: maximum elevation 59.7 below mean sea level February 10 to March 29, 1907; minimum elevation since 1906, 76.7 meters below mean sea level in November 1924.

MEAN DAILY WATER SURFACE ELEVATION IN METERS BELOW MEAN SEA LEVEL - 1993

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	69.675	69.405	69.250	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.495	69.495
2	69.675	69.405	69.250	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.495	69.495
3	69.675	69.405	69.250	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.495	69.495
4	69.675	69.370	69.250	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.525	69.495
5	69.675	69.370	69.250	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.525	69.495
6	69.675	69.370	69.250	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.525	69.495
7	69.675	69.370	69.250	69.190	69.160	69.220	69.250	69.340	69.405	69.465	69.525	69.495
8	69.645	69.370	69.250	69.190	69.160	69.220	69.250	69.340	69.405	69.465	69.525	69.495
9	69.645	69.340	69.220	69.190	69.160	69.220	69.280	69.340	69.405	69.465	69.525	69.495
10	69.645	69.340	69.220	69.190	69.160	69.220	69.280	69.340	69.435	69.465	69.525	69.495
11	69.615	69.340	69.220	69.190	69.160	69.220	69.280	69.370	69.435	69.495	69.525	69.495
12	69.615	69.340	69.220	69.190	69.160	69.220	69.280	69.370	69.435	69.495	69.525	69.495
13	69.615	69.340	69.220	69.190	69.160	69.220	69.280	69.370	69.435	69.495	69.525	69.495
14	69.585	69.340	69.220	69.190	69.160	69.220	69.280	69.370	69.435	69.495	69.525	69.495
15	69.585	69.340	69.220	69.190	69.160	69.220	69.280	69.405	69.435	69.495	69.525	69.495
16	69.555	69.310	69.220	69.190	69.160	69.220	69.280	69.405	69.435	69.495	69.525	69.495
17	69.555	69.280	69.220	69.190	69.160	69.220	69.310	69.405	69.435	69.495	69.525	69.495
18	69.525	69.310	69.220	69.190	69.160	69.220	69.310	69.405	69.435	69.495	69.525	69.495
19	69.525	69.280	69.220	69.190	69.160	69.220	69.310	69.405	69.465	69.495	69.525	69.495
20	69.525	69.280	69.190	69.190	69.160	69.220	69.310	69.405	69.465	69.495	69.525	69.495
21	69.495	69.280	69.190	69.190	69.160	69.220	69.310	69.405	69.465	69.495	69.495	69.495
22	69.495	69.280	69.190	69.190	69.160	69.250	69.310	69.405	69.465	69.495	69.495	69.495
23	69.495	69.280	69.190	69.190	69.160	69.250	69.310	69.405	69.465	69.495	69.495	69.495
24	69.465	69.280	69.190	69.190	69.160	69.250	69.310	69.405	69.465	69.495	69.495	69.495
25	69.465	69.280	69.190	69.190	69.160	69.250	69.310	69.405	69.465	69.495	69.495	69.495
26	69.465	69.250	69.190	69.190	69.160	69.250	69.340	69.405	69.465	69.495	69.495	69.495
27	69.435	69.250	69.190	69.190	69.160	69.250	69.340	69.405	69.465	69.495	69.495	69.465
28	69.435	69.250	69.190	69.190	69.160	69.250	69.340	69.405	69.465	69.495	69.495	69.465
29	69.435	69.190	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.495	69.495	69.465
30	69.405	69.190	69.190	69.160	69.190	69.250	69.340	69.405	69.465	69.495	69.495	69.465
31	69.405	69.190	69.190	69.190	69.190	69.250	69.340	69.405	69.465	69.495	69.495	69.465
Avg.	69.560	69.325	69.215	69.190	69.165	69.225	69.290	69.380	69.440	69.485	69.510	69.490

Month	Current Year 1993		Period 1935-1993		
	# Extreme Elevation Meters		Elevation Meters		
	High	Low	# Average	# Maximum	! Minimum
Jan.	69.405	69.675	71.635	69.310	75.990
Feb.	69.250	69.405	71.540	69.220	75.830
Mar.	69.190	69.250	71.460	69.190	75.770
April	69.160	69.190	71.405	69.160	75.800
May	69.160	69.190	71.400	69.130	75.740
June	69.190	69.250	71.445	69.190	75.830
July	69.250	69.340	71.495	69.220	75.930
Aug.	69.340	69.405	71.555	69.250	76.020
Sept.	69.405	69.465	71.615	69.280	76.020
Oct.	69.465	69.495	71.640	69.310	76.140
Nov.	69.495	69.525	71.650	69.340	76.200
Dec.	69.465	69.495	71.615	69.340	76.080
Yearly	69.160	69.675	71.540	69.130	76.200

Area and Capacity Table		
Elevation	Area	Capacity
Meters Below M.S.L.	Hectares	Million Cubic Meters
84.640	0	0
83.520	8,337	31.7
82.300	25,455	232.8
81.080	38,284	629.8
79.250	49,615	1,443.2
78.030	54,512	2,077.2
76.810	60,218	2,775.3
74.370	72,723	4,393.7
73.150	79,683	5,322.5
71.630	89,760	6,611.5
70.100	95,426	8,022.6
67.060	106,029	11,092.7
64.010	116,753	14,481.1
60.960	127,680	18,206.2

# Mean Daily                      # Mean monthly                      ! Reading near first day of month

## CHEMICAL ANALYSES OF WATER SAMPLES

The table below is based on samples collected and analyzed by the California Regional Water Quality Control Board - Colorado River Basin, Region-7. New River samples prior to 1985 collected and analyzed by the U.S. Geological Survey. Beginning December 1971, not all constituents analyzed. Samples from New River are taken from the right bank at road bridge 137 meters north of international boundary. Records of sampling extend from April 1951 through 1993.

## NEW RIVER

1993 Date	Time Std.	*Streamflow Momentary CMS	Water Temperature Deg C	PH Units	Oxygen Dissolved (DO) mg/L	Specific Conductance Microsiemens/cm	Turbidity NTU
Mar. 9	1200	10.2	19.0	7.2	3.7	2,990	26
Nov.16	1200	8.07	14.0	7.4	**	3,000	N.A.

Note: Temperature, pH, D.O., and Specific Conductance - Data collected in field

\* Flow reported by Imperial Irrigation District

\*\* DO Meter Inoperable

N.A. Data not available

## CHEMICAL ANALYSES OF WATER SAMPLES

## NEW RIVER AT INTERNATIONAL BOUNDARY

1993

SAMPLE TYPE	COMPOSITE		DETECTION LIMIT
	Mar. 9, 1993	Nov. 16, 1993	
PARAMETER	CONCENTRATION	CONCENTRATION	
Arsenic	N.D.	N.D.	10.0 ug/l
Boron	0.59 mg/l	—	0.1 mg/l
Cadmium	2.0 ug/l	N.D.	1.0 ug/l
Chromium	N.D.	N.D.	10.0 ug/l
Copper	11.0 ug/l	N.D.	10.0 ug/l
Lead	N.D.	N.D.	10.0 ug/l
Phenol	0.006 mg/l	—	0.002 mg/l
MBAS	0.36 mg/l	1.64 mg/l	0.025 mg/l
Zinc	N.D.	N.D.	50.0 ug/l
Total Cyanide	N.D.	N.D.	0.01 mg/l
Total Phosphate (PO <sub>4</sub> -P)	1.2 mg/l	—	0.01 mg/l
Nitrate (NO <sub>3</sub> -N)	0.8 mg/l	0.90 mg/l	0.20 mg/l
Nitrite (NO <sub>2</sub> -N)	N.D.	0.04 mg/l	0.03 mg/l
Ammonia (NH <sub>3</sub> +NH <sub>4</sub> -N)	3.7 mg/l	4.40 mg/l	0.05 mg/l
Total Dissolved Solids	2,100 mg/l	2,410 mg/l	—
Total Suspended Solids	17.0 mg/l	4.20 mg/l	—
Volatile Suspended Solids	7.0 mg/l	2.30 mg/l	—

N.D.— Parameter not detected

SPECIFIC CONDUCTANCE OF WATER SAMPLES

The following table shows specific conductance of individual water samples from the New River in Mexico at the international boundary. Samples were taken by the Mexican Section of the Commission, who also made the determinations.

NEW RIVER AT INTERNATIONAL BOUNDARY

SPECIFIC CONDUCTANCE OF WATER SAMPLES IN MICROSIEMENS/CM @ 25 DEG C - 1993

January		March		May		July		September		November	
6	3,200	3	4,400	5	4,200	7	4,700	1	3,800	3	4,700
13	3,900	10	3,400	12	4,300	14	4,900	8	4,000	10	4,100
20	4,900	17	3,300	19	4,200	21	4,300	15	4,100	17	4,200
27	4,200	24	4,300	26	4,200	28	3,900	22	3,700	24	3,900
		31	3,000					29	3,900		
February		April		June		August		October		December	
3	4,300	7	3,600	2	5,000	4	3,900	7	4,100	1	4,900
10	4,800	14	4,000	9	4,400	11	4,000	13	4,500	8	4,100
17	4,500	21	3,800	16	5,000	18	4,400	20	4,400	15	4,100
24	4,300	28	3,600	23	5,000	25	3,800	27	4,500	22	4,100
				30	4,900					29	3,550



## 11-0100.00 COTTONWOOD CREEK ABOVE MORENA DAM, CALIFORNIA

**DESCRIPTION:** Staff gage located on east side of outlet tower immediately upstream from face of Morena Dam. The dam is located on Cottonwood Creek 2.9 kilometers upstream from the mouth of Hauser Creek, 13.7 kilometers upstream from Barrett Dam, and about 32.2 kilometers upstream from the international boundary. The zero of the gage is 878.56 meters above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Reservoir inflows shown below were computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall, by the International Boundary and Water Commission, United States Section. They represent all water reaching Morena Reservoir, including rainfall on reservoir water surface. Basic data were furnished by the City of San Diego, California. Records April 1911 through 1993.

**REMARKS:** Storage began in Morena Reservoir March 1910. Reservoir capacity and area ratings date from 1910 when Morena Dam was completed. Records for 1993 computed on basis of area-capacity curves determined from 1948 resurvey. Various changes have been made to the spillway section since construction of the dam. Elevation of the present crest of ungated spillway is 47.85 meters, gage datum. Reservoir capacity at spillway crest, 1948 survey, is 61,934 TCM. The entire capacity of Morena Reservoir is used to furnish a part of the water supply of the City of San Diego, California. Water is released from Morena Reservoir down Cottonwood Creek to Barrett Reservoir as required.

**EXTREMES:** Maximum monthly inflow since 1937, 55,845 TCM, March 1983. Prior to 1937, maximum monthly inflow, 45,886 TCM, January 1916; minimum no flow during parts of many years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1937 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	20,362	1,159	20,362	0
February	18,288	2,658	41,407	9.9
March	11,856	3,713	55,845	23.8
April	5,691	2,076	28,530	4.1
May	2,953	1,037	18,642	0
June	1,526	576	10,173	0
July	447	362	7,651	0
August	39.0	298	8,916	0
September	0.0	199	6,331	0
October	77.0	181	4,817	0
November	42.9	298	5,633	0
December	1,538	812	9,472	5.4
Yearly	62,820	13,369	177,579	149

## 11-0105.00 COTTONWOOD CREEK BELOW MORENA DAM, CALIFORNIA

**DESCRIPTION:** Two water-stage recorders, one on the upstream side of the southeast abutment of Morena Dam for measuring head on the spillway crest and one immediately below the dam with a rectangular control weir for measuring ordinary reservoir releases, and cableway located about 1.3 kilometers downstream from the dam. Discharge measurements made at the cableway include leakage, controlled releases, and spillway discharges.

**RECORDS:** Monthly records shown below represent the water available immediately below Morena Dam, consisting of spillway waste, draft, and leakage from the dam. They are computed by the International Boundary and Water Commission, United States Section, from basic data furnished by the City of San Diego, California. Records available: January 1911 through 1993.

**REMARKS:** Flows at this station are regulated by Morena Dam; storage began March 1910. Water is released from Morena Reservoir as required and flows down the natural channel of Cottonwood Creek to Barnett Reservoir. There are no major diversions above Morena dam.

**EXTREMES:** Maximum monthly discharge since 1937, 55,615 TCM, March 1983. Prior to 1937, maximum monthly discharge, 26,397 TCM February 1916; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1937 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	821	269	2,583	0
February	743	1,072	19,644	0
March	821	2,142	55,615	0
April	819	1,605	28,159	0
May	821	863	18,100	0
June	819	638	9,260	0
July	821	367	6,236	0
August	821	350	7,937	0
September	819	398	7,253	0
October	821	227	4,639	0
November	819	263	5,071	0
December	821	520	9,099	0
Yearly	9,766	8,714	168,432	0

## 11-0110.00 COTTONWOOD CREEK ABOVE BARRETT DAM, CALIFORNIA

**DESCRIPTION:** Staff gage located immediately upstream from face of dam on west side of outlet tower. Barrett Dam is located on Cottonwood Creek 13.7 kilometers downstream from Morena Dam, 1.6 kilometers downstream from the mouth of Pine Valley Creek, and about 19.3 kilometers upstream from the international boundary. Zero of gage is 440.78 meters above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Records reported below represent all water reaching Barrett Dam from the sub-basin below Morena Dam, including rainfall on the reservoir water surface. Leakage, releases, and spills from Morena Reservoir are not included. The inflows were computed from monthly reservoir records of storage, releases, spills, leakage evaporation, and rainfall furnished by the City of San Diego, California. Records available: January 1921 through 1993. Records of stream flow for a station at the dam site are also available for the periods 1906-1915 and 1917-1920.

**REMARKS:** Storage began at Barrett Reservoir in January 1921. The area-capacity-elevation curves used in the inflow calculations are dated 1948, 1951, and 1955 and were furnished by the City of San Diego, California. Capacity of reservoir at top of flash gates on spillway (gage height 51.47 meters) is 55,205 TCM. Capacity at spillway crest (gage height 49.04 meters) is 46,811 TCM. Dead storage, 887 TCM below lowest outlet (gage height 17.95 meters) is included in these capacities. The entire capacity of Barrett Reservoir is used to furnish a part of the water supply of the City of San Diego, California.

**EXTREMES:** Maximum monthly discharge since 1937, 67,540 TCM, February 1980. Prior to 1937, maximum monthly discharge, 67,595 TCM February 1927; minimum, no flow during several months of various years.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1937 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	29,627	1,476	29,627	6.4
February	12,271	3,301	67,539	9.4
March	7,224	5,196	56,370	17.4
April	4,077	2,470	26,680	12.6
May	2,576	1,052	10,251	0
June	814	475	4,818	0
July	0	221	2,081	0
August	0	138	735	0
September	0	142	936	0
October	0	115	796	0
November	247	218	1,531	0
December	252	638	6,845	2.1
Yearly	57,088	15,442	141,024	159

11-0114.90 DULZURA CONDUIT BELOW BARRETT DAM, CALIFORNIA

DESCRIPTION: Water-stage recorder 0.8 kilometer downstream from Barrett Dam on right bank of Dulzura Conduit 15.2 meters upstream from road crossing to Barrett Dam. Elevation of gage has not been determined.

RECORDS: Computed on basis of head on control section of flume, as measured by water-stage recorder, and rating curve determined from current meter measurements. Records obtained and furnished by the City of San Diego, California. Records available: January 1909 through 1993.

REMARKS: Barrett Dam was completed in 1921. Prior to this date the intake of Dulzura Conduit was located 2.4 kilometers upstream. The conduit carries diversions from Barrett Reservoir on Cottonwood Creek westerly across the divide into Otay Reservoir for municipal use by the City of San Diego. Prior to September 30, 1958, station was located 12.9 kilometers along the conduit from Barrett Dam, being reported as "Dulzura Conduit near Dulzura;" and the draft from Barrett Reservoir was computed from the discharges obtained at the conduit gaging station, multiplied by the factor 1.05 to allow for channel loss in the reach from the reservoir to the gaging station.

EXTREMES: Since 1937: Maximum mean daily discharge, 1.56 CMS on March 15, 1954; minimum discharge, no flow for long periods on many occasions.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
Sum	0	0	0	0	0	0	0	0	0	0	0	0

Current Year 1993

Period 1937-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum
Jan.			! !	0	! !	0	0	485	2,899	0	
Feb.			! !	0	! !	0	0	509	2,627	0	
Mar.			! !	0	! !	0	0	677	2,874	0	
April			! !	0	! !	0	0	951	3,528	0	
May			! !	0	! !	0	0	1,082	3,750	0	
June			! !	0	! !	0	0	1,152	3,602	0	
July			! !	0	! !	0	0	1,004	3,602	0	
Aug.			! !	0	! !	0	0	936	3,478	0	
Sept.			! !	0	! !	0	0	781	2,862	0	
Oct.			! !	0	! !	0	0	649	3,022	0	
Nov.			! !	0	! !	0	0	652	3,404	0	
Dec.			! !	0	! !	0	0	587	2,843	0	
Yearly				0		0	0	9,465	33,514	0	

φ Mean daily

! And other days

## 11-0111.00 COTTONWOOD CREEK BELOW BARRETT DAM, CALIFORNIA

**DESCRIPTION:** Water-stage recorder and cableway located about 4.0 kilometers downstream from Barrett Dam and 0.8 kilometer upstream from Rattlesnake Canyon for measuring Barrett Dam spills; and staff gage and control weir located immediately below the dam for measuring leakage. The elevation of the gage is about 305 meters (from topographic map).

**RECORDS:** Data furnished by the City of San Diego, California. Prior to January 1953, the records were furnished by the City of San Diego and reviewed and revised by the United States Section of the Commission. The recorder is to be operated only when Barrett Reservoir is near or above spillway level. Spillway discharges have occurred in May 1943, March, April 1979, January to May of 1980, April, December 1982, the entire year of 1983, and January to April 1993. Spillway discharges included in the period record below were computed by the City of San Diego from the head on the spillway crest, read on the reservoir gage, and applied to a broad-crested weir formula. Records available: January 1921 through 1993. Storage began in Barrett Reservoir in January 1921.

**REMARKS:** Records reported below represent the water available in the natural channel of Cottonwood Creek immediately below Barrett Dam. Records of draft from Barrett Reservoir are not included, inasmuch as all releases are made to Dulzura Conduit, which transports water outside the basin. Leakage is mainly through the spillway gates.

**EXTREMES:** Maximum monthly discharge since 1937, 111,775 TCM March 1983. Prior to 1937, maximum monthly discharge 47,366 TCM February 1927; minimum, no flow during several months of various years.

MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1937 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	4,528	298	7,460	0
February	12,586	2,269	86,736	0
March	8,034	4,074	111,775	0
April	2,128	2,277	45,417	0
May	0	949	28,287	0
June	0	433	13,503	0
July	382	167	5,311	0
August	382	115	4,206	0
September	1,554	37.4	1,554	0
October	1,530	31.6	1,530	0
November	0	91.4	5,100	0
December	0	140	6,058	0
Yearly	31,124	10,882	254,099	0

11-0120.00 COTTONWOOD CREEK ABOVE TECATE CREEK NEAR DULZURA, CALIFORNIA

**DESCRIPTION:** Water-stage recorder and cableway located 2.6 kilometers upstream from the international land boundary between the United States and Mexico, 1.3 kilometers upstream from the confluence with Tecate Creek, and 8.2 kilometers south of Dulzura, California. Low water discharge measurements are made by wading at the gage; high water measurements are made from the cableway, which is located 213 meters downstream from the gage. Zero of the gage is 173.55 meters above mean sea level, U. S. C. & G. S. datum.

**RECORDS:** Based on a continuous record of gage heights and current meter measurements or observation of no flow. Records obtained and furnished by the U. S. Geological Survey. Records available: October 1936 through 1993.

**REMARKS:** Flow is largely controlled by Barrett and Morena Reservoirs, 16.1 kilometers and 29.0 kilometers, respectively, upstream from this station.

**EXTREMES:** Maximum discharge 331 CMS February 21, 1980 (gage height 3.40 meters). Minimum discharge, no flow during part of each year.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	8.13	17.6	5.21	0.25	0.31	0.40	0.57	0.48	1.90	1.84	0.04
2	0	6.63	15.3	4.87	.25	.31	.42	.59	.48	1.90	.45	.03
3	0	5.81	13.5	4.62	.25	.31	.45	.62	.48	1.87	.20	.03
4	0	5.13	12.1	4.30	.26	.31	.45	.62	.48	1.93	.15	.03
5	0	4.53	10.9	4.13	.27	.42	.48	.59	.48	1.95	.11	.03
6	.08	4.30	10.0	4.02	.25	.59	.48	.59	.45	1.93	.08	.03
7	23.2	4.11	9.26	3.96	.24	.54	.48	.59	.54	1.93	.07	.03
8	37.7	25.9	8.78	3.79	.25	.51	.51	.57	1.84	1.95	.06	.03
9	4.39	36.0	8.24	3.60	.24	.45	.48	.57	1.95	1.95	.05	.03
10	2.29	21.7	7.87	3.43	.22	.42	.48	.54	2.01	1.95	.05	.03
11	1.78	14.5	7.50	3.31	.22	.37	.45	.54	1.98	1.95	.06	.04
12	3.00	11.0	7.08	3.23	.23	.37	.48	.54	1.98	1.95	.07	.05
13	12.8	9.54	6.60	3.14	.22	.37	.48	.57	1.95	1.95	.07	.04
14	28.6	8.72	6.49	2.89	.21	.37	.48	.59	1.76	1.95	.06	.04
15	22.7	8.04	6.29	2.66	.21	.31	.48	.62	1.90	1.95	.05	.08
16	68.0	7.42	6.15	.99	.23	.31	.51	.62	2.01	1.95	.05	.05
17	41.6	6.91	6.00	.76	.25	.31	.48	.62	2.21	1.95	.05	.05
18	45.3	7.56	5.86	.62	.23	.28	.45	.62	2.12	1.95	.04	.04
19	49.8	47.9	5.72	.54	.23	.28	.48	.62	2.12	1.95	.04	.04
20	41.1	77.6	5.55	.48	.23	.31	.71	.59	2.15	1.95	.04	.04
21	29.7	45.0	5.38	.42	.24	.31	.74	.51	2.10	1.95	.03	.04
22	22.4	28.6	5.15	.40	.25	.28	.74	.51	2.07	1.95	.03	.03
23	17.4	23.0	4.90	.40	.27	.31	.74	.54	2.01	1.95	.04	.03
24	14.2	36.5	4.73	.37	.28	.31	.74	.54	1.95	1.95	.04	.03
25	12.1	29.2	4.62	.34	.28	.28	.74	.51	1.90	1.95	.04	.03
26	10.8	21.6	5.98	.31	.31	.31	.74	.51	1.87	1.95	.03	.03
27	9.77	23.8	10.4	.31	.31	.31	.96	.51	1.87	1.95	.03	.03
28	8.52	19.9	9.06	.28	.31	.34	1.02	.51	1.87	1.95	.03	.03
29	7.84		8.01	.28	.31	.37	.99	.48	1.84	1.95	.03	.03
30	7.16		6.26	.27	.31	.40	.65	.48	1.87	1.95	.04	.03
31	8.98		5.64		.31		.59	.48		1.95		.03
Sum	531.21	549.03	246.92	63.73	7.92	10.67	18.28	17.36	48.72	60.21	3.93	1.12

Current Year 1993

Period 1937-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.			16	68.0	1	0	17.1	45,897	1,368	45,897	0
Feb.			20	77.6	7	4.11	19.6	47,436	3,513	85,134	0
Mar.			1	17.6	25	4.62	7.97	21,334	4,773	109,418	0
April			1	5.21	30	.27	2.12	5,506	2,697	49,635	0
May			1	.31	114	.21	.26	684	963	22,439	0
June			6	.59	118	.28	.36	922	324	7,301	0
July			28	1.02	1	.40	.59	1,579	110	3,599	0
Aug.			1	.62	129	.48	.56	1,500	91.2	1,850	0
Sept.			17	2.21	6	.45	1.62	4,209	90.3	4,209	0
Oct.			1	1.95	3	1.87	1.94	5,202	100	5,202	0
Nov.			1	1.84	121	.03	.13	340	53.9	1,378	0
Dec.			15	.08	1	.03	.04	96.8	192	3,169	0
Yearly				77.6		0	4.27	134,706	14,255	220,556	0

♠ Mean daily      † And other days

11-0125.00 CAMPO CREEK NEAR CAMPO, CALIFORNIA

DESCRIPTION: Water-stage recorder and broad-crested weir on left bank, 0.8 kilometer upstream from the international land boundary between the United States and Mexico, just upstream from the bridge on California State Highway 94, 5.6 kilometers southwest of Campo, California. Zero of gage is 664.13 meters above mean sea level, U. S. C. & G. S. datum.

RECORDS: Based on current meter measurements and observation of no flow. Records obtained and furnished by the U. S. Geological Survey from October 1936 through 1993.

REMARKS: Campo Creek originates in the United States and flows southwestward into Mexico where it joins Tecate Creek. The flow at this station was partially regulated by a small conservation reservoir, 1.6 kilometers upstream, from August 1956 to February 20, 1980, when it was destroyed by a flood.

EXTREMES: Maximum discharge, 25.3 CMS, March 24, 1983 (gage height 1.64 meters present datum), from rating curve extended above 3.12 CMS on basis of velocity-depth relation and cross section area at the control. Minimum discharge, no flow during part of most years.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.01	0.40	2.83	1.70	0.85	0.54	0.22	0.15	0.10	0.08	0.21	0.54
2	.01	.40	2.52	1.42	.85	.51	.22	.13	.10	.08	.20	.34
3	.01	.37	2.32	1.16	.88	.62	.21	.13	.10	.09	.13	.42
4	.01	.37	2.24	1.19	.88	.71	.20	.11	.09	.09	.17	.48
5	.01	.37	2.15	1.25	.82	.65	.19	.11	.09	.10	.20	.57
6	.09	.37	2.07	1.27	.76	.93	.18	.11	.09	.11	.22	.51
7	15.3	.42	1.98	1.30	.71	.85	.17	.10	.09	.11	.16	.42
8	18.7	8.10	1.90	1.25	.57	.71	.18	.10	.09	.11	.16	.48
9	.96	4.25	1.84	1.16	.45	.48	.18	.10	.09	.14	.12	.42
10	.45	1.27	1.78	1.10	.51	.40	.18	.10	.09	.16	.18	.24
11	.59	1.10	1.78	1.02	.54	.51	.14	.09	.09	.20	.37	.40
12	2.86	1.02	1.76	.91	.51	.48	.16	.10	.09	.23	.88	1.36
13	4.30	.96	1.73	.88	.37	.45	.19	.10	.09	.19	.82	.74
14	9.54	.91	1.73	.82	.37	.42	.18	.12	.09	.17	.62	.65
15	4.81	.88	1.70	.82	.45	.40	.18	.13	.09	.15	.68	2.55
16	21.1	.88	1.70	.65	.42	.37	.18	.13	.10	.24	.25	1.39
17	9.66	.85	1.67	.79	.37	.34	.18	.13	.11	.28	.24	.76
18	14.0	.99	1.64	.79	.37	.31	.18	.13	.12	.26	.27	.65
19	10.5	2.78	1.59	.85	.45	.31	.18	.12	.12	.22	.31	.71
20	2.55	4.25	1.56	.85	.48	.31	.18	.11	.12	.18	.24	.79
21	1.16	2.97	1.47	.91	.51	.28	.18	.08	.12	.17	.31	.82
22	.93	2.61	1.39	.96	.54	.28	.18	.08	.11	.18	.40	.82
23	.76	2.32	1.30	.96	.57	.31	.18	.07	.11	.19	.76	.71
24	.65	2.72	1.25	.93	.59	.28	.18	.07	.10	.17	.76	.74
25	.62	2.07	1.19	.93	.62	.27	.18	.28	.10	.16	.59	.74
26	.57	2.04	3.91	.91	.57	.26	.19	.11	.08	.15	.45	.79
27	.51	3.12	4.84	.91	.51	.25	.20	.11	.05	.16	.45	.76
28	.48	3.00	3.74	.88	.42	.24	.22	.10	.05	.14	.48	.57
29	.45		2.83	.88	.51	.24	.22	.10	.06	.14	.42	.12
30	.45		2.58	.85	.51	.23	.19	.10	.07	.14	.54	.09
31	.42		2.10		.54		.16	.10		.14		.09
Sum	122.46	51.79	65.09	30.30	17.50	12.94	5.76	3.50	2.80	4.93	11.59	20.67
Current Year 1993										Period 1937-1993		
Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	φ High	Day	φ Low		Total	Average	Maximum	Minimum	
Jan.			16	21.1	1	0.01	3.95	10,581	400	10,581	0	
Feb.			8	8.10	1	.37	1.85	4,475	505	5,288	0	
Mar.			27	4.84	25	1.19	2.10	5,624	845	11,587	0	
April			1	1.70	16	.65	1.01	2,618	533	8,886	0	
May			3	.88	13	.37	.56	1,512	256	3,956	0	
June			6	.93	30	.23	.43	1,118	129	2,234	0	
July			1	.22	11	.14	.19	498	73.2	1,525	0	
Aug.			25	.28	23	.07	.11	302	71.1	2,008	0	
Sept.			18	.12	27	.05	.09	242	52.1	1,214	0	
Oct.			17	.28	1	.08	.16	426	64.6	1,084	0	
Nov.			12	.88	9	.12	.39	1,001	127	1,522	0	
Dec.			15	2.55	130	.09	.67	1,786	207	1,953	0	
Yearly				21.1		0.01	0.96	30,183	3,263	38,639	0	

φ Mean daily

! And other days

## 11-0131.00 INFLOWS TO RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

**DESCRIPTION:** Rodriguez Dam is located in Mexico on Rio de las Palmas, the principal tributary to the Tijuana River, about 9.0 kilometers upstream from its confluence with Cottonwood Creek, 17.0 kilometers upstream from the point where the Tijuana River crosses the international boundary between the United States and Mexico, and 16.0 kilometers southeast of Tijuana, Baja California.

**RECORDS:** Computed from monthly reservoir records of storage, releases, spills, leakage, evaporation, and rainfall. Records obtained by the Ministry of Agriculture and Hydraulic Resources through May 1961; from June 1961 through March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana, Baja California, and from April 1966 by the State of Baja California Commission of Public Services for Tijuana. Since 1992, the data have been provided by the National Water Commission. Records furnished by the Mexican Section of the Commission. Records available: May 1937 through 1993. Storage began in Rodriguez Reservoir on September 22, 1936.

**REMARKS:** Records of runoff represent all water reaching Rodriguez Reservoir, including rainfall on the reservoir water surface. Area-capacity-elevation rating for reservoir used in the computations is dated 1927 when the reservoir area was initially surveyed. Elevation of crest of spillway 115.85 meters above mean sea level; at top of spillway gates 125.00 meters above mean sea level. Reservoir capacity at spillway crest 92,370 TCM; at top of spillway gates 138 TCM.

**EXTREMES:** Maximum monthly inflow, 237,657 TCM; January 1993; minimum, no flow during part of most years.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1938 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	237,657	6,645	237,657	0
February	119,962	8,895	194,216	7.2
March	39,159	12,758	174,556	5.2
April	10,552	3,931	95,953	0
May	3,688	773	14,136	0
June	1,183	251	5,749	0
July	0	124	1,806	0
August	0	73.0	950	0
September	0	74.0	575	0
October	0	92.8	432	0
November	0	193	2,393	0
December	472	1,022	19,348	10.3
Yearly	412,673	34,831	412,673	313

## 11-0132.00 DIVERSIONS FROM RODRIGUEZ RESERVOIR, BAJA CALIFORNIA

DESCRIPTION: Sparling flow meter located immediately below the dam in the pipeline which carries water from Rodriguez Reservoir to Gate No. 1 (Poblado Presa) and to Gate No. 2 (City Aqueduct). Formerly, water for irrigation was also diverted to the North and South Canals.

RECORDS: Direct recording by Sparling flow meter. Records through May 1961 were obtained by the Ministry of Agriculture and Hydraulic Resources; from June 1961 to March 1966 by the Junta de Agua Potable y Alcantarillado del Distrito Urbano de Tijuana; and from April 1966 through 1990 by the State of Baja California Commission of Public Services for Tijuana. Since 1992, the data have been provided by the National Water Commission. Records available: May 1937 through 1993 through the Mexican Section of the Commission.

REMARKS: Beginning in January 1937, diversions for irrigation began from both sides for the Tijuana valley and for domestic use at the village by Rodriguez Dam and the City of Tijuana. Since February 1960, no water has been released for irrigation of farmlands.

EXTREMES: Maximum monthly diversion, 2,421 TCM, July 1944; minimum, no flow on several occasions since March 1941.

## MONTHLY DISCHARGE IN THOUSAND CUBIC METERS

MONTH	CURRENT YEAR 1993	PERIOD 1938 - 1993		
		AVERAGE	MAXIMUM	MINIMUM
January	312	457	1,969	0
February	65	455	1,763	0
March	0	516	1,990	0
April	1,204	637	1,976	0
May	1,699	796	2,067	0
June	1,596	880	2,290	0
July	1,621	940	2,421	0
August	1,452	875	2,293	0
September	1,449	766	1,884	0
October	1,496	683	1,996	0
November	1,389	548	1,928	0
December	1,357	551	1,969	0
Yearly	13,640	8,104	22,596	0

11-0133.00 TIJUANA RIVER AT INTERNATIONAL BOUNDARY

DESCRIPTION: Water-stage recorder on top of north levee about 1.1 kilometers downstream (north) from boundary, 1.8 kilometers upstream from the new Dairy Mart Road bridge, and 2.3 kilometers west of the international gate at San Ysidro, California. Zero of the gage is at mean sea level, U. S. C. & G. S. datum.  
 RECORDS: Based on current meter measurements, staff gage readings and record of gage heights. Records obtained and furnished by the United States Section of the Commission. Records available: May 1947 through 1993.  
 EXTREMES: Since May 1947: Maximum instantaneous discharge, 937 CMS, February 21, 1980; minimum discharge, no flow during many years since 1951.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.41	12.7	44.2	7.82	2.95	1.75	0.97	0.48	0.87	2.53	2.23	0.99
2	1.77	11.9	45.6	5.49	1.92	1.73	.92	.98	.84	2.59	1.95	.75
3	1.24	10.9	31.7	5.72	1.91	1.77	1.03	.91	.81	2.61	1.30	.71
4	1.05	11.7	53.0	5.95	1.89	1.81	.98	.80	.86	2.54	1.11	.67
5	.87	12.3	68.8	6.17	1.88	2.03	1.07	.78	.96	2.60	.97	.63
6	8.30	12.7	67.1	7.05	1.87	1.96	1.10	1.12	1.03	2.56	.79	.75
7	337	12.8	54.4	7.02	1.86	1.92	1.15	.70	1.09	2.52	.69	.87
8	227	66.8	35.1	6.51	1.85	1.80	.95	.09	1.44	2.38	.65	.67
9	21.6	176	26.0	6.40	1.84	1.78	.96	.30	2.13	2.42	.55	.63
10	9.01	110	18.9	6.51	1.83	1.68	.97	.49	2.29	2.45	.57	.65
11	7.62	64.0	12.4	6.26	1.82	1.44	.86	.60	2.33	2.62	.58	1.61
12	38.8	38.2	11.8	6.29	1.80	1.42	.86	.69	2.80	2.66	.64	2.12
13	34.6	31.4	11.2	6.17	1.79	1.38	.89	.73	2.31	2.63	.81	1.67
14	251	30.6	10.7	6.20	1.78	1.39	.84	.65	2.25	2.55	.94	1.82
15	337	30.3	10.1	5.35	1.77	1.33	.90	.66	2.23	2.56	.85	2.10
16	731	28.9	9.57	5.61	1.76	1.34	.91	.69	2.17	2.63	1.05	1.07
17	603	26.6	9.09	5.58	1.74	1.24	.96	.70	2.37	2.70	1.00	1.15
18	312	26.9	8.67	5.35	1.73	1.12	.94	.68	2.43	2.68	.93	.02
19	236	160	8.58	5.78	1.72	1.03	.93	.64	2.28	2.62	.88	.07
20	68.5	496	8.30	5.44	1.71	1.00	.94	.65	2.23	2.46	.76	.17
21	43.0	428	7.90	4.96	1.70	1.01	1.27	.95	2.32	2.75	.69	.20
22	31.2	136	7.56	4.79	1.69	1.06	1.38	.87	2.37	3.46	.71	.16
23	24.5	72.2	7.08	4.62	1.76	1.04	1.43	.87	2.42	2.80	.92	.17
24	20.6	134	6.71	4.42	1.69	.97	1.35	.86	2.41	2.37	.77	.11
25	17.8	109	6.60	4.22	1.60	.88	1.36	.93	2.35	2.46	.81	.13
26	15.5	49.3	8.07	4.05	1.65	.82	1.65	.88	2.39	2.38	.82	.15
27	13.5	63.4	8.86	3.85	1.68	.95	1.36	1.60	2.36	2.37	.73	.26
28	13.3	56.1	11.2	3.68	1.66	1.02	1.50	2.03	2.38	2.49	.54	.29
29	13.0	10.1	9.18	3.51	1.66	.99	1.38	1.63	2.39	2.33	.74	.25
30	13.9	9.18	8.24	3.37	1.69	1.00	.97	.86	2.42	2.37	1.82	.28
31	12.6			1.68			.62	.86		2.30		.32
Sum	3,447.67	2,418.7	636.71	164.14	55.88	40.66	33.40	25.68	59.51	79.39	27.80	20.44

Current Year 1993

Period 1947-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	High		Low	Total		Average	Maximum	Minimum	
			Day	Day							
Jan.	14,180	11,975	16	923	5	0.64	111	297,879	9,709	297,879	0
Feb.	13,795	12,650	20	566	3	10.7	86.4	208,976	15,084	388,951	0
Mar.	12,995	12,410	4	99.4	25	6.51	20.5	55,012	15,760	362,019	0
April			1	8.84	30	3.37	5.47	14,182	4,151	77,633	0
May			1	3.31	125	1.57	1.80	4,828	2,145	52,545	0
June			5	3.26	26	.73	1.36	3,513	691	11,960	0
July			17	2.97	31	.53	1.08	2,886	542	11,400	0
Aug.			28	2.21	1	0	.83	2,219	701	21,083	0
Sept.			10	4.33	3	.76	1.98	5,142	306	5,142	0
Oct.			22	3.85	21	2.02	2.56	6,859	417	6,859	0
Nov.			30	2.97	28	.42	.95	2,402	584	5,399	0
Dec.			11	4.25	117	0	.66	1,766	1,052	8,270	0
Yearly				923		0	19.2	605,664	51,142	734,832	0

! And other days

## STORED WATER IN RESERVOIRS, TIJUANA RIVER BASIN

Data are presented below for all storage reservoirs in the Tijuana River Basin. The data represent contents on the last day of the month in thousand cubic meters. The reservoir capacities indicated are total capacities at the top of the spillway gates in closed position on the controlled spillways of Barrett and Rodriguez Dams, and at spillway level for Morena Dam, which has had an uncontrolled spillway since the spillway gates were removed in 1942. The records of storage reported below for Morena, Barrett, and Rodriguez Reservoirs are based on the capacities as determined by the following surveys: Morena 1948; Barrett 1948, 1951, and 1955; and Rodriguez 1927, when the reservoir area was initially surveyed.

The storage data for Morena and Barrett reservoirs are obtained and provided by the City of San Diego, California and the U.S. Geological Survey. The data for Rodriguez Dam were provided by the Secretariat of Hydraulic Resources in Mexico up to May 1961, from June 1961 to March 1966 the data were provided by the Potable Water and Sewerage Board for the Urban District of Tijuana, from April 1966 to December 1991, the data were provided by the State Public Service Commission of Tijuana, Baja California, and since 1992, by the Secretariat of Agriculture and Hydraulic Resources.

## IN THOUSAND CUBIC METERS

Month	MORENA RESERVOIR, CALIFORNIA (Capacity 61,933)		BARRETT RESERVOIR, CALIFORNIA (Capacity 55,211)		RODRIGUEZ RESERVOIR, BAJA CALIFORNIA (Capacity 138,003)		TOTAL IN TIJUANA RIVER BASIN RESERVOIRS (Capacity 255,147)	
	1993	Average 1937-1993	1993	Average 1937-1993	1993	Average 1937-1993	1993	Average 1937-1993
Jan.	26,716	22,631	47,209	17,099	94,472	39,747	168,397	79,477
Feb.	45,344	24,076	47,482	18,270	101,050	41,273	193,876	83,619
Mar.	56,308	25,514	47,189	20,632	131,032	46,884	234,529	93,030
April	60,331	25,685	49,481	21,265	137,892	47,333	247,704	94,283
May	61,340	25,440	52,272	20,803	138,000	46,713	251,612	92,956
June	60,945	24,797	53,202	19,966	136,596	45,403	250,743	90,166
July	59,270	24,120	52,454	19,051	133,518	43,685	245,242	86,856
Aug.	57,196	23,523	51,879	18,115	130,640	42,005	239,715	83,643
Sept.	55,304	22,889	48,546	17,470	127,840	40,800	221,690	81,159
Oct.	53,695	22,497	44,770	16,844	125,335	39,513	223,800	78,854
Nov.	52,883	22,360	45,517	16,453	122,944	39,066	221,344	77,879
Dec.	53,458	22,528	46,389	16,773	121,696	39,316	221,543	78,617
Avg.	53,566	23,838	48,866	18,562	125,085	42,645	227,517	85,045
Max.	61,340	!# 76,069	53,202	!* 56,641	138,000	!138,486	251,612	!263,471
Min.	26,716	!! 12	44,770	!! 131	94,472	!! 0	168,397	!! 1,559

# March 31, 1941 - Prior to removal of spillway gates

\* April 30, 1937 - Sandbags were placed on crest of spillway

! Maximum end of month storage for period of record

!! Minimum end of month storage for period of record

RAINFALL ON THE TIJUANA RIVER WATERSHED  
IN MILLIMETERS

Tabulated below are monthly records of rainfall with averages for their periods of record at stations located in California and Baja California. Daily records, where available, are on file in the offices of the United States and Mexican Sections of the Commission. For location, elevation, period of record, and the observer, see alphabetical listing of these stations following rainfall data.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Marron Valley, California		Sawday Ranch, California		Campo, California	
	1993	Average 1906-1993	1993	Average 1907-1993	1993	Average 1951-1993	1993	Average 1950-1993	1993	Average 1900-1993
Jan.	545	98	516	90	#	66	531	91	473	79
Feb.	220	96	172	87	#	55	212	77	165	81
Mar.	59	90	43	82	#	74	39	79	#	74
April	0	41	0	37	#	29	0	36	#	34
May	3	15	2	13	#	8	6	10	3	12
June	12	3	9	2	#	1	8	1	4	2
July	0	9	0	3	#	1	0	15	0	13
Aug.	7	14	4	6	#	3	19	21	0	14
Sept.	0	10	0	6	#	6	0	12	0	9
Oct.	14	22	9	18	#	10	5	15	8	16
Nov.	35	40	33	37	#	35	54	44	38	35
Dec.	33	77	29	70	#	56	41	61	29	62
Yearly	928	515	817	451		344	915	462		431

Month	Chula Vista, California		Lower Otay Dam, California						
	1993	Average 1930-1993	1993	Average 1906-1993					
Jan.	210	48	278	56					
Feb.	#	44	100	42					
Mar.	34	45	38	57					
April	0	20	0	25					
May	T	5	0	10					
June	12	1	11	3					
July	0	0	0	1					
Aug.	0	2	0	3					
Sept.	0	5	1	6					
Oct.	4	9	3	10					
Nov.	20	29	20	33					
Dec.	18	41	22	39					
Yearly		249	473	285					

# Missing Data T Trace

IN MEXICO

Month	El Pinal, Baja California		El Hongo, Baja California		Belen, Baja California		Tecate, Baja California		El Carrizo, Baja California	
	1993	Average 1964-1993	1993	Average 1980-1993	1993	Average 1965-1993	1993	Average 1946-1959 1961-1993	1993	Average 1980-1993
Jan.	410	85	344	66	#	60	551	77	#	41
Feb.	220	93	177	69	#	69	121	53	#	45
Mar.	45	95	38	75	#	69	35	65	#	65
April	0	38	0	15	0	26	0	26	0	17
May	12	9	5	6	4	5	0	7	T	3
June	8	1	4	2	3	2	0	2	5	1
July	0	18	0	15	0	4	0	4	0	5
Aug.	12	23	0	23	2	6	#	6	0	3
Sept.	0	18	0	8	0	10	#	4	0	5
Oct.	14	16	0	14	14	16	#	12	1	19
Nov.	47	47	12	34	24	41	#	37	14	39
Dec.	20	74	27	32	#	50	#	52	17	42
Yearly	788	513	607	376		363		345		310

# Missing Record T Trace

RAINFALL ON THE TIJUANA RIVER WATERSHED  
IN MILLIMETERS

IN MEXICO

	Valle de Palmas, Baja California		Rodriguez Dam, Baja California						
	1993	Average 1948-1993	1993	Average 1938-1993					
Jan.	277	46	315	45					
Feb.	147	36	89	39					
Mar.	21	40	26	43					
April	0	15	0	18					
May	0	3	0	3					
June	5	1	#	1					
July	0	2	1	1					
Aug.	8	5	0	2					
Sept.	0	5	0	6					
Oct.	22	9	#	10					
Nov.	21	22	14	24					
Dec.	10	28	12	39					
Yearly	511	203		225					

# Missing record      T Trace

## LOCATION OF RAINFALL STATIONS ON THE TIJUANA RIVER WATERSHED

The precipitation records of the stations listed alphabetically below began on the date shown and extend through 1993.

## IN THE UNITED STATES

NAME OF STATION	LATITUDE	LONGITUDE	♠ ELEV. (Meters)	RECORD BEGAN	OBSERVER
Barrett Dam, California	32° 41'	116° 40'	494.69	1907	City of San Diego
Campo, California	32° 38'	116° 28'	801.62	1877	County of San Diego
Chula Vista, California	32° 36'	117° 06'	2.74	1930	Chula Vista Fire Department
Lower Otay Dam, California	32° 37'	116° 56'	164.59	1906	City of San Diego
Marron Valley, California	32° 34'	116° 46'	167.64	1951	County of San Diego
Morena Dam, California	32° 41'	116° 31'	937.26	1906	City of San Diego
Sawday Ranch, California	32° 45'	116° 29'	975.36	1950	William Tulloch

## IN MEXICO

NAME OF STATION	LATITUDE	LONGITUDE	♠ ELEV. (Meters)	RECORD BEGAN	OBSERVER
Belen, Baja California	32° 12'	116° 29'	555.04	1965	** S.A.R.H.
El Carrizo, Baja California	32° 29'	116° 42'	494.99	1980	S.A.R.H.
El Hongo, Baja California	32° 31'	116° 18'	960.12	1981	S.A.R.H.
El Pinal, Baja California	32° 11'	116° 17'	"1350.00	1964	S.A.R.H.
Rodriguez Dam, Baja California	32° 27'	116° 54'	120.09	1938	S.A.R.H.
Tecate, Baja California	32° 33'	116° 41'	480.06	1946	S.A.R.H.
Valle de Las Palmas, Baja California	32° 22'	116° 37'	280.11	1948	S.A.R.H.

♠ Elevation above mean sea level

\*\* Ministry of Agriculture and Hydraulic Resources

" Estimated from topographic maps

EVAPORATION IN THE TIJUANA RIVER BASIN  
IN MILLIMETERS

Tabulated below are records of evaporation observed at 3 stations in California and at 2 stations in Baja California, with averages for their periods of record. The stations in California are observed by Western Salt Company, City of San Diego, California, and the United States Section of the Commission; those in Baja California are observed by the Ministry of Agriculture and Hydraulic Resources of Mexico. For specific location of these stations, refer to data opposite same station name shown in "Location of Rainfall Stations on the Tijuana River Watershed" in this bulletin.

Types of pans used:

1. Barrett Reservoir: January 1921 through September 1926, square 0.91-meter by 0.91-meter by 0.46-meter deep floating pan. October 1926 through 1993, square 0.91-meter by 0.91-meter by 0.46-meter deep land pan set 0.38-meter in ground.
2. Morena Reservoir: October 1915 through December 1921, square 0.91-meter by 0.91-meter by 0.46-meter deep floating pan. January 1922 through August 1926 records are the average of evaporation in a square 0.91-meter by 0.91-meter by 0.46-meter deep floating pan and a land pan of the same dimensions. September 1926 through 1993, square 0.91-meter by 0.91-meter by 0.46-meter deep land pan set 0.38-meter in ground.
3. Lower Otay Dam: January 1950 through 1993, square 0.91-meter by 0.91-meter by 0.46-meter deep land pan set 0.38-meter in ground.

IN THE UNITED STATES

Month	Morena Dam, California		Barrett Dam, California		Lower Otay Dam California	
	1993	Average 1916-1993	1993	Average 1921-1993	1993	Average 1950-1993
Jan.	105	54	86	48	38	49
Feb.	1	53	24	54	45	57
Mar.	71	82	67	84	88	85
April	143	118	110	118	125	118
May	184	165	150	165	149	155
June	195	212	169	203	170	176
July	215	243	169	239	180	211
Aug.	216	225	170	225	182	199
Sept.	188	180	154	184	150	163
Oct.	122	126	104	129	115	118
Nov.	46	81	67	80	78	72
Dec.	59	58	37	50	62	55
Yearly	1,545	1,597	1,307	1,579	1,382	1,458

IN MEXICO

Month	Rodriguez Dam, Baja California		El Carrizo, Baja California	
	1993	Average 1939-1942 1946-1993	1993	Average 1980-1993
Jan.	56	104	#	138
Feb.	48	107	#	120
Mar.	#	111	#	144
April	128	140	194	183
May	157	130	254	224
June	#	191	273	274
July	187	216	260	290
Aug.	176	199	281	276
Sept.	140	167	269	239
Oct.	#	138	225	207
Nov.	109	112	177	152
Dec.	99	87	168	132
Yearly		1,717		2,343

# Missing Record

TEMPERATURE IN THE TIJUANA RIVER BASIN  
IN DEGREES CELSIUS

The maximum, minimum, and monthly average temperature observations for United States stations are from daily readings of thermometers generally exposed in a shelter located a few meters above sod-covered ground. The maximum and minimum temperatures shown for the stations in Mexico are from daily maximum and minimum thermometer observations, with maximum and minimum for their periods of record. For specific location, elevation, period of record, and the observer, refer to data opposite same station name as shown in "Location of Rainfall Stations on Tijuana River Watershed" in this bulletin.

IN THE UNITED STATES

Month	Barrett Dam, California				Campo, California				Chula Vista, California			
	1993			Average 1931- 1993	1993			Average 1951- 1993	1993			Average 1931- 1993
	Mean	Max.	Min.		Mean	Max.	Min.		Mean	Max.	Min.	
Jan.	10.0	23.9	-2.8	9.6	8.7	22.2	-7.2	8.6	14.1	26.7	1.1	11.9
Feb.	11.4	23.9	2.8	10.6	9.2	21.7	-1.7	9.2	#	#	#	12.7
Mar.	14.5	26.7	3.9	11.9	#	#	#	10.0	16.6	28.3	7.2	13.3
April	16.6	31.1	5.6	14.5	#	#	#	12.2	17.5	27.8	9.4	14.9
May	20.4	32.2	8.3	17.2	#	30.0	#	15.0	18.8	25.6	11.1	16.2
June	21.8	37.2	9.4	20.4	19.6	38.9	2.8	18.6	20.2	27.8	11.7	17.6
July	22.1	37.2	11.7	24.5	19.1	38.9	4.4	22.7	21.2	25.6	16.7	19.7
Aug.	24.1	38.9	11.7	24.5	21.6	40.6	2.2	22.8	21.5	27.8	16.7	20.6
Sept.	22.3	39.4	10.0	22.5	20.5	40.0	2.8	20.4	21.1	32.2	13.3	19.9
Oct.	18.2	35.6	7.2	18.0	16.8	36.1	1.7	16.1	19.8	31.1	11.1	17.6
Nov.	14.6	29.4	2.8	13.4	11.6	28.3	-2.8	11.4	16.8	30.6	5.6	14.8
Dec.	11.3	26.1	0.6	10.3	8.8	24.4	-5.0	8.7	14.1	25.6	3.9	12.6
Yearly	17.3	39.4	-2.8	16.5				14.6				16.0

# Missing Data

IN MEXICO

Month	El Pinal, Baja California				El Hongo, Baja California				Belen, Baja California			
	1993		1964-1993		1993		1981-1993		1993		1965-1993	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	25	-6	29	-16	17	-3	25	-9	#	#	34	-6
Feb.	26	-2	31	-10	18	-2	27	-6	#	#	32	-4
Mar.	25	-2	29	-7	25	-1	29	-2	#	#	36	-4
April	26	4	33	-8	30	4	32	-1	30	3	38	-3
May	30	0	34	-4	31	6	38	1	32	5	40	0
June	32	5	43	-4	35	5	41	2	34	7	43	3
July	38	5	44	0	34	10	42	7	37	4	45	4
Aug.	34	2	44	0	40	6	41	3	39	8	45	5
Sept.	41	5	45	-4	38	2	39	2	37	7	44	1
Oct.	25	-2	40	-5	37	5	37	0	34	2	40	-6
Nov.	24	-3	35	-10	27	0	29	-2	26	0	34	-4
Dec.	22	-5	29	-4	27	0	27	-8	#	#	33	-7
Yearly	41	-6	45	-16	40	-3	42	-9			45	-7

Month	Tecate, Baja California				El Carrizo, Baja California				Valle de Palmas, Baja California			
	1993		1946-1993		1993		1980-1993		1993		1948-1993	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Jan.	24	0	38	-9	#	#	30	-1	24	-2	33	-11
Feb.	25	2	38	-8	#	#	34	-2	25	1	37	-5
Mar.	30	2	36	-5	#	#	32	-4	29	3	38	-2
April	31	4	39	-2	33	8	41	4	34	3	41	-2
May	35	5	42	1	32	9	42	5	38	5	44	2
June	38	7	44	0	36	9	42	9	38	8	48	4
July	36	9	46	2	31	12	43	8	40	10	49	7
Aug.	#	#	47	1	36	12	45	10	43	9	48	5
Sept.	#	#	46	2	42	10	42	9	42	4	47	0
Oct.	#	#	41	-3	35	9	38	6	39	3	43	0
Nov.	#	#	36	-3	29	5	35	4	30	0	38	-7
Dec.	#	#	36	-5	25	4	32	-3	28	-2	35	-6
Yearly			47	-9			45	-4	43	-2	49	-11

# Missing Data

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS  
ALONG TIJUANA RIVER AND TRIBUTARIES

1993

The total area within the Tijuana River basin is 4,483 square kilometers, as determined from the best available maps from both the United States and Mexico. The drainage areas shown below are tabulated according to their downstream sequence.

The irrigated areas, tabulated in downstream sequence, are from the most reliable sources available. Those in the United States were furnished by the Tijuana River Valley Association or estimated from aerial photographs. Those in Mexico were furnished by the Ministry of Agriculture and Hydraulic Resources of Mexico through the Mexican Section of the Commission. All irrigation in the Tijuana River basin in 1993 was by pumping from ground water.

Designation of Areas	Drainage Basin-Square Kilometers			Irrigated Areas-Hectares		
	United States	Mexico	Total	United States	Mexico	Total
Cottonwood Creek						
above Morena Dam	295	0	295	0		0
Morena Dam to Barrett Dam	344	0	344	0		0
above Barrett Dam	640	0	640	0		0
below Barrett Dam and above						
Tecate Creek	168	0	168	0		0
above Tecate Creek	808	0	808	0		0
Campo Creek						
above International Boundary	220	10	230	0		0
Tecate Creek						
above International Boundary						
(not including Campo Creek)	49	166	215	0		0
Cottonwood Creek						
above International Boundary						
Station	1,070	176	1,246	0		0
Rio de las Palmas						
above Rodriguez Dam	18	2,541	2,559	0	(b)	0
Tijuana River						
above Nestor Gaging Station	1,186	3,279	4,465	119		119
above the Mouth	1,197	3,287	4,484	(a) 343		343

(a) Data from Otay Water District, leased areas from IBWC irrigation and private landowners.

(b) There was no irrigation in 1993 in the Tijuana Irrigation District, Tijuana Valley, Baja California Mexico, from the Rodriguez Reservoir.



09-5375.00 WHITEWATER DRAW NEAR DOUGLAS, ARIZONA

DESCRIPTION: Water-stage recorder located on U. S. Highway 80 bridge between Douglas and Bisbee, Arizona, about 137 meters upstream from the Southern Pacific Railroad bridge, 2.4 kilometers upstream from the international boundary, and 3.2 kilometers west of Douglas, Arizona. Zero of gage is 1,191.51 meters above mean sea level, U. S. C. & G. S. datum of 1929. Location April 26, 1972 to April 10, 1974 was 61 meters upstream from bridge. Datum 1.34 meters higher.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Computations by shifting control methods. Records obtained and furnished by the U. S. Section of the Commission. Records fair. Records available: August to October 1911 (gage heights and discharge measurements only), July to October 1912, January to June 1913, October 1913, December 1913 to June 1914, February to June 1915, October 1915 to September 1919, October 1919 to April 1922 (gage heights and discharge measurements only), July 1930 to December 1933, May 1935 to July 1947, October 1947 through 1993 (July 1954 to March 1955, monthly discharge only).

REMARKS: Diversions above this station are mainly by pumping from ground water for irrigation. Records show flow at the international boundary into Mexico.

EXTREMES: Prior to 1936: Maximum recorded discharge, 97.7 CMS August 10, 1931 (gage height 3.70 meters); maximum estimated discharge, 115 CMS July 27, 1919; minimum discharge, no flow for several days of many years. Since 1936: Maximum discharge, 143 CMS August 7, 1955; maximum gage height, 5.04 meters July 29, 1966; minimum daily discharge, no flow at times during most years.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0	0	0	0	0	0	0	0	1.26	0	0	0
2	0	0	0	0	0	0	0	0	.56	0	0	0
3	0	0	0	0	0	0	0	0	.01	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	.01	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	.06	.12	0	0	0	0
12	0	0	0	0	0	0	.18	.01	.14	0	0	0
13	0	0	0	0	0	0	.13	0	.09	0	0	0
14	0	0	0	0	0	0	.67	0	0	0	0	0
15	0	0	0	0	0	0	.05	0	0	0	0	0
16	0	0	0	0	0	0	.54	0	0	0	0	0
17	0	0	0	0	0	0	.54	0	0	0	0	0
18	.07	0	0	0	0	0	.01	0	0	0	0	0
19	1.24	0	0	0	0	0	0	0	0	0	0	0
20	1.05	0	0	0	0	0	0	0	0	0	0	0
21	.05	0	0	0	0	0	0	0	0	0	0	0
22	.01	0	0	0	0	0	0	.08	0	0	0	0
23	0	0	0	0	0	0	0	.05	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	.10	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	.06	0	0	0	0
29	0	0	0	0	0	0	0	.80	0	0	0	0
30	0	0	0	0	0	0	0	.34	0	0	0	0
31	0	0	0	0	0	0	0	.18	0	0	0	0
Sum	2.42	0	0	0	0	0	2.18	1.74	2.07	0	0	0

Current Year 1993

Period 1936-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	2.190	1.465	20	1.73	1	0	0.08	209	42.2	556	0
Feb.	1.465	1.465	1	0	1	0	0	0	19.4	163	0
Mar.	1.465	1.465	1	0	1	0	0	0	26.9	364	0
April	1.465	1.465	1	0	1	0	0	0	19.8	213	0
May	1.465	1.465	1	0	1	0	0	0	14.1	170	0
June	1.465	1.465	1	0	1	0	0	0	128	1,961	0
July	2.110	1.465	16	1.28	1	0	.07	188	2,021	10,004	0
Aug.	2.065	1.465	29	1.06	1	0	.06	150	3,278	17,861	0
Sept.	2.215	1.465	2	1.89	1	0	.07	179	856	3,910	0
Oct.	1.465	1.465	1	0	1	0	0	0	403	7,528	0
Nov.	1.465	1.465	1	0	1	0	0	0	38.0	434	0
Dec.	1.465	1.465	1	0	1	0	0	0	129	2,915	0
Yearly	2.215	1.465		1.89		0	0.02	726	6,975	27,533	0

1 And other days

SEWAGE INFLUENT, DOUGLAS, ARIZONA  
INTERNATIONAL TREATMENT PLANT

DESCRIPTION: Parshall flume in the influent line of the older trickling filter unit and a Parshall flume in the influent line of the newer extended aeration unit. The treatment plant is located about 1.6 kilometers west of the Douglas-Agua Prieta Port of Entry immediately adjacent to the international boundary in Douglas, Cochise County, Arizona.

RECORDS: Continuous monthly records since March 1948; daily records from March 18, 1948 through 1950 and from January 1952 through 1993.

REMARKS: The older 4.9 thousand cubic meters per day trickling filter unit was constructed in 1947 by the International Boundary and Water Commission. Since April 8, 1968 all sewage from Agua Prieta has been retained in Mexico to be used for irrigation along with the effluent from the Douglas International Treatment Plant. On July 1, 1973, ownership and operation of the plant was transferred from the International Boundary and Water Commission to the City of Douglas. In 1980 the plant was enlarged, with the addition of the extended aeration unit bringing the total capacity up to 9.8 thousand cubic meters per day. The effluent from the Douglas Treatment Plant is discharged through a closed conduit to Mexico.

Month	Total Monthly Flows			Mean Daily Flows—Thousand Cubic Meters Per Day					
	Thousand Cubic Meters			Current Year 1993			Period 1952-1993		
	U.S.	Mexico	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	195	0	195	9.6	3.7	6.3	9.6	1.6	4.3
Feb.	147	0	147	7.1	4.2	5.3	13.9	2.1	4.3
Mar.	173	0	173	7.5	4.2	5.6	13.9	2.2	4.3
April	172	0	172	8.7	2.2	5.7	12.2	1.4	4.3
May	190	0	190	12.2	4.0	6.1	12.2	1.9	4.4
June	143	0	143	5.7	4.0	4.8	9.5	2.1	4.5
July	196	0	196	14.1	#	6.3	14.1	1.8	4.7
Aug.	161	0	161	10.2	3.3	5.2	10.2	1.4	4.7
Sept.	158	0	158	7.6	4.3	5.3	9.6	1.8	4.6
Oct.	165	0	165	7.3	3.9	5.3	12.0	2.3	4.5
Nov.	173	0	173	7.9	4.5	5.8	10.9	1.2	4.4
Dec.	185	0	185	8.6	3.9	6.0	12.6	1.9	4.4
Yearly	2,058	0	2,058	14.1		5.6	14.1	1.2	4.5

# Missing Data

09-4705.00 SAN PEDRO RIVER AT PALOMINAS, ARIZONA

DESCRIPTION: Water-stage recorder located near left bank on downstream side of the bridge pier at Highway 92, 1.1 kilometers east of Palominas, 4.0 kilometers upstream from Green Brush Draw, 7.2 kilometers downstream from international boundary, and 19 kilometers southwest of Bisbee, Arizona. Zero of gage is 1,276.39 meters above mean sea level (State Highway bench mark).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records available: May 1930 to October 1933, May 1935 to July 1941, and July 1950 through 1993. Records obtained and furnished by U. S. Geological Survey to September 30, 1981; thereafter by the United States Section of the Commission.

REMARKS: There are some small diversions for irrigation for a small area above this station, mostly in Mexico. Record shows approximate flow of river at international boundary.

EXTREMES: Maximum daily discharge, 623 CMS on August 14, 1940 (gage height 4.93 meters present datum), from rating curve extended above 159 CMS on basis of slope-area measurement of peak flow; no flow at time in most years. Greatest flood known occurred on September 28, 1926 (gage height, about 7.28 meters present datum), from flood marks; discharge not determined.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.03	1.13	0.87	0.25	0.01	0	0	0.05	0.97	0	0	0
2	.03	1.03	.88	.24	.01	0	0	.16	.40	0	0	0
3	.03	.99	.84	.22	.01	0	0	.08	.16	0	0	0
4	.03	.95	.79	.21	.01	.01	0	.10	.14	0	0	0
5	.03	.91	.77	.18	.01	.01	0	.31	.13	0	0	0
6	.03	.86	.74	.15	.01	.01	0	.17	.13	0	0	0
7	.24	.82	.71	.12	.01	.01	0	.03	.13	0	0	0
8	1.44	.85	.67	.12	.01	.01	0	0	.12	0	0	0
9	12.2	.96	.65	.11	0	.01	0	0	.12	0	0	0
10	1.81	1.31	.63	.10	0	.01	0	0	.11	0	0	0
11	7.33	1.22	.61	.10	0	.01	0	0	.10	0	0	0
12	11.3	1.17	.57	.08	0	0	.08	0	.10	0	0	0
13	3.91	1.10	.56	.09	0	0	.13	0	.09	0	0	.08
14	2.16	.99	.54	.11	0	0	.18	0	.10	0	0	.06
15	1.61	1.00	.51	.09	0	0	.13	0	.06	0	0	.05
16	1.34	1.14	.49	.07	0	0	.11	0	.03	0	0	.05
17	5.27	1.33	.37	.06	0	0	.11	.84	.02	0	0	.05
18	155	1.26	.35	.05	0	0	.11	.14	.01	0	0	.05
19	167	1.16	.31	.04	.01	0	.11	0	0	0	0	.07
20	20.7	1.16	.29	.04	0	0	.10	.67	0	0	0	.07
21	6.43	1.45	.27	.03	0	0	.10	.01	0	0	0	.07
22	3.34	1.31	.24	.02	0	0	.09	.22	0	0	0	.07
23	2.55	1.20	.24	.02	0	0	.08	.03	0	0	0	.05
24	2.14	1.11	.22	.02	.01	0	.08	0	0	0	0	.05
25	1.87	1.02	.21	.02	0	0	.07	.21	0	0	0	.05
26	1.62	.94	.21	.02	0	0	.06	.06	0	0	0	.05
27	1.50	.91	.23	.02	0	0	.06	.35	0	0	0	.05
28	1.48	.88	.24	.02	0	0	.05	.06	0	0	0	.05
29	1.50	.24	.01	0	0	0	.05	.90	0	0	0	.05
30	1.36	.25	.01	0	0	0	.05	.87	0	0	0	.05
31	1.24	.25	.01	0	0	0	.05	5.13	0	0	0	.05
Sum	416.52	30.16	14.75	2.62	0.10	0.08	1.80	10.39	2.92	0	0	1.07

Current Year 1993

Period 1951-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day	High	Day	Low		Total	Average	Maximum	Minimum
Jan.	4.405	0.755	19	314	14	0.02	13.4	35,987	2,578	35,987	3.2
Feb.	1.030	.910	21	1.60	7	.78	1.08	2,606	967	8,343	3.7
Mar.	.925	.770	11	.88	124	.21	.48	1,274	937	9,129	16.4
April	.785	.660	11	.25	30	.01	.09	226	216	1,282	0
May	.670	.650	1	.02	19	0	0	8.6	73.6	502	0
June	.675	.655	14	.02	11	0	0	6.9	160	1,716	0
July	.820	.655	12	.24	11	0	.06	156	5,904	21,263	0
Aug.	1.635	.655	31	16.7	8	0	.34	898	9,495	44,860	204
Sept.	1.005	.665	1	1.36	119	0	.10	252	2,252	20,160	0
Oct.	.665	.665	11	0	11	0	0	0	2,185	58,371	0
Nov.	.665	.665	11	0	11	0	0	0	311	3,161	0
Dec.	.750	.665	21	.08	11	0	.03	92.4	1,895	31,428	7.6
Yearly	4.405	0.650		314		0	1.32	41,507	26,974	77,448	5,427

1 And other days

09-4800.00 SANTA CRUZ RIVER NEAR LOCHIEL, ARIZONA

DESCRIPTION: Water-stage recorder located in the United States near left bank on the downstream side of concrete bridge pier of county highway bridge, 4.0 kilometers northeast of Lochiel, Arizona, and 2.7 kilometers upstream from the international land boundary. The elevation of the zero of the gage has not been determined, but topographic maps indicate the elevation of the stream bed at the gage is about 1,408 meters.

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: January 1949 through 1993.

REMARKS: There are small diversions by ground water pumping for irrigating about 80.9 hectares above this station.

EXTREMES: Maximum discharge, 362 CMS on August 15, 1984, (gage height 3.19 meters); minimum discharge, no flow for several days of many years.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.03	0.37	0.31	0.14	0.08	0.03	0.05	0.02	0.06	0.04	0.02	0.03
2	.03	.37	.28	.15	.08	.03	.05	.02	.05	.03	.02	.03
3	.03	.37	.27	.17	.10	.03	.05	.02	.05	.03	.02	.03
4	.02	.34	.27	.16	.09	.03	.04	.03	.05	.03	.02	.03
5	.03	.34	.26	.18	.08	.03	.04	.02	.04	.02	.02	.03
6	.03	.34	.25	.19	.07	.03	.04	.04	.04	.03	.02	.03
7	.03	.34	.23	.20	.07	.03	.04	.04	.04	.02	.02	.03
8	.04	.37	.23	.20	.07	.03	.04	.05	.03	.02	.02	.03
9	.03	.42	.23	.22	.07	.03	.04	.03	.03	.02	.02	.03
10	.04	.37	.22	.23	.06	.03	.05	.03	.03	.02	.02	.03
11	1.02	.34	.22	.25	.06	.03	.16	.03	.04	.02	.02	.03
12	.06	.34	.22	.27	.06	.03	.16	.03	.05	.02	.03	.03
13	.05	.31	.22	.28	.06	.03	.12	.05	.03	.02	.03	.03
14	.08	.34	.21	.31	.06	.03	1.08	.04	.03	.02	.03	.03
15	.03	.45	.20	.34	.08	.03	.09	.03	.03	.02	.03	.03
16	.02	.40	.20	.34	.09	.03	.06	.03	.02	.02	.03	.03
17	.42	.34	.20	.37	.07	.03	.05	.03	.02	.02	.03	.03
18	66.3	.31	.20	.40	.06	.03	.04	.03	.03	.02	.03	.03
19	19.3	.34	.20	.40	.06	.03	.04	.03	.04	.02	.03	.03
20	5.41	.40	.20	.37	.06	.04	.03	.03	.05	.02	.03	.03
21	2.86	.34	.19	.40	.05	.04	.03	.03	.06	.02	.03	.03
22	1.59	.31	.19	.37	.05	.03	.03	.02	.06	.02	.03	.03
23	.82	.31	.18	.31	.05	.03	.03	.40	.06	.02	.03	.03
24	.62	.31	.19	.24	.06	.04	.03	.68	.07	.02	.03	.03
25	.54	.31	.18	.23	.05	.04	.02	.20	.06	.02	.03	.03
26	.48	.28	.18	.19	.05	.04	.02	.20	.06	.02	.03	.03
27	.48	.28	.16	.16	.05	.04	.02	.10	.06	.02	.03	.03
28	.48	.31	.13	.12	.05	.04	.02	.11	.05	.02	.03	.03
29	.42	.14	.10	.10	.04	.04	.02	.13	.05	.02	.03	.03
30	.42	.13	.09	.04	.05	.05	.02	.08	.05	.02	.03	.03
31	.40	.13	.09	.04	.04	.05	.02	.08	.05	.02	.03	.03
Sum	102.11	9.65	6.42	7.38	1.96	1.00	2.53	2.66	1.34	0.68	0.79	0.93

Current Year 1993

Period 1949-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters				
	High	Low	Day	Cubic Meters per Second		Total		Average	Maximum	Minimum		
				Day	High						Low	
Jan.			18	66.3	1	4	0.02	3.29	8,822	382	8,822	1.6
Feb.			15	.45	126	.28	.34	.34	834	127	1,233	2.2
Mar.			1	.31	128	.13	.21	.21	555	144	2,594	.9
April			118	.40	30	.09	.25	.25	638	66.9	638	0
May			3	.10	129	.04	.06	.06	169	32.9	210	0
June			30	.05	1	.03	.03	.03	86.4	23.4	208	0
July			14	1.08	125	.02	.08	.08	219	596	5,267	2.0
Aug.			24	.68	1	.02	.09	.09	230	1,211	14,207	.1
Sept.			24	.07	116	.02	.04	.04	116	373	3,249	0
Oct.			1	.04	1	.02	.02	.02	58.8	359	5,837	0
Nov.			112	.03	1	.02	.03	.03	68.3	75.9	497	0
Dec.			1	.03	1	.03	.03	.03	80.4	134	1,348	0
Yearly				66.3			0.02	0.38	11,877	3,525	21,433	155

† Mean daily

‡ And other days

09-4805.00 SANTA CRUZ RIVER NEAR NOGALES, ARIZONA

DESCRIPTION: Water-stage recorder, cable with sit-down cable car located 8.9 kilometers east of Nogales, Arizona, 1.3 kilometer downstream from the international boundary and 9.7 kilometers upstream from the Santa Cruz bridge on State Highway No. 82. Zero of gage is 1,128.53 meters above mean sea level, U. S. C. & G. S. datum (levels by International Boundary and Water Commission).

RECORDS: Based on current meter measurements, observations of no flow, and a continuous record of gage heights. Records obtained and furnished by the U. S. Geological Survey. Records available: March to November 1907 and April 1909 to December 1912 (discharge measurements and fragmentary gage height record); January 1913 to June 1922 (October 1915 to September 1916, monthly discharges only); May 1930 to December 1933; and July 1935 through 1993.

REMARKS: Diversions in both countries affect the flow at this station. The major diversions occur in Mexico for domestic and irrigation uses. There are no storage dams above the station as of December 1993.

EXTREMES: Maximum discharge, 949 CMS on October 9, 1977 (gage height 4.72 meters); minimum discharge, no flow for several days of many years.

MEAN DAILY DISCHARGE IN CUBIC METERS PER SECOND 1993 --- ANNUAL AND PERIOD SUMMARY

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.36	2.83	2.44	0.96	0.26	0.06	0.02	0.01	0.40	0.07	0.04	0.04
2	.96	2.80	2.21	.91	.28	.03	.21	.01	.08	.16	.05	.04
3	.85	3.03	2.01	1.16	.27	.02	.20	.10	.05	.08	.07	.04
4	.79	3.29	1.95	.88	.17	.01	.11	.14	.02	.09	.06	.04
5	.74	3.29	1.84	.88	.12	.02	.08	.12	.03	.07	.06	.04
6	.88	3.29	1.64	.74	.10	.03	.08	.12	.03	.09	.04	.04
7	2.41	3.29	1.61	.79	.11	.05	.09	.09	.03	.08	.03	.04
8	43.0	3.00	1.53	.91	.10	.12	.02	.07	.03	.07	.03	.04
9	8.07	3.71	1.53	.85	.07	.05	0	.06	.03	.07	.03	.04
10	8.07	3.48	1.36	.99	.04	.05	.03	.12	.05	.05	.03	.03
11	53.2	3.37	1.53	.74	.03	.10	.71	.08	.40	.05	.04	.04
12	7.02	3.29	1.53	.76	.03	.06	.03	.07	.28	.05	.03	.05
13	5.81	3.00	1.42	.71	.04	.07	0	.01	.20	.05	.05	.04
14	4.30	2.75	1.33	.79	.03	.03	.05	0	.18	.05	.04	.04
15	3.17	3.65	1.50	.76	.04	.03	.04	.02	.17	.05	.08	.05
16	2.52	4.56	1.30	.88	.04	.08	.07	.03	.13	.04	.08	.06
17	7.48	4.08	1.47	.68	.04	.09	.03	.03	.17	.05	.08	.09
18	167	4.56	1.39	.79	.04	.05	.02	.02	.19	.05	.05	.11
19	46.4	4.28	1.22	.85	.04	0	.02	.04	.14	.05	.06	.12
20	9.15	4.70	1.25	.85	.05	0	.02	.04	.11	.04	.05	.13
21	4.79	4.08	1.22	.93	.05	0	.02	.04	.10	.05	.04	.14
22	4.08	4.11	1.44	.79	.05	0	.04	.03	.11	.05	.04	.15
23	3.79	4.11	1.70	.71	.07	0	.03	.03	.06	.05	.04	.15
24	3.26	3.51	1.39	.76	.03	0	.02	.24	.17	.04	.04	.15
25	3.65	3.14	1.50	.62	.02	0	.01	.05	.16	.04	.04	.15
26	3.96	2.58	1.39	.59	.02	0	.05	.18	.12	.04	.04	.17
27	3.31	2.24	1.84	.57	.06	0	.02	.06	.18	.04	.04	.17
28	3.37	2.12	1.73	.62	.14	0	.02	.82	.20	.05	.04	.17
29	3.71		1.42	.62	.07	0	.02	.23	.19	.05	.04	.19
30	3.29		1.05	.37	.04	.03	.01	.07	.07	.04	.04	.21
31	3.17		1.08		.06		.01	.07		.04		.21
Sum	413.56	96.14	47.82	23.46	2.51	0.98	2.08	3.00	4.08	1.79	1.40	2.98

Current Year 1993

Period 1936-1993

Month	Extreme Gage Meters		Extreme-Cubic Meters per Second				Average	Volume-Thousand Cubic Meters			
	High	Low	Day		φ High	φ Low		Total	Average	Maximum	Minimum
			Day	φ High							
Jan.			18	167	5	0.74	13.3	35,732	3,140	37,352	0
Feb.			20	4.70	28	2.12	3.43	8,306	2,225	25,344	0
Mar.			1	2.44	30	1.05	1.54	4,132	2,038	24,145	0
April			3	1.16	30	.37	.78	2,027	589	4,263	0
May			2	.28	125	.02	.08	217	151	1,272	0
June			8	.12	119	0	.03	84.7	103	1,787	0
July			11	.71	19	0	.07	180	3,238	19,258	.1
Aug.			28	.82	14	0	.10	259	6,751	56,481	12.1
Sept.			1	.40	14	.02	.14	353	1,903	111,633	0
Oct.			2	.16	116	.04	.06	155	2,274	72,806	0
Nov.			115	.08	17	.03	.05	121	639	9,108	0
Dec.			130	.21	10	.03	.10	257	2,936	41,405	0
Yearly				167		0	1.64	51,824	25,987	108,071	2,756

φ Mean daily

! And other days

## SEWAGE INFLUENT, NOGALES INTERNATIONAL TREATMENT PLANT

DESCRIPTION: One 61-centimeter Marshall flume with a water-stage recorder is located at the international boundary for measuring raw wastewater from Nogales, Sonora. The plant influent and effluent flows are measured by flow meters and recorded on individual chart recorders and continuous totalizers. The Nogales Wash Pumping Plant flows are contaminated surface waters from Mexico captured in the U.S. and pumped into the international sewer trunk line. Flows determined by pump hour clocks. The Nogales International Treatment Plant is located adjacent to I-19, approximately 14.5 kilometers north of the international boundary, all within the City of Nogales, Santa Cruz County, Arizona.

RECORDS: Flows from the United States are deduced from total plant influent less the flows measured crossing the international boundary from Mexico. Records available: Continuous monthly record for plant influent since August 1951; daily records for plant influent, January 1952 through 1993.

REMARKS: Prior to December 18, 1971 the plant was located along the right bank of Nogales Wash, approximately 3.2 kilometers north of the international boundary. From December 1971 to January 1991 the Nogales International Treatment Plant treated combined sewage from both Nogales, Arizona, Sonora by means of aerated stabilization lagoons with a capacity of 31.0 thousand cubic meters per day. Chlorinated plant effluent was discharged directly to the Santa Cruz River. A plant expansion project was completed in February 1991, increasing the capacity to 65.1 thousand cubic meters per day and discharging ultraviolet disinfected effluent into the Santa Cruz River.

Month	Total Monthly Flows				Daily Flows—Thousand Cubic Meters Per Day					
	Thousand Cubic Meters				Current Year 1993			Period 1952-1993		
	U.S.	Mexico	Plant*	Total	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Jan.	554	1,381	0	1,935	93.0	49.2	62.4	93.0	2.5	19.0
Feb.	654	914	26.2	1,594	74.4	51.2	56.9	79.2	2.5	19.6
Mar.	687	1,034	0	1,721	85.7	49.6	55.5	85.7	2.8	19.7
April	571	992	0	1,563	57.2	47.6	52.1	69.2	2.6	18.5
May	488	1,042	0	1,530	51.5	45.4	49.4	55.7	2.1	17.4
June	430	903	0	1,333	48.5	36.0	44.4	48.7	2.6	16.1
July	495	930	0	1,425	50.5	41.5	46.0	58.2	2.6	17.0
Aug.	550	982	0	1,532	60.6	40.8	49.4	64.6	2.8	18.6
Sept.	601	1,045	0	1,646	61.1	51.6	54.9	61.1	3.0	19.7
Oct.	559	1,063	0	1,622	55.4	48.9	52.3	76.3	2.6	19.5
Nov.	546	1,039	0	1,585	64.0	49.3	52.8	64.0	3.0	19.1
Dec.	552	1,038	0	1,590	54.8	46.7	51.3	67.3	1.3	19.3
Yearly	6,687	12,363	26.2	19,076	93.0	36.0	52.3	93.0	1.3	18.6

\* Nogales Wash Pumping Plant

RAINFALL ON THE SANTA CRUZ RIVER WATERSHED  
IN MILLIMETERS

Tabulated below are the monthly records of rainfall with averages for their periods of record at stations located in Arizona. Two stations are operated and maintained by the United States Section of the Commission and two by the National Weather Service. For location, elevation, period of record, type of gage in use, and the observer, see alphabetical listing of stations on this page.

IN THE UNITED STATES

Month	San Rafael #2, Arizona		Canelo, Arizona		Patagonia, Arizona		Nogales Sanitation Plant 9N, Arizona	
	1993	Average 1973-1993	1993	Averages 1930-1993	1993	Averages 1930-1993	1993	Averages 1953-1993
Jan.	252	50	203	33	199	35	151	33
Feb.	88	35	56	28	53	28	53	21
Mar.	16	37	15	23	25	25	32	25
April	0	13	0	10	0	10	0	9
May	12	9	7	5	24	5	28	7
June	1	14	0	19	6	12	6	10
July	120	124	43	105	59	111	51	119
Aug.	164	98	132	108	186	105	323	106
Sept.	77	58	13	45	37	45	37	42
Oct.	19	35	13	26	18	28	9	34
Nov.	47	23	33	20	41	21	18	16
Dec.	8	44	5	36	6	38	2	38
Yearly	804	540	520	458	654	463	710	460

LOCATION OF RAINFALL STATIONS ON THE SANTA CRUZ RIVER WATERSHED

The precipitation records of the stations listed alphabetically below begin on the date shown and extend through 1993.

IN THE UNITED STATES

NAME OF STATION	TYPE GAGE	LATITUDE	LONGITUDE	ELEV. (Meters)	RECORD BEGAN	OBSERVER
Canelo, Arizona	S	31° 33'	110° 32'	1,527	1930	R. E. Ewing
Nogales Sanitation Plant 9N, Arizona	S	31° 25'	110° 57'	1,085	June 1952	I. B. & W. C.
Patagonia, Arizona	S	31° 33'	110° 45'	1,277	1930	George R. Proctor
San Rafael #2, Arizona	S	31° 22'	110° 38'	1,481	Jan. 1973	I. B. & W. C.

S Standard 203 millimeter rain gage

TEMPERATURE IN THE SANTA CRUZ RIVER BASIN  
IN DEGREES CELSIUS

Tabulated below are monthly records of temperature at the station located at the Nogales Sanitation Plant in Arizona 14.5 kilometers north of the international boundary. On December 18, 1971, the station was moved to correspond with a new Nogales Sanitation Plant. Prior to this date, the station was located 3.2 kilometers north of the international boundary at the old Nogales Sanitation Plant. This station is operated and maintained by the United States Section of the Commission. The equipment at the Nogales Sanitation Plant - 9N consists of a standard 203-millimeter rain gage and maximum and minimum thermometer. The collection of data for mean relative humidity, evaporation, and mean wind speed was discontinued in 1984.

For specific location of this station, refer to data opposite same station name shown in "Location of Rainfall Stations," in this bulletin.

Month	Nogales Sanitation Plant - 9N		
	1993		
	Mean	Max.	Min.
Jan.	9.8	25.6	-3.9
Feb.	9.1	22.8	-5.0
Mar.	12.0	30.0	-2.8
April	15.1	33.9	-1.7
May	20.3	36.1	3.9
June	23.2	40.6	4.4
July	25.8	39.4	12.2
Aug.	25.3	38.9	13.9
Sept.	21.8	35.6	5.6
Oct.	17.2	33.9	0.0
Nov.	10.3	27.8	-10.0
Dec.	7.8	25.0	-9.4
Yearly	16.5	40.6	-10.0

DRAINAGE AREAS ABOVE GAGING STATIONS AND IRRIGATED AREAS  
ALONG SANTA CRUZ RIVER, SAN PEDRO RIVER, AND WHITEWATER DRAW

1993

The drainage basin areas tabulated below are derived from the best available maps from both the United States and Mexico.

Data on irrigated areas in the Whitewater Draw Basin were furnished by the Soil Conservation Service at Douglas, Arizona and estimated from aerial photographs.

Designation of Areas	Drainage Basin—Square Kilometers			Irrigated Areas—Hectares		
	United States	Mexico	Total	United States	Mexico	Total
Santa Cruz River: Above Lochiel, Arizona Gaging Station	212	0	212	40	0	40
Above El Cajon, Mexico Gaging Station	464	324	788	40	952	992
Above Nogales, Arizona Gaging Station	479	901	1,380	40	1,091	1,131
San Pedro River: Above Palominas, Arizona Gaging Station	238	*1,621	1,859	578	1,400	1,978
Whitewater Draw: Above Douglas, Arizona Gaging Station	2,650	0	2,650	8,634	0	8,634

\* An additional 122 square kilometers in Mexico is tributary to the San Pedro River downstream from this station.