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Prepared in cooperation with State of Arizona and with other agencies

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WATER QUALITY RECORDS IN ARIZONA

1964

Prepared in cooperation with

Salt River Valley Water Users' Association
New Mexico Interstate Stream Commission
Bureau of Reclamation, U.S. Department of the Interior
Corps of Engineers, U.S. Army
Forest Service, U.S. Department of Agriculture

Copies of this report may be obtained from
District Chief, Water Resources Division
U.S. Geological Survey
P.O. Box 4070
Tucson, Arizona 85717

Streamflow records for most of the water quality stations in this report are contained in the following companion volume:

Surface Water Records of Arizona

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[*Symbols after station name designate type of data; c, chemical; t, water temperature; s, sediment.*]

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WATER QUALITY RECORDS IN ARIZONA, 1964

INTRODUCTION

The quality-of-water investigations of the U.S. Geological Survey are concerned with the chemical and physical characteristics of surface- and ground-water supplies of the Nation. The basic records for the 1964 water year for quality of surface waters within the State of Arizona are given in this report. The data were collected and computed by the Water Resources Division of the U.S. Geological Survey, under the direction of H. M. Babcock, district chief.

The Geological Survey began publishing annual basic records of chemical quality, water temperatures, and suspended sediment in 1941 in the water-supply paper series, "Quality of Surface Waters of the United States." The records prior to 1948 were published each year in a single volume for the entire country and in two volumes in 1948 and 1949. Beginning in 1950, the records were published in four volumes and beginning in 1959 in five volumes; each volume covered an area where boundaries coincided with those of certain natural drainage areas. The records for Arizona are contained in Part 9 of the water-supply series. These publications are available in most major public libraries. (See "Annual Water-Supply Paper Series" p. 11.)

Distribution of this report is limited, and it is primarily for local and immediate use. The records will be published in the Geological Survey water-supply papers at 5-year intervals. The first compilation will cover only the years 1964 and 1965.

COOPERATION

The work was done under cooperative agreements between the U.S. Geological Survey and the following organizations:

Salt River Valley Water Users' Association,
V. I. Corbell, president, and R. J. McMullin, general manager.
New Mexico Interstate Stream Commission,
S. E. Reynolds, secretary.

Assistance in the form of funds or services was given by the Bureau of Reclamation, U.S. Department of the Interior; Corps of Engineers, U.S. Army; and Forest Service, U.S. Department of Agriculture. Several stations were operated from funds appropriated directly to the Geological Survey.

Water-quality data from Lake Mead at Hoover Dam were furnished by the Metropolitan Water District of Southern California, Lee Streicher, water purification engineer.

DEFINITION OF TERMS AND ABBREVIATIONS

The terms and abbreviations of water-quality and hydrologic data, as used in the text and tabular data of this report, are defined as follows:

Acre-foot (ac-ft) is a quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet or 325,851 gallons. The term is commonly used in measuring volumes of water used or stored.

Cfs-day is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It equals 86,400 cubic feet, 1.983471 acre-feet, or 646,317 gallons.

Channel (watercourse) is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. River, creek, run, branch, anabranch, and tributary are some of the terms used to describe natural channels. Natural channels may be single or braided. Canal and floodway are some of the terms used to describe artificial channels.

Cubic feet per second (cfs) is a unit expressing rates of discharge. One cubic foot per second is equal to the discharge of a stream of rectangular cross section, 1 foot wide and 1 foot deep, flowing water at an average velocity of 1 foot per second.

Discharge, in its simplest concept, means outflow; therefore, the use of this term is not restricted as to course or location, and it can be applied to describe the flow of water from a pipe or from a drainage basin. It is also correct to speak of the discharge of a canal or stream into a lake, a stream, or an ocean.

Daily mean discharge is the mean discharge for one day.

Mean daily discharge is the arithmetic mean discharge for the same day during a specific period of years.

Mean discharge is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge (at time of sampling). If the discharge value at the time of sampling is reported instead of daily mean value, the heading of the discharge column will be "Discharge (cfs)."

Drainage area is that area, in a specified location, measured in a horizontal plane, which is enclosed by a drainage divide.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Equivalents per million (epm) is a unit for expressing the concentration of chemical constituents in terms of the interreacting values of the electrically charged particles, or ions, in solution. One equivalent per million of a positively charged ion will react with one equivalent per million of a negatively charged ion. Parts per million is converted to equivalents per million by multiplying by the reciprocal of the combining weight of the ion.

Conversion factors: Parts per million to equivalents per million

Ion	Multiply by	Ion	Multiply by
Aluminum (Al^{+3})	0.11119	Hydroxide (OH^{-1})	0.05880
Arsenic (As^{+3})	.04004	Iodide (I^{-1})	.00788
Barium (Ba^{+2})	.01456	Iron (Fe^{+3})	.05372
Beryllium (Be^{+2})	.22192	Lead (Pb^{+2})	.00965
Bicarbonate (HCO_3^{-1})	.01639	Lithium (Li^{+1})	.14411
Bromide (Br^{-1})	.01251	Magnesium (Mg^{+2})	.08226
Cadmium (Cd^{+2})	.01779	Manganese (Mn^{+2})	.03640
Calcium (Ca^{+2})	.04990	Nickel (Ni^{+2})	.03406
Carbonate (CO_3^{-2})	.03333	Nitrate (NO_3^{-1})	.01613
Chloride (Cl^{-1})	.02821	Phosphate (PO_4^{-3})	.03159
Chromium (Cr^{+6})	.11539	Potassium (K^{+1})	.02557
Cobalt (Co^{+2})	.03394	Sodium (Na^{+1})	.04350
Copper (Cu^{+2})	.03148	Strontium (Sr^{+2})	.02282
Fluoride (F^{-1})	.05264	Sulfate (SO_4^{-2})	.02082
Hydrogen (H^{+1})	.99209	Zinc (Zn^{+2})	.03060

Gage height is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage," although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of gage height or discharge are obtained. When used in connection with a discharge record, the term is applied only to those gaging stations where a continuous record of discharge is obtained.

Hardness of water is the property of water attributable to the presence of alkaline earths and is expressed as equivalent calcium carbonate ($CaCO_3$). Hardness is a physical-chemical characteristic, not a substance.

Partial-record station is a particular site where limited data are collected systematically over a period of years for use in hydrologic analyses.

Particle size is the diameter, in millimeters (mm) of suspended sediment or bed material determined by sieve and sedimentation methods.

Particle-size classification is the classification recommended by the American Geophysical Union Subcommittee on sediment terminology (Lane and others, 1947, p. 937). According to this classification, a particle having a diameter:

Less than 0.004 mm is clay.
Between 0.004 and 0.062 mm is silt.
Between 0.062 and 2.0 mm is sand.

Parts per million (ppm) is a unit for expressing the concentration of chemical constituents by weight, usually as grams of constituents per million grams of a solution. In the laboratory the results are expressed in weights of solutes in a given volume of water. To express the results in parts per million, the data must be converted. For most waters this conversion is made by assuming that a liter of water weighs 1 kilogram; and thus, milligrams per liter is equivalent to parts per million. Parts per million, for suspended sediment, is computed as 1 million times the ratio of the weight of sediment to the weight of the mixture of water and sediment.

Sediment is solid material both mineral and organic that is transported by, suspended in, or deposited by water. The amount, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are: degree of slope, length of slope, soil characteristics, land usage, and amount and intensity of precipitation.

Sediment discharge is the rate at which dry weight of sediment passes a section of a stream or is the quantity of sediment, as measured by dry weight, or by volume, that is discharged in a given time.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks and dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current and is expressed in micromhos per centimeter at 25°C. Because the specific conductance is related to the number and specific chemical types of ions in solution, it can be used for approximating the salinity of the water. The following general relations are applicable:

Specific conductance x (0.65 ± 0.05)=ppm dissolved solids;

$$\frac{\text{Specific conductance}}{100} = \frac{\text{total epm}}{2}$$

Sodium-adsorption-ratio (SAR) is the expression of relative activity of sodium ions in exchange reaction with soil and is an index of sodium or alkali hazard to the soil. This ratio should be known especially for water used for irrigating farmland.

Stage is the height of a water surface above an established datum plane; also gage height.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff," as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Thermograph is a thermometer for continuously recording variations of temperature automatically on a chart. The term "temperature recorder" is used to indicate the location of the thermograph in station descriptions in the table headings.

Tons per acre-foot indicates the dry weight of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in parts per million by 0.00136.

Tons per day is the quantity of a substance in solution or suspension that passes a stream section during a 24-hour period.

Water year in Geological Survey reports dealing with surface-water supply is the 12-month period, October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1964, is called the "1964 water year."

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the year after thorough mixing in the reservoir.

STATION NUMBERS

A station number has been assigned as an added means of identification for each stream location where regular measurements of streamflow and determinations of water quality have been made. The numbers have been assigned to conform with the standard downstream order of listing gaging stations. The numbering system consists of two digits followed by a hyphen and a six digit number. The notation to the left of the hyphen identifies the Part or hydrologic region used by the Geological Survey for reporting hydrologic data. The number to the right of the hyphen represents the position of the location in the standard downstream order listing the stations within each of the parts. The assigned numbers are in numerical order but are not consecutive. They are so selected from the complete six digit number scale that intervening numbers will be available for future assignments to new locations. The identification number for each station in this report is printed to the left of the station name and contains only the essential digits. For example, the number is printed as 9-4740 for a station whose complete identification number is 09-4740.00.

COLLECTION AND EXAMINATION OF SAMPLES

Water samples for chemical and physical analyses are usually collected at or near points on streams where gaging stations are maintained by the Geological Survey for measurement of discharge. These discharge records are released annually by the Geological Survey as "Surface Water Records of Arizona."

Most of these records are used in conjunction with the computations of the chemical constituents and sediment loads in the report.

The map on page 8 shows the location of water-quality stations in Arizona

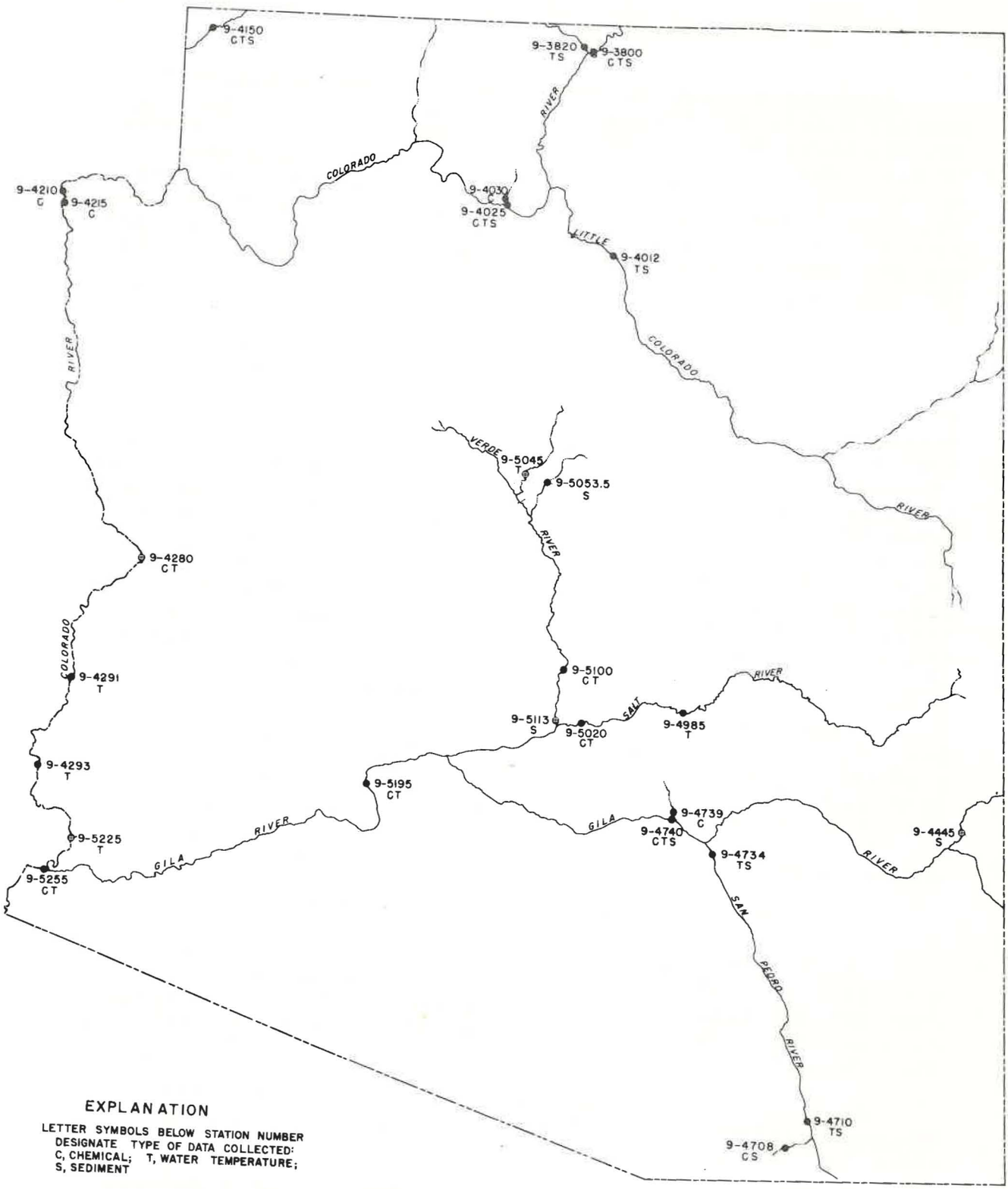

FIGURE 1.--MAP OF ARIZONA SHOWING LOCATION OF WATER-QUALITY STATIONS.

Solutes

The methods of collecting and compositing water samples for determining the concentration of solutes are described by Rainwater and Thatcher (1960). One sample can adequately define the water quality at a given time if the mixture of solutes throughout the stream-cross section is homogeneous. However, the concentration of solutes at different locations in the stream-cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. It is necessary to sample some streams at several verticals across the channel to determine accurately the solute load. No single method of compositing samples is applicable to all problems related to the study of water quality. Although generally holding to the principle of 10-day periods, or the equivalent of three composite samples per month, modifications usually are made on the basis of dissolved-solids content, as indicated by measurements of conductivity of daily samples. Samples collected at monthly and miscellaneous water-quality stations were analyzed individually. The measurements are supplemented by other information, such as chloride content, river stage, and weather conditions.

Temperature

Water temperatures were measured at most of the water-quality stations. For daily stations, the water temperatures were taken at about the same time each day in order that the data would be relatively unaffected by diurnal variations in temperature. Most large swiftly flowing streams probably have a small diurnal variation in water temperature, whereas sluggish or shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. The thermometers used for determining the water temperature were accurate to plus or minus 0.5°F.

At stations where thermographs are located, the records consist of maximum and minimum temperatures for each day and the monthly averages of maximum daily and minimum daily temperatures.

Sediment

In general, suspended-sediment samples were collected

daily with U.S. depth-integrating samplers at three verticals in the cross section of the stream. The US DH-48 hand sampler was used during periods of low flow, and the US DH-59, D-43, or D-49 samplers were used during periods of high flow. During periods of high or rapidly changing flow, samples were taken two or more times daily at most sampling stations.

In periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately preceding and following the periods, and suspended-sediment loads for other periods of similar discharge. The estimates were further guided by weather conditions and sediment discharge for other stations.

In addition to the records of quantities of suspended sediment transported, records of periodic measurements of the particle-size distribution of suspended sediment and bed material are included.

REFERENCES

The following publications are available for background information on the methods for collecting, analyzing, and evaluating the chemical and physical properties of surface waters:

Colby, B. R., and Hubbell, D. W., 1961, Simplified methods for computing total sediment discharge with the modified Einstein procedure: U.S. Geol. Survey Water-Supply Paper 1593, 17 p.

Hem, J. D., 1959, Study and interpretation of the chemical characteristics of natural water: U.S. Geol. Survey Water-Supply Paper 1473, 269 p.

Lane, E. W. and others, 1947, Report of Subcommittee on terminology: Am. Geophys. Union Trans., v. 28, p. 937.

Langbein, W. B., and Iseri, K. T., 1960, General introduction and hydrologic definitions: U.S. Geol. Survey Water-Supply Paper 1541-A, 29 p.

Rainwater, F. H., and Thatcher, L. L., 1960, Methods for collection and analysis of water samples: U.S. Geol. Survey Water-Supply Paper 1454, 301 p.

U.S. Inter-Agency Committee on Water Resources, A study of methods used in measurement and analysis of sediment loads in streams:

Report 4, 1941, Methods of analyzing sediment samples: Iowa University 203 p.
Report 11, 1957, The development and calibration of visual accumulation tube: St. Anthony Falls Hydraulic Lab., Minneapolis, Minn., 109 p., 43 figs.
Report 12, 1957, Some fundamentals of particle-size analysis: U.S. Govt. Printing Office, Washington, D.C. 20402, 55 p. 9 figs.
Report AA, 1959, Federal Inter-agency sedimentation instruments and reports: St. Anthony Falls Hydraulic Lab., Minneapolis, Minn., 41 p. 27 figs.
Report 13, 1961, The single stage sampler for suspended sediment: U.S. Govt. Printing Office, Washington, D. C., 20402, 105 p. 51 figs.
Report 14, 1963, Determinations of fluvial sediment discharge: U.S. Govt. Printing Office, Washington, D.C. 20402,151 p. 70 figs.

Annual Series of Water-Supply Papers
for Quality of Surface Waters

U.S. Geological Survey, 1943-53, Quality of surface waters of the United States; water years 1941-49: U.S. Geol. Survey Water-Supply Papers:

Year	WSP	Year	WSP	Year	WSP
1941	942	1944	1022	1947	1102
1942	950	1945	1030	1948	1133
1943	970	1946	1050	1949	1163

U.S. Geological Survey, 1954-64, Quality of surface waters of the United States; Parts 9-14, Colorado River basin to Pacific slope basins in Oregon and lower Columbia River basin; water years 1950-63: U.S. Geol. Survey Water-Supply Papers:

Year	WSP	Year	WSP	Year	WSP
1950	1189	1955	1403	* 1960	1745
1951	1200	1956	1453	*1961	1885
1952	1253	1957	1523	1962	1945
1953	1293	1958	1574	*1963	1951
1954	1353	1959	1645		

*In preparation.

PART 9. COLORADO RIVER BASIN

COLORADO RIVER MAIN STEM

9-3800. COLORADO RIVER AT LEES FERRY, ARIZ.

LOCATION.--At gaging station at head of Marble Gorge at Lees Ferry, Coconino County, just upstream from Paria River, 16 miles downstream from Glen Canyon Dam, 28 miles downstream from Utah-Arizona State line, 61.5 miles upstream from Little Colorado River, and 79 miles downstream from San Juan River.
DRAINAGE AREA.--107,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January to July 1926, October 1926 to June 1927, October 1928 to September 1930, November 1942 to October 1945, October 1947 to September 1964.
Water temperatures: July 1949 to September 1964.
Sediment records: October 1928 to December 1933, November 1942 to September 1944, October 1947 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 984 ppm Dec. 1-31; minimum, 468 ppm Sept. 7-30.
Hardness: Maximum, 480 ppm Feb. 1-29; minimum, 232 ppm Sept. 7-30.
Specific conductance: Maximum daily, 1,460 micromhos Feb. 10, 14; minimum daily, 685 micromhos Sept. 30.
Water temperatures: Maximum, 76°F Sept. 22-25; minimum, 43°F Feb. 24.
Sediment concentrations: Maximum daily, 5,200 ppm Mar. 28; minimum daily, 12 ppm June 9-30.
Sediment loads: Maximum daily, 260,000 tons Mar. 28; minimum daily, 30 tons June 9.
EXTREMES, 1928-33, 1942-45, 1947-64.--Dissolved solids (1928-30, 1942-45, 1947-64): Maximum, 1,940 ppm Sept. 26, 1962; minimum, 209 ppm June 11-20, 1929.
Hardness (1928-30, 1942-45, 1947-64): Maximum, 960 ppm Oct. 15, 1960; minimum, 132 ppm June 11-20, 1944.
Specific conductance (1942-45, 1947-64): Maximum daily, 2,430 micromhos Oct. 15, 1960; minimum daily, 318 micromhos June 9, 1948.
Water temperatures (1949-64): Maximum, 85°F July 26, 1959; minimum, freezing point on many days during winter months of most years.
Sediment concentrations (1928-33, 1942-44, 1947-64): Maximum daily, 83,300 ppm Aug. 11, 1930; minimum daily, 12 ppm June 9-30, 1964.
Sediment loads (1928-33, 1942-44, 1947-64): Maximum daily, 9,450,000 tons Aug. 7, 1929; minimum daily, 30 tons June 9, 1964.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Tucson, Ariz. (formerly at Albuquerque, N. Mex.).

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, Magnesium	Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-31, 1963...	1000	12	0.00	76	27	89	6.4	158		256	70	0.3	3.7	0.13	649	0.88	1752	300	170	2.2	971	7.5
Nov. 1-23.....	1000	--	--	83	24	90	--	158		--	--	--	--	--	660	.90	1782	304	174	2.2	984	7.6
Nov. 24-30.....	1000	--	--	105	33	107	--	168		--	--	--	--	--	832	1.13	2246	396	258	2.3	1200	7.7
Dec. 1-31.....	1020	--	--	123	38	123	--	182		--	--	--	--	--	984	1.34	2710	464	315	2.5	1370	7.8
Jan. 1-31, 1964...	1153	10	.00	122	38	126	7.0	192		427	94	.4	3.3	.13	980	1.38	3051	460	302	2.6	1360	7.9
Feb. 1-29.....	4008	--	--	129	38	123	--	196		--	--	--	--	--	978	1.33	10584	480	319	2.4	1430	8.0
Mar. 1-31.....	6315	--	--	131	32	125	--	196		--	--	--	--	--	952	1.29	16232	460	299	2.5	1390	8.0
Apr. 1-30.....	12950	--	--	122	34	122	--	190		--	--	--	--	--	914	1.24	31958	444	288	2.5	1350	7.9
May 1-31.....	5186	--	--	111	35	132	--	180		--	--	--	--	--	894	1.22	12518	422	274	2.8	1340	7.8
June 1-30.....	1001	--	--	113	35	131	--	186		--	--	--	--	--	914	1.24	2317	426	300	2.9	1350	7.9
July 1-31.....	977	12	.01	112	35	128	5.9	184		383	109	.4	4.5	.19	918	1.25	2422	425	274	2.7	1340	7.9
Aug. 1-29.....	2814	--	--	115	35	126	--	184		--	--	--	--	--	922	1.25	7005	430	279	2.6	1330	7.8
Aug. 30-Sept. 3...	2358	--	--	102	31	112	--	174		--	--	--	--	--	820	1.12	5221	380	237	2.5	1190	7.8
Sept. 4-6.....	2787	--	--	74	22	74	--	154		--	--	--	--	--	575	.78	4327	276	150	1.9	864	7.7
Sept. 7-30.....	2710	9.8	.01	63	18	58	3.7	140		177	44	.3	2.8	.12	468	.64	3424	232	117	1.4	715	8.0
Weighted average	3319	--	--	116	33	119	--	184		--	--	--	--	--	889	1.21	7970	427	275	2.4	1305	7.8
Time-weighted average.....	--	--	--	109	33	115	--	177		--	--	--	--	--	860	--	--	407	262	2.4	1253	7.8
Tons per day....	--	--	--	1041	297	1070	--	1650		--	--	--	--	--	--	--	--	--	--	--	--	--

9-3800. COLORADO RIVER AT LEES FERRY, ARIZ.--Continued

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	--	68	62	66	--	--	62	--	--	66	62	--	--	60	--	--	62	62	--	--	63	61	64	61	--	--	--	64	61	--	60	--
November	58	--	--	63	62	62	59	--	--	--	--	58	61	--	61	--	--	59	59	59	--	--	58	--	59	--	--	57	--	--	--	--
December	--	--	--	--	--	--	--	--	54	57	--	--	--	--	52	--	--	--	54	--	--	--	--	--	--	--	--	--	--	--	51	--
January	--	--	--	--	49	48	48	48	--	--	--	47	48	44	--	--	--	--	--	46	49	48	45	47	--	--	47	47	47	46	44	--
February	45	--	46	45	--	--	44	--	--	44	46	46	47	45	--	--	46	45	--	45	--	--	46	43	46	45	--	46	46	--	--	--
March	--	46	46	47	44	--	44	--	46	46	47	44	47	--	46	46	47	--	44	--	--	--	44	44	47	46	44	45	46	47	45	--
April	46	46	47	46	46	--	--	44	--	46	--	46	47	44	47	44	--	--	47	47	--	44	45	44	--	--	44	44	45	46	--	--
May	45	48	45	46	45	46	46	--	--	50	47	54	50	50	54	--	--	52	--	52	--	55	--	--	54	--	54	--	--	--	54	--
June	--	54	--	54	--	--	56	--	58	--	53	--	--	57	--	--	55	54	--	--	--	58	59	59	--	59	--	57	--	57	--	--
July	--	--	--	61	60	60	60	60	58	--	59	59	60	60	--	--	63	59	60	--	--	--	61	62	61	59	--	--	--	59	--	--
August	57	--	--	--	60	60	60	60	--	58	58	--	60	60	60	61	57	52	48	54	53	51	54	54	54	54	52	52	57	54	55	56
September	58	--	--	70	72	73	75	75	74	75	--	74	--	74	--	--	75	75	--	--	75	76	76	76	76	--	--	--	75	75	--	--

9-3800. COLORADO RIVER AT LEES FERRY, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	1000	C 92	250	1000	C 120	320	1000	C 130	350
2..	1000	C 92	250	1000	C 120	320	1010	C 130	350
3..	1000	C 92	250	1000	C 120	320	1020	C 130	360
4..	1000	C 92	250	1000	C 120	320	1030	C 130	360
5..	1000	C 92	250	1000	C 120	320	1030	C 130	360
6..	1000	C 92	250	1000	C 120	320	1030	C 130	360
7..	1000	C 92	250	1000	C 120	320	1030	C 130	360
8..	1000	C 92	250	1000	C 120	320	1030	C 130	360
9..	1000	C 92	250	1000	C 120	320	1030	C 130	360
10..	1000	C 92	250	1000	C 120	320	1030	C 130	360
11..	1000	C 92	250	1000	C 120	320	1030	C 130	360
12..	1000	C 92	250	1000	C 120	320	1030	C 130	360
13..	1000	C 92	250	1000	C 120	320	1030	C 130	360
14..	1000	C 92	250	1000	C 120	320	1030	C 130	360
15..	1000	C 92	250	1000	C 120	320	1030	C 130	360
16..	1000	C 92	250	1010	C 120	330	1030	C 130	360
17..	1000	C 92	250	1000	C 120	320	1030	C 130	360
18..	1000	C 92	250	1000	C 120	320	1020	C 130	360
19..	1000	C 92	250	1000	C 120	320	1020	C 130	360
20..	1000	C 92	250	1000	C 120	320	1020	C 130	360
21..	1000	C 92	250	1000	C 120	320	1020	C 130	360
22..	1000	C 92	250	1000	C 120	320	1020	C 130	360
23..	1000	C 92	250	1000	C 120	320	1030	C 130	360
24..	1000	C 92	250	1000	C 120	320	1030	C 130	360
25..	1000	C 92	250	1000	C 120	320	1030	C 130	360
26..	1000	C 92	250	1000	C 120	320	1030	C 130	360
27..	1000	C 92	250	1000	C 120	320	1030	C 130	360
28..	1000	C 92	250	1000	C 120	320	980	C 130	340
29..	1000	C 92	250	1000	C 120	320	980	C 130	340
30..	1000	C 92	250	1000	C 120	320	980	C 130	340
31..	1000	C 92	250	--	--	--	980	C 130	340
Total	21000	--	7750	30010	--	9610	31620	--	11060

Day	JANUARY			FEBRUARY			MARCH		
1..	980	C 140	370	3970	C 1600	17000	4030	C 970	10000
2..	980	C 140	370	3970	C 1600	17000	4010	C 970	10000
3..	980	C 140	370	3990	C 1600	17000	4010	C 970	10000
4..	980	C 140	370	4030	C 1200	13000	4010	C 970	10000
5..	980	C 140	370	4030	C 1200	13000	4010	C 970	10000
6..	980	C 140	370	4030	C 1200	13000	4030	C 970	10000
7..	980	C 140	370	4030	C 1200	13000	4030	C 970	10000
8..	980	C 140	370	4010	C 1200	13000	4010	C 970	10000
9..	990	C 140	370	3990	C 1000	11000	4010	C 970	10000
10..	990	C 140	370	3990	C 1000	11000	4030	C 970	10000
11..	990	C 140	370	3990	C 1000	11000	4030	C 970	10000
12..	990	C 140	370	3990	C 1000	11000	4030	C 970	10000
13..	990	C 140	370	3990	C 1000	11000	4050	C 970	11000
14..	990	C 140	370	3990	C 1000	11000	4050	C 970	11000
15..	990	C 140	370	3990	C 1000	11000	4050	C 970	11000
16..	990	C 140	370	3990	C 1000	11000	4050	C 970	11000
17..	990	C 140	370	3990	C 1000	11000	4050	C 970	11000
18..	990	C 140	370	3990	C 1000	11000	4050	C 970	11000
19..	990	C 140	370	4010	C 980	11000	4050	C 970	11000
20..	990	C 140	370	4010	C 980	11000	4050	C 970	11000
21..	990	C 140	370	4010	C 980	11000	4050	C 970	11000
22..	990	C 140	370	4010	C 980	11000	4050	C 970	11000
23..	990	C 140	370	4010	C 980	11000	4050	C 970	11000
24..	1000	C 140	380	3990	C 980	10000	4050	C 970	11000
25..	1000	C 140	380	3990	C 980	10000	4050	C 970	11000
26..	1000	C 140	380	4010	C 980	11000	6480	2700	S 60000
27..	1000	C 140	380	4060	C 980	11000	12800	4400	150000
28..	1000	C 140	380	4080	C 980	11000	18900	5200	260000
29..	1140	440	S 1900	4100	C 980	11000	19000	4300	220000
30..	2950	2500	19900	--	--	--	19100	3100	160000
31..	3970	2100	22000	--	--	--	18600	3300	160000
Total	35750	--	54210	116240	--	345000	195770	--	1273000

S Computed by subdividing day.
C Composite period.

9-3800. COLORADO RIVER AT LEES FERRY, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	16700	3200	140000	17000	2500	110000	1020	C 51	140
2..	16900	2000	91000	12700	1300	44000	1030	C 51	140
3..	16000	2500	110000	12500	1400	47000	1030	C 51	140
4..	12300	2200	73000	13000	1400	49000	1030	C 51	140
5..	12200	1900	62000	13900	1900	71000	1030	C 51	140
6..	12200	C 1500	49000	13000	1900	67000	1040	C 51	140
7..	12200	C 1500	49000	12800	1700	59000	1040	C 51	140
8..	12200	C 1500	49000	12500	1600	B 54000	1040	C 51	140
9..	12200	C 1500	49000	12500	1400	B 47000	933	C 12	30
10..	12200	C 1500	49000	12500	1300	44000	978	C 12	32
11..	12200	C 1500	49000	8100	670	S 21000	990	C 12	32
12..	12100	C 1500	49000	1060	C 59	170	980	C 12	32
13..	12100	C 1500	49000	1020	C 59	160	990	C 12	32
14..	12100	C 1500	49000	1000	C 59	160	1000	C 12	32
15..	12100	C 1500	49000	990	C 59	160	1000	C 12	32
16..	12000	C 1500	49000	990	C 59	160	1000	C 12	32
17..	11500	C 1500	46000	990	C 59	160	1010	C 12	33
18..	10700	C 1300	38000	990	C 59	160	1010	C 12	33
19..	10700	C 1300	38000	1000	C 59	160	1010	C 12	33
20..	10800	C 1300	38000	1000	C 59	160	1000	C 12	32
21..	10800	C 1300	38000	1010	C 59	160	1000	C 12	32
22..	10800	C 1300	38000	1010	C 59	160	1010	C 12	33
23..	10800	C 1300	38000	1020	C 59	160	980	C 12	32
24..	10800	C 1300	38000	1020	C 59	160	980	C 12	32
25..	10800	C 1300	38000	1030	C 59	160	980	C 12	32
26..	10800	C 1300	38000	1040	C 59	160	980	C 12	32
27..	13400	2600	S 110000	1040	C 59	160	990	C 12	32
28..	20000	3900	210000	1030	C 59	160	990	C 12	32
29..	19600	3600	190000	1000	C 59	160	990	C 12	32
30..	19300	3400	180000	1010	C 59	160	980	C 12	32
31..	--	--	--	1010	C 59	160	--	--	--
Total	388500	--	2093000	160760	--	616210	30041	--	1826

Day	JULY			AUGUST			SEPTEMBER		
1..	990	C 26	69	1050	C 39	110	1800	C 16	78
2..	990	C 26	69	1030	C 39	110	2710	C 16	120
3..	1000	C 26	70	1020	C 39	110	990	C 16	43
4..	1000	C 26	70	1010	C 39	110	2640	C 16	110
5..	1010	C 26	71	1010	C 39	110	2840	C 16	120
6..	1010	C 26	71	1010	C 39	110	2880	C 16	120
7..	1020	C 26	72	1010	C 39	110	2940	C 16	130
8..	1010	C 26	71	1010	C 39	110	2390	C 16	100
9..	1000	C 26	70	1010	C 39	110	2650	C 16	110
10..	950	C 26	67	1020	C 39	110	3090	C 16	130
11..	950	C 26	67	1020	C 39	110	2810	C 16	120
12..	950	C 26	67	1020	C 39	110	2840	C 16	120
13..	950	C 26	67	1020	C 39	110	2250	C 16	97
14..	960	C 26	67	1020	C 39	110	2500	C 16	110
15..	940	C 26	66	1020	C 39	110	2560	C 16	110
16..	930	C 26	65	1020	C 39	110	2470	C 16	110
17..	930	C 26	65	3010	140	S 1800	997	C 16	43
18..	920	C 26	64	5940	95	1500	2540	C 16	110
19..	920	C 26	64	5970	C 45	720	2500	C 16	110
20..	930	C 26	65	6060	C 45	740	2060	C 16	89
21..	960	C 26	67	6060	C 45	740	2010	C 16	87
22..	970	C 26	68	6060	C 45	740	2640	C 16	110
23..	980	C 26	69	6060	C 45	740	2380	C 16	100
24..	980	C 26	69	6030	C 45	730	2240	C 16	97
25..	980	C 26	69	5010	C 45	610	2020	C 16	87
26..	1000	C 26	70	3750	C 25	250	3030	C 16	130
27..	1000	C 26	70	3750	C 25	250	3070	C 16	130
28..	1000	C 26	70	3810	C 25	260	3090	C 16	130
29..	1000	C 26	70	3810	C 25	260	4120	C 16	180
30..	1010	C 26	71	3730	C 25	250	5850	C 16	250
31..	1050	C 26	74	2560	C 25	170	--	--	--
Total	30290	--	2124	87910	--	11520	78907	--	3381

Total discharge for year (cfs-days)..... 1,216,798
Total load for year (tons)..... 4,426,191

S Computed by subdividing day.
B Computed from estimated-concentration graph.
C Composite period.

9-3800. COLORADO RIVER AT LEES FERRY, ARIZ.--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 13, 1964	1630		46	4030	1080		--	--		--		10	91	100				V
Mar. 26	1315		46	6710	5120		2	3		4		50	99	100				VPWC
Mar. 26	1545		47	9280	5240		2	3		4		51	98	100				VPWC
Mar. 27	1445		47	12500	3410		2	2		3		28	93	100				VPWC
Mar. 28	0915		45	18700	5930		2	2		2		21	90	100				VPWC
Apr. 28	1500		47	20100	3500		1	2		2		22	91	100				VPWC

Particle-size analyses of bed material, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S; sieve; V, visual accumulation tube; W, in distilled water)

29051

Date of collection	Time (24 hour)	Number of sampling points	Discharge	Bed material: Percent finer than size indicated, in millimeters												Method of analysis
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
Oct. 3, 1963						0	37	92	100							V
Oct. 10						2	70	99	100							V
Oct. 18						2	71	97	100							V
Oct. 24						0	24	74	100							V
Oct. 31						2	68	98	100							V
Nov. 7						2	70	99	100							V
Nov. 15						2	60	95	100							V
Nov. 20						1	70	98	100							V
Nov. 28						2	53	87	100							V
Dec. 10						1	60	92	100							V
Jan. 7, 1964						1	40	82	100							V
Jan. 14						4	81	100	--							V
Jan. 21						2	68	95	100							V
Jan. 28						2	70	96	100							V
Feb. 19						1	63	93	100							

PARIA RIVER BASIN

9-3820. PARIA RIVER AT LEES FERRY, ARIZ.

LOCATION.--At gaging station 0.5 mile upstream from mouth and 1 mile northwest of Lees Ferry, Coconino County.
DRAINAGE AREA.--1,570 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to February 1950.
Water temperatures: October 1956 to September 1964.
Sediment records: October 1947 to September 1964.
EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 220,000 ppm Aug. 2; minimum daily, 41 ppm Oct. 1-17.
Sediment loads: Maximum daily, 340,000 tons Aug. 12; minimum daily, less than 0.05 ton Oct. 7.
EXTREMES, 1947-64.--Water temperatures (1956-62, 1963-64): Maximum, 96°F Aug. 11, 1958, July 29, 1960; minimum, freezing point Jan. 18, 1960 and several days during January 1961.
Sediment concentrations: Maximum daily, 433,000 ppm Aug. 4, 1961; minimum daily, 1 ppm June 1-10, 1950.
Sediment loads: Maximum daily, 5,100,000 tons Sept. 12, 1958; minimum daily, less than 0.05 ton on many days most years.
REMARKS.--Flow affected by ice Dec. 8 to Jan. 21, Jan. 24, Feb. 4-9.

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	--	--	--	--	--	--	--	--	--	74	--	--	--	--	--	--	--	62	62	68	--	65	--	--	--	--	--	--	--	--	60	--
November	--	--	--	--	--	--	--	--	--	--	--	56	56	--	57	--	49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	--	--	--	--	--	--	--	--	37	--	--	--	--	37	--	--	--	--	--	35	--	--	--	--	--	--	--	--	--	--	35	--
January	--	--	--	--	--	--	--	--	--	--	--	--	35	34	--	--	--	--	--	37	39	--	37	--	--	--	--	42	--	--	--	--
February	--	--	39	--	--	--	--	--	--	--	--	--	--	41	--	--	--	--	--	46	--	--	47	--	--	45	--	39	--	--	--	--
March	--	--	51	--	--	--	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	51	48	--	52	60	61	--	66	64	--
April	--	--	--	--	--	--	--	--	--	54	64	64	--	68	72	--	--	--	--	64	68	66	--	61	--	--	72	--	75	--	--	--
May	69	--	--	60	55	61	55	67	--	--	--	--	--	75	78	66	72	81	--	79	--	--	--	--	--	84	73	79	69	--	--	--
June	83	79	83	--	74	--	--	--	--	72	--	--	--	--	86	--	70	--	73	--	--	74	78	88	78	76	--	78	83	85	--	--
July	--	--	--	82	83	83	--	78	79	--	82	81	--	85	--	90	83	--	88	--	--	--	80	79	80	79	--	78	81	--	81	--
August	83	78	--	--	76	76	78	90	89	91	--	75	--	--	--	--	82	--	69	--	68	--	80	79	77	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--	--	66	69	70	--	--	--	--	--	--	73	--	--	70	--	70	--	74	76	79	78	--	--	--

9-3820. PARIA RIVER AT LEES FERRY, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	8.9	C 41		0.1	9.3	C 100		2	16	--		20
2..	6.8	C 41		.1	10	C 100		3	15	--		20
3..	5.9	C 41		.1	9.6	C 100		3	15	--		20
4..	5.2	C 41		.1	10	C 100		3	14	--		20
5..	4.7	C 41		.1	12	C 100		3	13	--		10
6..	5.0	C 41		.1	13	C 100		4	14	--		20
7..	4.2	C 41		T	13	C 100		4	16	--		20
8..	4.6	C 41		.1	76	--		6000	16	--		20
9..	5.7	C 41		.1	27	--		1000	14	390		15
10..	6.4	C 41		.1	16	--		300	10	220		6
11..	7.5	C 41		.1	13	--		20	12	200	B	6
12..	6.8	C 41		.1	12	340		11	8.9	100	B	2
13..	6.2	C 41		.1	12	260		8	9.3	100	B	2
14..	6.2	C 41		.1	12	200	B	6	9.3	100		2
15..	6.2	C 41		.1	12	140		4	8.2	100	B	2
16..	6.4	C 41		.1	37	17000	K	2900	8.6	100	B	2
17..	6.8	C 41		.1	68	24000		4400	8.9	100	B	2
18..	37	26000	S	3200	22	9000		530	12	90		3
19..	15	40000		1700	18	25000		1200	12	100	B	3
20..	286	75000	S	83000	18	30000		1400	15	220		9
21..	63	56000		9900	18	25000	B	1200	16	--		9
22..	25	53000		3700	25	10000	B	680	12	--		6
23..	16	16000		690	20	1900		100	14	--		8
24..	13	3000		100	16	570	B	25	11	--		6
25..	12	2000	B	65	18	630	B	30	12	--		6
26..	12	1000	B	35	17	520		24	12	180		6
27..	11	600	B	18	16	480	B	20	12	190	B	6
28..	10	200		5	16	460		17	12	200		6
29..	10	110		3	17	480	B	22	14	210	B	8
30..	9.6	100	B	3	14	340	B	12	16	260	B	12
31..	9.3	80		2	--	--		--	14	270		10
Total	632.4	--		102422.6	596.9	--		19931	392.2	--		287
	JANUARY				FEBRUARY				MARCH			
1..	12	--		6	21	160	B	9	13	220	B	8
2..	15	--		10	20	170	B	9	10	90		2
3..	16	--		10	18	310		15	17	260		12
4..	15	--		10	16	450		19	19	630		32
5..	7.8	--		4	13	370	B	12	14	540		20
6..	7.1	170		3	16	320	B	14	19	600	B	30
7..	9.3	150	B	4	12	240		8	17	630		29
8..	6.2	100		2	12	200	B	6	12	390	B	12
9..	6.2	--		2	15	250	B	10	12	270		9
10..	8.9	--		2	21	260		15	12	220		7
11..	8.6	--		2	30	540		44	17	360		16
12..	6.8	--		2	30	880		71	17	630		29
13..	7.8	150		3	26	960		67	21	620		35
14..	7	60		1	16	960		41	20	1500		81
15..	7	--		1	8.2	720	B	16	16	1400	B	60
16..	7	--		1	12	430	B	14	18	1000		49
17..	7	--		2	8.8	320	B	8	16	750		32
18..	8	--		2	14	360		14	16	860	B	35
19..	9.3	--		4	21	350	B	20	16	880		38
20..	13	250		9	24	360		23	15	700	B	30
21..	16	190		8	18	350	B	18	12	560	B	18
22..	20	110		6	16	370	B	16	5.8	370	B	6
23..	21	240		14	13	260		9	13	460		16
24..	13	210		7	16	280	B	12	21	1300		74
25..	11	180	B	5	16	280		12	30	2200		180
26..	13	140	B	5	20	290		16	24	2400		160
27..	12	110		4	12	220		7	22	2100		120
28..	16	90		4	15	220		9	24	2300		150
29..	18	110		5	16	230	B	10	27	3600		260
30..	18	130	B	6	--	--		--	27	7800		570
31..	23	220		14	--	--		--	24	11000		710
Total	366.0	--		158	496	--		544	546.8	--		2830

S Computed by subdividing day.
T Less than 0.05 ton.
B Computed from estimated-concentration graph.
C Composite period.
K Computed from estimated-concentration graph and subdividing day.

9-3820. PARIA RIVER AT LEES FERRY, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	APRIL Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	MAY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	JUNE Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day
1..	24	15000	970	25	7500	S 750	4.6	C 63	0.8
2..	28	18000	1400	23	18000	1100	4.6	C 63	.8
3..	27	20000	1400	13	3600	130	4.6	C 63	.8
4..	58	17000	2700	8.8	1900	45	4.2	C 63	.7
5..	39	7200	760	7.0	700	13	4.6	C 63	.8
6..	33	9000	B 800	6.6	600	11	3.9	C 63	.7
7..	31	8000	B 670	22	2000	S 190	3.7	C 63	.6
8..	24	5000	320	38	3300	340	3.7	C 63	.6
9..	30	12000	970	25	1800	B 120	3.9	C 63	.7
10..	27	22000	1600	40	58000	6500	4.2	C 63	.7
11..	25	19000	1300	31	40000	3500	3.9	C 63	.7
12..	20	15000	810	24	31000	B 2000	3.9	C 63	.7
13..	19	20000	1000	19	26000	1300	3.7	C 63	.6
14..	15	13000	530	16	23000	990	3.4	C 63	.6
15..	12	5000	160	13	20000	700	3.4	C 63	.6
16..	9.9	6300	170	5.8	9500	150	3.4	C 63	.6
17..	13	6000	B 210	4.2	2300	26	3.4	C 63	.6
18..	12	4500	B 140	4.6	640	8	3.4	C 63	.6
19..	7.8	2700	57	5.0	460	6	3.7	C 63	.6
20..	8.2	1200	27	3.9	300	B 3	3.7	C 63	.6
21..	12	2700	87	3.4	150	1	3.9	C 63	.7
22..	12	1700	55	3.4	100	B .9	3.2	C 63	.5
23..	8.2	1100	24	3.2	100	B .9	3.4	C 63	.6
24..	7.8	750	16	3.2	85	.7	3.4	C 63	.6
25..	7.0	370	7	3.4	80	B .7	3.4	C 63	.6
26..	6.6	200	B 4	4.6	90	1	3.7	C 63	.6
27..	6.6	140	2	6.4	1200	21	3.9	C 63	.7
28..	6.6	100	B 2	8.6	780	18	7.8	C 60	1
29..	7.0	110	2	5.8	400	6	6.6	C 60	1
30..	9.6	400	B 10	5.0	200	3	4.2	C 60	.7
31..	--	--	--	4.2	220	2	--	--	
Total	546.3	--	16203	386.1	--	17937.2	121.4	--	20.4

Day	JULY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	AUGUST Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	SEPTEMBER Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day
1..	3.2	C 72	0.6	9.5	38000	1000	3.4	C 69	0.6
2..	3.2	C 72	.6	53	220000	S 43000	3.4	C 69	.6
3..	2.9	C 72	.6	12	120000	B 4200	3.7	C 69	.7
4..	2.6	C 72	.5	180	180000	K 130000	3.9	C 69	.7
5..	2.6	C 72	.5	55	80000	12000	3.9	C 69	.7
6..	3.2	C 72	.6	51	54000	7700	3.9	C 69	.7
7..	3.4	C 72	.7	32	29000	2500	3.9	C 69	.7
8..	3.4	C 72	.7	17	23000	1000	3.9	C 69	.7
9..	3.4	C 72	.7	12	21000	680	4.2	C 69	.8
10..	3.9	C 72	.8	8.2	15000	330	7.5	5300	S 210
11..	4.2	C 72	.8	8.2	13000	S 640	9.9	8800	240
12..	4.2	C 72	.8	505	160000	S 340000	5.8	3000	47
13..	4.2	C 72	.8	257	100000	S 100000	4.2	1500	B 18
14..	16	4800	S 600	174	87000	S 45000	5.0	1000	14
15..	6.2	810	14	105	86000	25000	40	24000	S 5700
16..	4.6	C 110	1	70	44000	8600	30	37000	B 3100
17..	5.0	C 110	1	40	9000	970	8.2	26000	B 580
18..	3.9	C 110	1	25	8400	570	7.0	15000	B 280
19..	3.2	C 110	1	16	2700	120	7.4	20000	400
20..	3.2	C 110	1	12	1200	39	6.6	20000	360
21..	3.7	C 110	1	8	1200	26	7.4	15000	B 300
22..	4.6	C 110	1	6	1400	B 23	6.6	7300	130
23..	164	140000	S 93000	4.5	1800	22	6.6	6000	110
24..	34	95000	9400	4	2000	22	6.6	4000	71
25..	40	84000	S 13000	3.4	1200	11	6.6	1500	B 25
26..	32	150000	14000	3.9	800	8	6.6	560	10
27..	126	190000	K 96000	4.6	1000	12	6.6	310	B 6
28..	149	210000	S 120000	5.4	1000	14	6.2	140	2
29..	48	170000	24000	4.2	830	9	5.8	130	B 2
30..	17	93000	4600	4.6	850	10	5.8	170	3
31..	10	43000	1200	3.9	550	6	--	--	
Total	714.8	--	375829.7	1694.4	--	723512	230.6	--	11614.2

Total discharge for year (cfs-days)..... 6,723.9
Total load for year (tons).....1,271,289.1

S Computed by subdividing day.
B Computed from estimated-concentration graph.
C Composite period.
K Computed from estimated-concentration graph and subdividing day.

9-3820. PARIA RIVER AT LEES FERRY, ARIZ.--Continued

Particle-size analyses of suspended-sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 18, 1963	0900		58	85	19000		41	54		93		100	--	--				PWC
Oct. 20	0900		58	366	93600		37	44		64		91	99	100				VPWC
Oct. 23	0800		55	16	18800		79	94		100		--	--	--				PWC
Nov. 20	0745		39	12	24100		74	90		100		--	--	--				PWC
Apr. 10, 1964	1730		54	37	33500		63	84		99		100	--	--				PWC
May 2	0945		54	37	22000		54	79		100		--	--	--				PWC
May 5	1615		60	18	995		62	81		98		100	--	--				PWC
May 10	1015		61	53	64300		73	96		100		--	--	--				PWC
Aug. 12	0615		73	1040	190000		21	32		46		74	94	100				VPWC
Aug. 12	1215		74	451	146000		31	42		68		91	99	100				VPWC
Aug. 13	0730		71	630	187000		24	30		46		77	96	100				VPWC
Aug. 15	0830		77	98	118000		53	68		96		100	--	--				PWC
Sept. 19	1415		73	D 7.4	22200		72	89		99		100	--	--				PWC
Sept. 20	1020		71	5.8	21400		75	93		100		--	--	--				PWC

D Daily mean discharge.

LITTLE COLORADO RIVER BASIN

9-4012. LITTLE COLORADO RIVER AT CAMERON, ARIZ.

LOCATION.--At bridge on U.S. Highway 89 at Cameron, Coconino County, 12 miles upstream from gaging station which is 3 miles downstream from Coconino damsite, 9.5 miles downstream from Moenkopi Wash, 9.5 miles northwest of Cameron, and 45.5 miles upstream from mouth.

DRAINAGE AREA.--26,500 square miles, approximately, upstream from gaging station.

RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1958.
Water temperatures: October 1951 to September 1964.
Sediment records: October 1947 to September 1964.

EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 140,000 ppm Aug. 1; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 1,400,000 tons Aug. 14; minimum daily, 0 tons on many days.

EXTREMES, 1947-64.--Sediment concentrations: Maximum daily, 162,000 ppm Aug. 22, 1958; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 2,580,000 tons Sept. 21, 1952; minimum daily, 0 tons on many days each year.

REMARKS.--Sediment loads are computed at station with allowances made for inflow between sampling point and gaging station. Appreciable inflow between sampling site and gaging station during periods of storm runoff. Most of this inflow is from Moenkopi Wash, but other arroyos may at times become sizeable contributors.

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	75	55	75	75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	60	56	70	72	--	--	--	--	--	--	--	--	--	--
November	--	--	--	--	--	--	--	55	60	60	55	56	56	57	57	57	50	51	52	50	49	--	--	--	--	--	--	--	--	--	--	--
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
April	--	--	--	52	51	50	--	60	66	66	68	48	68	64	68	65	66	62	55	62	66	66	67	60	52	48	65	70	70	--	--	61
May	54	50	45	60	57	60	40	65	68	50	80	80	78	80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	80	--	--	--	--	--	--	--	--	80	--	--	85	84	80	75	--
August	80	80	80	80	80	84	84	82	84	86	80	75	75	78	80	82	84	75	80	78	74	74	79	80	65	60	75	65	--	--	--	78
September	70	80	60	78	85	85	85	85	82	85	78	75	67	65	62	72	72	74	70	70	68	70	72	60	60	58	60	72	75	75	--	72

9-4012. LITTLE COLORADO RIVER AT CAMERON, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	32	80000	7200	0	--	0			
2..	20	80000	4500	0	--	0			
3..	14	70000	B 2700	0	--	0			
4..	10	41000	1100	0	--	0			
5..	6.6	25000	440	0	--	0			
6..	4.4	--	200	0	--	0			
7..	2.0	--	40	0	--	0			
8..	1.2	--	10	88	71000	S 19000			
9..	.5	--	3	56	48000	7500			
10..	.2	--	1	38	47000	5000			
11..	0	--	0	30	42000	3500			
12..	0	--	0	24	40000	2700			
13..	0	--	0	16	39000	1700			
14..	0	--	0	21	39000	2300			
15..	0	--	0	24	36000	2400			
16..	0	--	0	16	28000	1200			
17..	0	--	0	10	26000	700			
18..	0	--	0	8.6	25000	580			
19..	578	43000	S 120000	5.7	23000	350			
20..	77	39000	S 9400	2.8	11000	83			
21..	150	42000	S 25000	1.8	4000	19			
22..	20	17000	920	.7	3000	6			
23..	6.6	--	300	0	--	0			
24..	2.2	--	40	0	--	0			
25..	.7	--	8	0	--	0			
26..	.3	--	2	0	--	0			
27..	.3	--	1	0	--	0			
28..	5.4	--	200	0	--	0			
29..	2.0	--	40	0	--	0			
30..	.4	--	4	0	--	0			
31..	0	--	0	--	--	--			
Total	933.8	--	172109	342.6	--	47038	0		0

	JANUARY			FEBRUARY			MARCH		
1..									
2..									
3..									
4..									
5..									
6..									
7..									
8..									
9..									
10..									
11..									
12..									
13..									
14..									
15..									
16..									
17..									
18..									
19..									
20..									
21..									
22..									
23..									
24..									
25..									
26..									
27..									
28..									
29..									
30..									
31..									
Total	0		0	0		0	0		0

S Computed by subdividing day.
B Computed from estimated-concentration graph.

9-4012. LITTLE COLORADO RIVER AT CAMERON, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	0	--	0	153	7000	S 5300	0		
2..	0	--	0	292	13000	S 11000	0		
3..	0	--	0	212	21000	S 14000	0		
4..	30	10000	S 4700	250	44000	31000	0		
5..	370	33000	34000	168	28000	13000	0		
6..	242	20000	13000	110	14000	4200	0		
7..	162	15000	6600	80	12000	2600	0		
8..	133	13000	4700	69	8200	1500	0		
9..	97	11000	2900	60	4500	730	0		
10..	70	9000	1700	50	2900	390	0		
11..	53	6600	940	40	2600	280	0		
12..	40	5700	S 740	30	2100	170	0		
13..	834	38000	89000	20	920	50	0		
14..	1190	38000	130000	10	540	14	0		
15..	1360	24000	88000	5	--	4	0		
16..	1260	20000	68000	3	--	2	0		
17..	1100	20000	59000	1	--	1	0		
18..	1140	22000	68000	0	--	0	0		
19..	1140	18000	55000	0	--	0	0		
20..	948	21000	54000	0	--	0	0		
21..	890	16000	38000	0	--	0	0		
22..	727	12000	24000	0	--	0	0		
23..	490	11000	14000	0	--	0	0		
24..	342	9100	8400	0	--	0	0		
25..	270	8000	5800	0	--	0	0		
26..	209	7000	4000	0	--	0	0		
27..	180	8000	3900	0	--	0	0		
28..	160	7000	B 3000	0	--	0	13		
29..	152	5600	2300	0	--	0	7		
30..	119	4000	B 1300	0	--	0	10		
31..	--	--	--	0	--	0	--		
Total	13708	--	784980	1553	--	86241	30		1000

Day	JULY			AUGUST			SEPTEMBER		
1..	1.1	--	20	1590	140000	S 810000	141	63000	25000
2..	0	--	0	1770	120000	S 970000	62	63000	11000
3..	0	--	0	3530	99000	1000000	46	66000	8500
4..	0	--	0	3260	86000	780000	28	63000	4900
5..	0	--	0	4200	84000	990000	23	62000	4000
6..	0	--	0	3540	78000	770000	16	52000	2300
7..	0	--	0	1780	64000	S 340000	21	43000	2500
8..	0	--	0	560	42000	66000	10	45000	1300
9..	0	--	0	365	40000	41000	9.2	47000	1200
10..	0	--	0	198	46000	26000	4.7	50000	660
11..	0	--	0	815	64000	S 200000	2720	76000	S 560000
12..	0	--	0	1080	75000	S 240000	3950	43000	S 500000
13..	0	--	0	1510	70000	S 340000	743	27000	54000
14..	106	--	40000	3760	120000	S 1400000	346	30000	28000
15..	37	--	6000	4090	100000	S 1300000	222	23000	14000
16..	3	--	250	5310	65000	970000	1130	30000	S 110000
17..	42	41000	J 5900	4870	70000	S 1000000	1040	27000	76000
18..	11	--	600	1290	50000	180000	688	22000	41000
19..	5.0	--	200	515	46000	66000	279	18000	14000
20..	2.0	--	50	315	41000	36000	146	17000	6700
21..	1.0	--	20	545	37000	56000	86	16000	3700
22..	.7	--	10	572	25000	39000	55	15000	2200
23..	13	--	1500	209	27000	15000	37	14000	1400
24..	5	--	100	177	24000	11000	24	12000	780
25..	365	61000	J 120000	154	22000	9100	50	18000	S 2600
26..	137	62000	24000	101	19000	5200	98	20000	S 5900
27..	1070	97000	K 330000	739	100000	S 430000	324	43000	S 62000
28..	1160	81000	S 280000	1470	68000	S 330000	399	63000	70000
29..	433	68000	82000	1190	81000	270000	320	42000	38000
30..	512	75000	S 190000	584	79000	130000	192	31000	16000
31..	1110	130000	S 450000	284	70000	56000	--	--	--
Total	5013.8	--	1530630	51373	--	12876300	13209.9	--	1667640

Total discharge for year (cfs-days)..... 86,164.1
Total load for year (tons)..... 17,165,938

S Computed by subdividing day.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.

9-4012. LITTLE COLORADO RIVER AT CAMERON, ARIZ.--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 22, 1963	1300		72	11	11600		96	99		99		100	--	--	--			PWC
Nov. 8	1300		55	82	62600		82	92		98		98	99	100	--			VPWC
July 16, 1964	1800		80	3.4	28700		56	65		77		95	99	100	--			VPWC
July 31	1500		75	1840	139000		58	67		81		90	96	100	--			VPWC
Aug. 1	1500		80	990	105000		60	68		85		92	97	100	--			VPWC
Aug. 5	0600		70	4170	86900		52	58		63		76	93	100	--			VPWC
Aug. 8	0600		72	566	47100		69	81		87		90	95	99	100			VPWC
Aug. 14	0430		70	3180	103000		49	59		70		83	93	98	100			VPWC
Aug. 21	0600		60	202	34600		74	85		90		91	95	99	100			VPWC
Aug. 22	0600		61	560	21300		48	58		69		73	87	99	100			VPWC
Aug. 23	1500		79	149	23000		73	83		92		96	99	100	--			VPWC
Sept. 10	1300		88	28	48700		83	100		--		--	--	--	--			PWC
Sept. 11	1100		75	3040	68900		44	51		58		69	77	95	100			VPWC
Sept. 12	0900		68	5720	40700		62	74		80		92	97	100	--			VPWC
Sept. 13	0600		67	680	25400		70	84		89		93	98	100	--			VPWC
Sept. 15	0600		62	310	22600		70	79		83		84	89	98	100			VPWC
Sept. 17	1400		72	626	24000		62	73		83		90	95	99	100			VPWC

9-4025. COLORADO RIVER NEAR GRAND CANYON, ARIZ.

LOCATION (revised).--At gaging station in Grand Canyon National Park at Kaibab Bridge, 0.2 mile upstream from Bright Angel Creek, 4.5 miles northeast of Grand Canyon, Coconino County, 26 miles downstream from Little Colorado River, and 267 miles upstream from Hoover Dam.
DRAINAGE AREA.--137,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1925 to November 1942, September 1943 to September 1964.
Water temperatures: October 1936 to October 1942, September 1943 to September 1964.
Sediment records: October 1925 to November 1942, September 1943 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 1,540 ppm July 28; minimum, 607 ppm Sept. 13, 14.
Hardness: Maximum, 520 ppm July 28; minimum, 192 ppm Sept. 13, 14.
Specific conductance: Maximum daily, 2,400 micromhos July 28; minimum daily, 971 micromhos Sept. 13.
Water temperatures: Maximum, 79°F July 19, 25, 26; minimum, 40°F Jan. 13.
Sediment concentrations: Maximum daily, 58,000 ppm Aug. 3; minimum daily, 25 ppm June 28.
Sediment loads: Maximum daily, 980,000 tons Aug. 17; minimum daily, 88 tons June 28.
EXTREMES, 1925-42, 1943-64.--Dissolved solids: Maximum, 1,890 ppm Sept. 21-30, 1934; minimum, 225 ppm June 11-20, 1942.
Hardness: Maximum, 965 ppm Sept. 13, 1961; minimum, 127 ppm June 11-17, 1926.
Specific conductance (1937-42, 1943-64): Maximum daily, 2,900 micromhos Sept. 6, 1940; minimum daily, 341 micromhos June 15, 1942.
Water temperatures (1936-42, 1943-64): Maximum, 88°F July 17, 1944; minimum, freezing point on several days during January and February 1948, December 1955.
Sediment concentrations: Maximum daily, 138,000 ppm Sept. 13, 1927; minimum daily, 16 ppm Dec. 25-31, 1960..
Sediment loads: Maximum daily, 27,600,000 tons Sept. 13, 1927; minimum daily, 88 tons June 28, 1964.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Tucson, Ariz. (formerly at Albuquerque, N. Mex.). Thermograph inoperative most of the year. Once daily temperature measurements are reported for entire year.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, Magnesium	Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-21, 1963...	1264	--	--	100	29	220	--	229		--	--	--	--	--	1040	1.41	3549	368	180	5.0	1700	7.8
Oct. 22, 23.....	1365	--	--	87	25	184	--	241		--	--	--	--	--	878	1.19	3236	320	122	4.5	1420	7.7
Oct. 24-31.....	1211	--	--	96	30	213	--	220		--	--	--	--	--	1020	1.39	3335	364	184	4.9	1670	7.8
Nov. 1-30.....	1276	--	--	90	32	215	--	225		--	--	--	--	--	1030	1.40	3548	356	171	5.0	1680	7.9
Dec. 1-31.....	1260	12	0.00	128	40	240	8.4	256		376	296	0.4	4.5	0.20	1270	1.73	4320	484	274	4.7	1960	8.0
Jan. 1-31, 1964...	1279	--	--	125	43	248	--	261		--	--	--	--	--	1290	1.75	4455	488	274	4.9	1980	7.9
Feb. 1-29.....	4261	--	--	128	41	171	--	221		--	--	--	--	--	1120	1.52	12885	488	307	3.4	1630	7.8
Mar. 1-31.....	6220	12	.01	122	41	163	6.1	218		418	158	.4	4.7	.10	1080	1.47	18137	472	293	3.3	1580	7.8
Apr. 1-30.....	13370	--	--	120	34	142	--	206		--	--	--	--	--	976	1.33	35233	440	271	2.9	1410	7.8
May 1-14.....	11180	--	--	117	35	144	--	194		--	--	--	--	--	974	1.32	29401	436	277	3.0	1410	7.8
May 15-31.....	1348	--	--	111	41	243	--	232		--	--	--	--	--	1220	1.66	4440	444	254	5.0	1910	8.0
June 1-30.....	1289	--	--	110	42	252	--	236		--	--	--	--	--	1220	1.66	4246	448	254	5.2	1960	7.9
July 1-27.....	1264	--	--	112	40	254	--	232		--	--	--	--	--	1270	1.73	4334	445	255	5.2	1990	7.9
July 28.....	2380	17	.00	140	41	320	8.0	284		396	415	.4	.5	.26	1540	2.09	9896	520	287	6.1	2400	7.8
July 29-31.....	1960	--	--	137	30	248	--	298		--	--	--	--	--	1270	1.73	6721	465	221	5.0	1940	7.7
Aug. 1, 2.....	2555	--	--	136	30	224	--	298		--	--	--	--	--	1220	1.66	8416	462	218	4.5	1850	7.7
Aug. 3-9.....	3911	--	--	92	17	204	--	280		--	--	--	--	--	952	1.29	10053	300	70	5.1	1470	7.7
Aug. 10-13.....	1970	--	--	117	30	237	--	290		--	--	--	--	--	1160	1.58	6170	415	177	5.1	1840	7.8
Aug. 14-18.....	5226	--	--	81	15	190	--	272		--	--	--	--	--	850	1.16	11994	264	41	5.1	1350	7.6
Aug. 19-31.....	5998	--	--	118	33	155	--	218		--	--	--	--	--	968	1.32	15676	430	251	3.3	1470	7.9
Sept. 1-7.....	2807	--	--	114	33	171	--	222		--	--	--	--	--	1020	1.39	7730	422	240	3.6	1550	7.9
Sept. 8-11.....	3072	--	--	74	23	125	5.2	178		--	--	--	--	--	691	.94	5731	280	134	3.3	1130	7.8
Sept. 12.....	6600	--	--	95	24	237	6.6	276		--	--	--	--	--	1050	1.43	18711	335	109	5.6	1770	7.7
Sept. 13, 14.....	4120	15	.01	60	10	140	4.3	218		158	112	.5	2.5	.25	607	.83	6752	192	13	4.4	1010	7.8
Sept. 15-30.....	3082	--	--	74	22	128	5.3	204		--	--	--	--	--	687	.93	5717	274	107	3.4	1130	7.8
Weighted average	3755	--	--	115	35	170	--	219		--	--	--	--	--	1040	1.41	10600	437	257	3.6	1554	7.8
Time-weighted average.....	--	--	--	112	36	203	--	231		--	--	--	--	--	1120	--	--	433	242	4.3	1720	7.8
Tons per day....	--	--	--	1167	354	1720	--	2220		--	--	--	--	--	--	--	--	--	--	--	--	--

COLORADO RIVER MAIN STEM--Continued

9-4025. COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	69	69	69	--	--	--	67	67	68	68	67	66	65	63	64	64	64	64	64	64	62	62	63	63	63	65	64	63	63	63	63	65
November	63	59	60	59	58	58	--	--	--	--	60	58	58	57	53	57	56	54	53	53	53	52	51	51	51	51	50	51	51	50	--	55
December	50	50	49	49	48	--	--	--	47	47	46	47	46	45	45	43	44	43	45	45	45	45	46	45	--	45	45	--	--	45	45	46
January	45	45	45	44	44	43	43	42	42	41	42	--	40	--	--	--	--	--	--	--	44	45	--	43	44	44	44	45	44	45	44	--
February	45	46	45	44	44	--	--	45	44	45	46	46	46	45	45	46	44	45	46	46	45	47	46	45	46	45	45	46	--	--	--	45
March	47	47	45	46	47	46	46	47	45	46	46	48	47	49	49	48	48	49	50	48	50	48	47	47	46	48	49	49	47	47	48	47
April	48	47	46	47	48	47	47	48	49	50	--	--	--	--	51	52	52	52	51	49	50	51	51	51	49	48	49	51	48	50	--	49
May	50	50	51	50	49	48	48	--	--	--	53	54	55	55	63	62	64	65	67	68	70	--	70	69	70	70	70	69	--	67	69	61
June	70	70	70	71	71	72	72	69	67	67	68	70	76	71	72	72	71	70	70	71	71	--	--	--	74	75	73	72	73	74	--	71
July	75	75	76	76	76	75	76	76	77	--	--	--	--	--	--	78	78	78	79	78	78	78	77	78	79	79	76	76	78	78	77	77
August	75	76	74	75	77	--	--	78	78	77	76	77	76	74	74	73	73	74	71	64	61	60	62	60	62	61	61	64	65	66	65	70
September	64	63	64	65	67	70	71	71	74	73	74	73	71	72	71	70	72	72	70	70	70	66	67	70	70	70	72	72	71	71	--	70

9-4025. COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	1180	3400	11000	1220	820	2700	1260	150	510
2..	1190	3700	12000	1230	250	830	1260	120	410
3..	1190	2500	8000	1260	500	1700	1260	120	410
4..	1190	2300	B 7400	1260	250	850	1260	120	410
5..	1200	2300	B 7400	1270	280	960	1260	210	710
6..	1200	2200	B 7100	1280	230	790	1260	200	B 680
7..	1210	1900	6200	1290	240	B 840	1270	140	B 480
8..	1220	1200	4000	1280	300	B 1000	1270	110	B 380
9..	1230	1100	3600	1310	300	B 1100	1270	90	310
10..	1240	1400	4700	1350	400	B 1400	1280	110	380
11..	1240	750	2500	1320	270	960	1270	110	380
12..	1250	500	1700	1300	950	3300	1260	98	330
13..	1260	520	1800	1290	1500	5200	1260	140	480
14..	1260	350	1200	1280	1300	4500	1260	120	410
15..	1270	360	1200	1260	1200	4100	1260	130	440
16..	1260	350	1200	1270	1000	3400	1260	120	410
17..	1260	460	1600	1280	810	2800	1260	110	370
18..	1260	320	1100	1300	1000	3500	1260	100	340
19..	1320	360	1300	1300	750	2600	1260	98	330
20..	1600	790	S 3600	1270	550	1900	1260	86	290
21..	1520	2400	9800	1270	480	1600	1260	88	300
22..	1440	6100	24000	1270	850	2900	1260	100	340
23..	1290	3000	10000	1260	950	3200	1260	110	370
24..	1250	3500	12000	1270	640	2200	1260	120	410
25..	1220	2400	7900	1270	350	1200	1260	120	B 410
26..	1200	2700	8700	1270	280	960	1260	110	370
27..	1200	2700	8700	1270	230	790	1260	120	410
28..	1200	2000	6500	1270	210	720	1260	120	B 410
29..	1200	1300	4200	1260	150	510	1250	110	B 370
30..	1210	850	2800	1260	160	540	1240	95	320
31..	1210	680	2200	--	--	--	1240	110	370
Total	38970	--	185400	38290	--	59050	39070	--	12540

	JANUARY			FEBRUARY			MARCH		
1..	1240	130	440	4210	1900	22000	4240	380	4400
2..	1240	150	500	4270	2500	29000	4250	350	4000
3..	1230	120	400	4250	2000	23000	4260	400	4600
4..	1230	100	330	4260	1600	18000	4250	370	4200
5..	1230	92	300	4270	1500	17000	4270	360	4200
6..	1230	94	310	4270	1300	B 15000	4290	370	4300
7..	1230	100	330	4290	1100	B 13000	4270	360	4200
8..	1240	100	330	4310	1000	12000	4310	330	3800
9..	1230	120	400	4340	1200	14000	4270	320	3700
10..	1230	100	330	4350	810	9500	4290	320	3700
11..	1230	94	310	4340	790	9200	4290	290	3400
12..	1230	90	B 300	4310	800	9300	4290	350	4000
13..	1230	85	280	4300	710	8200	4300	380	4400
14..	1220	--	280	4270	660	7600	4290	340	3900
15..	1220	--	280	4250	620	7100	4290	320	3700
16..	1230	--	280	4250	600	6900	4270	300	3400
17..	1240	--	290	4220	530	6000	4270	300	3400
18..	1240	--	290	4220	510	5800	4270	290	3300
19..	1250	--	280	4240	500	5700	4260	300	3400
20..	1250	--	280	4240	520	6000	4250	270	3100
21..	1250	81	270	4230	470	5400	4260	280	3200
22..	1260	75	260	4240	440	5000	4250	290	3300
23..	1260	84	280	4240	430	4900	4270	350	4000
24..	1260	80	270	4240	420	4800	4310	330	3800
25..	1260	72	240	4240	420	4800	4310	300	3500
26..	1260	100	340	4220	440	5000	4310	260	3000
27..	1250	140	470	4240	410	4700	7540	2000	S 52000
28..	1250	130	440	4220	380	4300	16300	13000	S 620000
29..	1250	120	400	4240	380	B 4400	19300	13000	680000
30..	1250	120	400	--	--	--	19200	9300	480000
31..	2420	220	S 1700	--	--	--	19300	8100	420000
Total	39640	--	11610	123570	--	287600	192830	--	2349900

S Computed by subdividing day.
B Computed from estimated-concentration graph.

9-4025. COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	18000	7200	350000	18900	7100	360000	1290	55	190
2..	16700	6600	300000	14800	4500	180000	1300	57	200
3..	16600	6300	280000	12700	3100	110000	1300	68	240
4..	14300	5200	200000	12500	3000	100000	1310	80	280
5..	12200	5500	180000	12800	3100	110000	1320	70	250
6..	12500	3900	130000	13400	3600	130000	1310	57	200
7..	12400	3500	120000	12200	3100	100000	1300	56	200
8..	12200	3600	120000	12300	2700	90000	1300	38	130
9..	12200	3700	120000	12300	2500	83000	1310	44	160
10..	12200	3500	120000	12300	2300	76000	1310	48	170
11..	12100	3700	B 120000	12300	2100	70000	1190	39	120
12..	12000	3700	B 120000	6740	1500	27000	1270	46	160
13..	12000	3700	B 120000	1850	360	1800	1280	40	B 140
14..	12900	4300	150000	1500	290	1200	1280	38	130
15..	13100	6400	230000	1460	240	950	1290	42	150
16..	13200	5600	200000	1430	210	810	1290	42	150
17..	13000	4700	160000	1400	170	640	1290	48	170
18..	12600	3900	130000	1380	170	630	1290	62	220
19..	12200	3300	110000	1360	160	590	1300	33	120
20..	12100	3700	120000	1340	140	510	1290	30	100
21..	11900	3600	120000	1340	140	510	1280	33	110
22..	11900	2700	87000	1320	130	B 460	1280	30	B 100
23..	11700	2600	82000	1310	130	460	1280	30	B 100
24..	11600	2200	69000	1320	130	460	1280	30	B 100
25..	11400	2000	62000	1340	94	340	1270	30	100
26..	11300	1900	58000	1340	100	360	1270	43	150
27..	11300	2100	64000	1330	72	260	1280	45	160
28..	16500	6800	S 320000	1330	80	290	1300	25	88
29..	19600	8400	440000	1330	100	B 360	1320	32	110
30..	19500	7700	400000	1300	100	350	1290	100	350
31..	--	--	--	1290	77	270	--	--	--
Total	401200	--	5082000	179510	--	1447250	38670	--	4848

Day	JULY			AUGUST			SEPTEMBER		
1..	1270	50	170	2660	25000	S 200000	3790	2600	27000
2..	1270	90	310	2450	38000	260000	2000	1800	9700
3..	1270	90	310	5010	58000	S 830000	3250	2000	18000
4..	1270	80	270	4200	57000	670000	1780	900	4300
5..	1270	60	200	4890	47000	640000	2480	1100	7400
6..	1280	60	210	5100	47000	B 670000	3170	1100	9400
7..	1270	55	190	3960	47000	B 520000	3180	800	6900
8..	1270	35	120	2440	36000	240000	3200	700	6000
9..	1260	40	140	1780	25000	120000	2900	400	3100
10..	1260	--	200	1630	15000	66000	2750	500	3700
11..	1240	--	200	1500	10000	40000	3440	1000	S 11000
12..	1210	--	100	2260	22000	S 160000	6600	22000	390000
13..	1200	--	100	2490	35000	240000	4870	23000	300000
14..	1200	--	100	3520	19000	S 170000	3370	7500	68000
15..	1290	--	100	5270	50000	S 750000	2900	4300	34000
16..	1330	30	110	5280	55000	810000	3130	2500	21000
17..	1220	100	330	7020	50000	980000	4160	6100	68000
18..	1190	210	670	5040	37000	S 490000	2660	10000	72000
19..	1210	180	590	7030	19000	360000	2600	7000	49000
20..	1180	130	410	6730	8000	140000	3050	3600	30000
21..	1180	130	410	6650	4500	81000	2720	2000	15000
22..	1210	180	590	7020	5300	100000	2340	1200	7600
23..	1240	250	840	6820	5300	98000	2780	930	7000
24..	1280	220	760	6600	3000	53000	2640	520	3700
25..	1340	160	580	6550	2600	46000	2800	450	3400
26..	1460	160	630	5580	2800	42000	2150	330	1900
27..	1470	140	560	4430	2000	24000	3310	350	3100
28..	2380	10000	S 69000	4860	1700	22000	3650	560	5500
29..	2080	29000	160000	5860	9700	150000	3710	3000	30000
30..	1720	38000	180000	5140	9200	130000	4710	3600	46000
31..	2080	20000	110000	4700	4900	62000	--	--	--
Total	42400	--	528200	144470	--	9164000	96090	--	1261700

Total discharge for year (cfs-days)..... 1,374,710
Total load for year (tons)..... 20,394,098

S Computed by subdividing day.
B Computed from estimated-concentration graph.

COLORADO RIVER MAIN STEM--Continued

9-4025. COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 11, 1964.....	0745		46	4340	735		40	48		82		100	--					PWC
Mar. 27.....	1500		49	9940	2840		25	29		45		97	100					VPWC
Mar. 28.....	1630		49	19200	19200		22	27		42		90	100					VPWC
May 6.....	0730		48	15900	6910		7	8		10		41	97	100				VPWC
Aug. 4.....	1830		77	4360	55600		62	68		88		99	100					VPWC
Aug. 14.....	0700		74	3690	21500		63	79		96		100	--					PWC
Aug. 15.....	1330		74	6000	67900		58	70		83		99	100					VPWC

BRIGHT ANGEL CREEK BASIN

9-4030. BRIGHT ANGEL CREEK NEAR GRAND CANYON, ARIZ.

LOCATION.--At gaging station 1,000 feet upstream from mouth, and 11 miles by Bright Angel trail from Grand Canyon, Coconino County.
DRAINAGE AREA (revised).--101 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1964.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 16, 1963.....	16							215			3.8										338	7.6
Nov. 16.....	17							217			3.5										339	7.9
Dec. 16.....	17							222			3.5										346	8.0
Jan. 9, 1964.....	16							230			3.0										353	8.2
Feb. 15.....	17							217			3.8										350	8.1
Mar. 16.....	15							231			3.6										360	8.1
Apr. 17.....	63							190			1.7										301	7.6
May 17.....	63							152			1.5										247	7.7
June 15.....	18							188			2.5										298	8.0
July 18.....	15							198			3.2										320	7.7
Aug. 16.....	15							196			2.6										309	8.1
Sept. 29.....	14							210			3.0										334	7.3

9-4150. VIRGIN RIVER AT LITTLEFIELD, ARIZ.

LOCATION.--At gaging station 0.4 mile downstream from Beaver Dam Wash, 0.4 mile upstream from Littlefield, Mohave County, and 36 miles upstream from waterline of Lake Mead at elevation 1,221 feet above mean sea level.
DRAINAGE AREA.--5,090 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: July 1949 to September 1964.
Water temperatures: October 1947 to September 1964.
Sediment records: October 1947 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 4,250 ppm Aug. 12; minimum, 1,300 ppm Apr. 16-19, May 13-21.
Hardness: Maximum, 2,250 ppm Aug. 12; minimum, 635 ppm Apr. 16-19.
Specific conductance: Maximum daily, 4,490 micromhos Aug. 12; minimum daily, 1,590 micromhos May 13.
Water temperatures: Maximum, 87°F June 1, 23, 25, July 2, Aug. 6; minimum, 47°F Dec. 26, 27, Feb. 15.
Sediment concentrations: Maximum daily, 180,000 ppm Aug. 13; minimum daily, 260 ppm Sept. 8, 9.
Sediment loads: Maximum daily, 580,000 tons Aug. 14; minimum daily, 39 tons Sept. 25, 28.
EXTREMES, 1947-64.--Dissolved solids (1949-50, 1953-64): Maximum, 4,250 ppm Aug. 12, 1964; minimum, 524 ppm Mar. 16, 1958.
Hardness (1949-50, 1953-64): Maximum, 2,250 ppm Aug. 12, 1964; minimum, 334 ppm Mar. 16, 1958.
Specific conductance (1949-64): Maximum daily, 4,490 micromhos Aug. 12, 1964; minimum daily, 734 micromhos Apr. 28, 1952.
Water temperatures: Maximum, 92°F July 7, 1953; minimum, 35°F Jan. 4, 1949, Jan. 4, 1950.
Sediment concentrations: Maximum daily, 180,000 ppm Aug. 13, 1964; minimum daily, 40 ppm June 16, 20, 1962.
Sediment loads: Maximum daily, 1,740,000 tons Aug. 25, 1955; minimum daily, 6 tons June 16, 20, 1962.
REMARKS.--Additional samples were collected to further define the quality of water at this station. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C): Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-31, 1963...	87.8					259		297	0	970	375				2440	3.32	578	1220	976	3.2	3150	7.4
Nov. 1-16.....	175					305		310	0	937	410				2330	3.17	1101	1140	886	3.9	3040	7.7
Nov. 17.....	299					156		220	0	719	185				1560	2.12	1259	850	670	2.3	2010	7.8
Nov. 18-30.....	128					293		331	0	815	380				2100	2.86	726	1020	748	4.0	2790	7.6
Dec. 1-31.....	111					304		334	0	868	400				2180	2.96	653	1080	806	4.0	2920	7.5
Jan. 1-31, 1964...	108					301		332	0	864	385				2180	2.96	636	1060	788	4.0	2880	7.9
Feb. 1-29.....	131					252		318	0	733	400				2120	2.88	750	1040	779	3.4	2900	7.7
Mar. 1-31.....	108					208		306	0	718	400				2200	2.99	642	1110	859	2.7	2930	7.7
Apr. 1-15.....	261					169		284	0	504	295				1590	2.16	1120	805	572	2.6	2210	7.7
Apr. 16-19.....	336					164		250	0	445	230				1300	1.77	1179	635	430	2.8	1840	7.6
Apr. 20-30.....	100					302		332	0	821	380				2200	2.99	594	1000	728	4.2	2860	7.9
May 1-12.....	176					253		294	0	692	328				1800	2.45	855	875	634	3.7	2450	7.7
May 13-21.....	289					181		238	0	497	232				1300	1.77	1014	645	450	3.1	1850	7.7
May 22-31.....	75.2					276		249	0	985	355				2280	3.10	463	1130	926	3.6	2860	7.7
June 1-30.....	46.8					298		237	0	1150	380				2570	3.50	325	1280	1086	3.6	3110	7.6
July 1-31.....	60.9	17		358	106	277	28	222	0	1250	366	1.0	0.1		2670	3.63	439	1330	1148	3.3	3160	8.1
Aug. 1-11.....	229					250		212	20	1490	270				2860	3.89	1768	1600	1393	2.7	3140	8.4
Aug. 12.....	140					406		404	0	1960	540				4250	5.78	1606	2250	1919	3.7	4490	8.1
Aug. 13-31.....	229					272		238	18	1310	335				2720	3.70	1682	1470	1245	3.1	3140	8.4
Sept. 1-30.....	53.3					279		296	0	1170	380				2670	3.63	384	1390	1147	3.3	3210	7.8
Weighted average	123	--		--	--	254	--	285	--	896	352	--	--		2200	2.99	732	1110	872	3.3	2810	7.7
Time-weighted average.....	--	--		--	--	267	--	288	--	946	368	--	--		2300	--	--	1160	918	3.4	2930	7.7
Tons per day....	--	--		--	--	85	--	95	--	298	117	--	--		--	--	--	--	--	--	--	--

Analyses of additional samples (instantaneous discharge shown)

Nov. 6, 1963.....	70	19	0.15	363	89	302	27	331	0	1030	435	0.5	8.8	0.82	2500	3.40		1270	999	3.7	3300	7.7
Feb. 13, 1964.....	147	18	.29	285	89	290	24	340	0	876	390	.6	3.7	.65	2190	2.98		1080	796	3.8	2950	7.7
June 10.....	49	20	.05	357	114	271	27	330	0	1170	375	3.3	2.1	.78	2650	3.60		1360	1090	3.2	3230	7.4
Sept. 19.....	51	19	.20	347	120	286	29	282	0	1190	365	.8	.2	.98	2600	3.54		1360	1130	3.4	3210	7.4

VIRGIN RIVER BASIN--Continued

9-4150. VIRGIN RIVER AT LITTLEFIELD, ARIZ.--Continued

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	77	76	76	73	76	76	74	74	73	74	66	76	76	72	77	70	73	70	64	69	70	70	68	68	63	63	70	60	60	68	67	71
November	65	60	60	65	--	66	62	52	56	56	65	65	66	66	64	62	49	55	57	58	57	53	56	54	59	58	56	57	58	58	--	59
December	51	54	55	53	52	50	50	52	50	50	50	49	50	50	50	50	50	50	50	48	48	53	49	49	54	47	47	49	49	55	48	50
January	48	55	57	53	55	52	52	53	52	53	53	53	52	51	53	57	57	56	56	55	59	52	51	53	53	55	56	56	57	58	--	54
February	56	56	51	55	57	53	50	50	58	59	59	56	53	53	47	56	59	59	55	57	58	59	63	56	56	55	58	58	54	--	--	56
March	59	53	57	59	62	50	49	59	60	63	67	61	63	57	64	63	62	62	63	63	63	63	58	58	63	68	63	63	69	72	70	61
April	61	55	59	62	57	54	64	70	71	69	57	70	70	72	--	70	67	60	62	70	73	72	67	59	59	70	72	69	73	72	--	66
May	63	63	66	62	61	66	65	63	69	68	76	73	65	73	72	70	75	76	71	71	75	70	71	72	67	--	64	71	78	78	78	70
June	87	71	80	80	75	71	66	70	70	70	--	76	76	76	71	71	76	72	73	74	76	86	87	83	87	78	78	75	76	78	--	76
July	75	87	75	75	77	80	80	75	81	85	83	78	78	78	78	81	--	82	81	82	81	83	82	85	83	82	83	86	84	83	80	81
August	78	80	84	83	80	87	77	82	--	82	82	83	84	76	76	80	80	75	80	78	80	80	80	78	79	78	78	77	75	75	75	79
September	76	75	75	75	75	75	75	76	76	76	65	65	75	75	75	75	75	75	75	75	75	75	77	77	76	76	75	75	80	75	--	75

9-4150. VIRGIN RIVER AT LITTLEFIELD, ARIZONA.--Continued

Suspended sediment, water year October 1963 to September 1964

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	50	600	81	78	1400	290	117	1700	540
2..	50	630	85	72	1200	230	113	1700	520
3..	51	610	84	81	1100	240	109	1800	530
4..	51	550	76	81	1200	260	107	2100	610
5..	52	460	65	83	1100	250	111	2200	660
6..	54	400	58	79	1000	210	107	1700	490
7..	52	390	55	735	41000	84000	105	1500	420
8..	54	400	58	544	27000	S 39000	109	1900	560
9..	55	430	64	191	11000	5700	138	2500	930
10..	56	420	64	127	4000	1400	131	2600	920
11..	60	470	76	107	2800	810	121	2100	690
12..	63	550	94	91	2400	590	109	1900	560
13..	65	570	100	87	2100	490	107	2100	610
14..	66	600	110	87	1900	450	117	2300	730
15..	67	550	99	87	2000	470	123	2300	760
16..	66	490	87	277	27000	20000	111	2100	630
17..	67	460	83	299	12000	S 9400	107	1900	550
18..	70	350	66	149	6300	2500	107	2000	580
19..	319	26000	22000	129	3300	1100	109	2400	710
20..	238	8100	5200	111	2500	750	107	3000	870
21..	194	6200	3200	119	2800	900	111	3000	900
22..	140	4900	1900	140	3400	1300	103	3100	860
23..	115	3600	1100	154	2800	1200	105	4100	1200
24..	96	2700	700	113	2200	670	98	4200	1100
25..	91	1900	470	113	2100	640	105	3300	940
26..	84	1700	390	115	2000	620	115	3200	990
27..	93	1700	430	125	2900	980	113	3300	1000
28..	79	1400	300	138	4000	1500	109	2700	790
29..	67	1300	240	134	2900	1000	96	2800	730
30..	78	1500	320	125	1800	610	105	3500	990
31..	78	1500	320	--	--	--	105	3300	940
Total	2721	--	37975	4771	--	177560	3430	--	23310

	JANUARY			FEBRUARY			MARCH		
1..	94	3100	790	115	2300	710	142	3500	1300
2..	98	3700	980	111	2700	810	142	3700	1400
3..	103	3900	1100	125	3200	1100	147	3900	1500
4..	113	3500	1100	127	3500	1200	149	3500	1400
5..	105	3300	940	119	3200	1000	136	3200	1200
6..	107	3800	1100	119	2900	930	121	3200	1000
7..	107	3500	1000	142	2900	1100	127	3100	1100
8..	102	2300	630	129	3100	1100	107	2800	810
9..	87	1900	450	119	3000	960	96	2800	730
10..	96	2100	540	121	2900	950	91	3000	740
11..	102	2100	580	123	3000	1000	84	2400	540
12..	91	1700	420	140	3100	1200	76	1900	390
13..	75	1200	240	147	2800	1100	93	2700	680
14..	84	1200	270	142	2500	960	113	3400	1000
15..	83	1400	310	134	2600	940	102	2600	720
16..	87	1500	350	136	2800	1000	100	1800	490
17..	94	1700	430	131	2800	990	93	1600	400
18..	109	2100	620	134	2800	1000	86	1700	390
19..	103	2700	750	134	2900	1000	89	1900	460
20..	123	3600	1200	125	2600	880	96	1700	440
21..	121	5000	1600	127	2200	750	86	1400	320
22..	138	5400	2000	111	1900	570	76	1700	350
23..	147	4200	1700	111	2100	630	91	2300	560
24..	138	2900	1100	149	3000	1200	103	2400	570
25..	121	2900	950	154	3400	1400	131	2600	920
26..	127	3100	1100	154	3200	1300	127	2900	990
27..	125	2900	980	142	3200	1200	121	3200	1000
28..	127	3100	1100	134	3600	1300	113	3300	1000
29..	121	3100	1000	138	3700	1400	100	2800	760
30..	111	2500	750	--	--	--	98	2700	710
31..	115	2200	680	--	--	--	105	3200	910
Total	3354	--	26760	3793	--	29680	3341	--	24880

S Computed by subdividing day.

9-4150. VIRGIN RIVER AT LITTLEFIELD, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	APRIL Mean discharge (cfs)	APRIL Suspended sediment Mean concentration (ppm)	APRIL Suspended sediment Tons per day	MAY Mean discharge (cfs)	MAY Suspended sediment Mean concentration (ppm)	MAY Suspended sediment Tons per day	JUNE Mean discharge (cfs)	JUNE Suspended sediment Mean concentration (ppm)	JUNE Suspended sediment Tons per day
1..	254	28000	19000	194	4400	2300	46	940	120
2..	430	20000	23000	163	3900	1700	42	800	91
3..	386	9300	9700	102	2400	660	44	830	99
4..	234	5500	3500	78	1800	380	44	840	100
5..	232	5600	3500	76	1800	370	44	800	95
6..	392	10000	11000	91	2100	520	44	760	90
7..	279	6800	5100	163	4100	1800	44	740	88
8..	207	4800	2700	268	6400	4600	42	830	94
9..	202	4800	2600	231	6300	3900	44	920	110
10..	210	4900	2800	215	5000	2900	45	860	100
11..	226	5400	3300	215	5000	2900	46	780	97
12..	207	4800	2700	312	8800	7400	46	880	110
13..	218	5100	3000	434	12000	14000	47	1000	130
14..	168	4000	1800	360	8800	8600	46	880	110
15..	265	7400	5300	319	8200	7100	47	770	98
16..	427	12000	14000	325	8300	7300	49	810	110
17..	392	10000	11000	296	7800	6200	50	650	88
18..	300	7900	6400	271	6400	4700	51	540	74
19..	225	5400	3300	221	5200	3100	52	630	88
20..	145	3300	1300	202	4800	2600	50	660	89
21..	94	2200	560	176	4000	1900	50	560	76
22..	81	1800	390	138	3200	1200	49	460	61
23..	91	2100	520	102	2000	550	47	440	56
24..	124	2900	970	84	1600	360	47	420	53
25..	115	2700	840	76	1400	290	47	470	60
26..	84	1900	430	65	1200	210	47	590	75
27..	75	1700	340	70	1400	260	50	580	78
28..	63	1400	240	72	1600	310	49	480	64
29..	84	1900	430	49	1200	160	49	470	62
30..	147	3300	1300	47	940	120	47	520	66
31..	--	--	--	49	1000	130	--	--	--
Total	6357	--	141020	5464	--	88520	1405	--	2632

Day	JULY Mean discharge (cfs)	JULY Suspended sediment Mean concentration (ppm)	JULY Suspended sediment Tons per day	AUGUST Mean discharge (cfs)	AUGUST Suspended sediment Mean concentration (ppm)	AUGUST Suspended sediment Tons per day	SEPTEMBER Mean discharge (cfs)	SEPTEMBER Suspended sediment Mean concentration (ppm)	SEPTEMBER Suspended sediment Tons per day
1..	49	550	73	212	28000	16000	49	400	53
2..	47	560	71	176	23000	11000	50	370	50
3..	49	550	73	227	47000	S 30000	51	340	47
4..	47	540	68	888	110000	280000	52	410	58
5..	47	480	61	589	73000	120000	52	550	77
6..	47	420	53	148	23000	S 9100	54	520	76
7..	47	520	66	70	2800	530	54	340	50
8..	47	640	81	54	1000	150	58	260	41
9..	47	570	72	52	920	130	58	260	41
10..	47	470	60	50	810	110	56	280	42
11..	46	500	62	51	730	100	55	340	50
12..	44	620	74	140	54000	21000	56	370	56
13..	44	690	82	964	180000	S 510000	59	350	56
14..	44	620	74	1880	110000	S 580000	60	320	52
15..	42	560	64	586	33000	54000	60	300	49
16..	44	550	65	148	15000	6000	56	300	45
17..	42	520	59	68	3600	660	54	320	47
18..	44	500	59	52	920	130	52	350	49
19..	42	510	58	52	1600	220	51	370	51
20..	42	530	60	50	1100	150	51	330	45
21..	42	560	65	46	450	56	51	310	43
22..	82	29000	S 6500	47	500	63	52	340	48
23..	64	9300	1600	49	580	77	51	310	43
24..	46	2300	290	50	590	80	51	290	40
25..	63	10000	1700	52	590	83	51	280	39
26..	212	35000	S 21000	52	600	84	51	300	41
27..	236	40000	26000	52	500	70	51	330	45
28..	60	3100	500	51	420	58	51	280	39
29..	52	1700	240	50	450	61	51	290	40
30..	47	1400	180	49	450	60	51	360	50
31..	77	13000	S 2600	49	420	56	--	--	--
Total	1889	--	62010	7004	--	1643339	1599	--	1463

Total discharge for year (cfs-days)..... 45,128
Total load for year (tons)..... 2,259,149

S Computed by subdividing day.

9-4150. VIRGIN RIVER AT LITTLEFIELD, ARIZ.--Continued

Suspended-sediment discharge and particle-size analyses, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 19, 1963	1630		64	720	33400	67000	33	48		73		92	96	99	100			VPWC
Nov. 6	1055		65	70	1060	200	--	--		--		--	--	--	--			--
Nov. 7	1800		62	470	16500	21000	20	23		42		82	95	99	100			VPWC
Nov. 8	1830		52	418	20300	23000	26	37		65		87	97	100	--			VPWC
Nov. 10	0730		56	129	3370	1200	26	38		55		75	92	99	100			VPWC
Dec. 29	1600		60	93	2070	520	10	10		17		58	96	100	--			VPWC
Feb. 13, 1964	1010		50	145	2930	1100	--	--		--		--	--	--	--			--
Mar. 30	1700		72	105	2620	740	16	16		25		58	94	100	--			VPWC
Apr. 9	1700		71	171	3780	1700	18	20		30		57	91	100	--			VPWC
Apr. 16	1600		70	890	19300	46000	15	18		23		60	93	100	--			VPWC
Apr. 17	1700		67	610	16000	26000	18	19		23		58	92	99	100			VPWC
Apr. 18	1700		68	173	4190	2000	31	33		41		64	93	100	--			VPWC
May 16	1500		77	191	4910	2500	35	38		50		70	94	100	--			VPWC
June 10	0905		70	49	452	60	--	--		--		--	--	--	--			--
July 22	1900		83	207	77200	45000	34	48		86		97	99	100	--			VPWC
July 23	1930		82	50	4710	640	42	63		85		89	98	100	--			VPWC
July 26	1900		82	79	24900	5300	47	54		89		97	99	100	--			VPWC
July 27	0800		76	772	50800	110000	20	30		58		83	97	100	--			VPWC
July 28	1830		86	66	4920	880	33	48		72		86	95	100	--			VPWC
Aug. 3	1700		84	326	36100	33000	30	33		73		90	98	100	--			VPWC
Aug. 4	0500		78	1720	127000	630000	22	26		46		73	92	99	100			VPWC
Aug. 5	0600		77	1930	130000	730000	24	27		42		70	90	98	100			VPWC
Aug. 7	1930		77	65	1850	320	16	19		33		44	76	99	100			VPWC
Aug. 13	0500		75	1900	193000	1100000	31	34		47		72	89	99	100			VPWC
Aug. 14	0800		74	2940	213000	1900000	23	24		38		59	81	98	100			VPWC
Aug. 15	0700		76	778	37300	81000	37	43		75		93	98	100	--			VPWC
Aug. 17	1900		80	56	1510	230	35	49		68		83	91	100	--			VPWC
Sept. 19	1340		--	51	574	79	--	--		--		--	--	--	--			--

9-4210. LAKE MEAD AT HOOVER DAM, ARIZ.-NEV.

LOCATION.--Midway between intake towers, 225 feet upstream from gaging station on state line between Mohave County, Arizona, and Clark County, Nevada.
DRAINAGE AREA.--167,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1940 to September 1964.
REMARKS.--Samples are collected by the U.S. Bureau of Reclamation and analyzed by the Metropolitan Water District of Southern California, LaVerne, California.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Elevation (feet)	Depth (feet)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (calculated): Parts per million	Dissolved solids (calculated): Tons per acre-foot	Dissolved solids (calculated): Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Temperature (°F)	Specific conductance (micromhos at 25°C)	pH
Oct. 1, 1963.....	surface	1093	9.6	88	33	103	5	124	0	333	99		0.6		733			353	251	75	1140	8.0
Oct. 1.....	5	1088	--	--	--	--	--	123	0	--	99		--		--			--	--	75	1150	8.0
Oct. 1.....	25	1068	--	--	--	--	--	124	0	--	99		--		--			--	--	74	1150	7.9
Oct. 1.....	50	1043	--	--	--	--	--	--	--	--	98		--		--			348	--	74	1140	8.2
Oct. 1.....	75	1018	10	92	30	96	4	146	0	305	91		2.0		703			353	305	67	1100	7.8
Oct. 1.....	100	993	--	--	--	--	--	--	--	--	89		--		--			347	--	62	1090	7.8
Oct. 1.....	125	968	10	92	30	95	4	154	0	300	91		2.3		702			353	227	58	1100	8.0
Oct. 1.....	150	943	--	--	--	--	--	--	--	--	92		--		--			351	--	56	1110	7.8
Oct. 1.....	175	918	10	94	30	99	4	157	0	307	94		2.5		719			358	229	55	1120	8.0
Oct. 1.....	200	893	--	--	--	--	--	--	--	--	94		--		--			352	--	54	1110	8.0
Oct. 1.....	225	868	11	92	30	98	4	157	0	300	94		2.4		710			353	224	54	1120	7.9
Oct. 1.....	250	843	--	--	--	--	--	--	--	--	94		--		--			349	--	54	1110	8.1
Oct. 1.....	275	818	--	--	--	--	--	159	0	--	94		--		--			--	--	53	1110	8.0
Oct. 1.....	3300	793	--	--	--	--	--	--	--	--	94		--		--			348	--	53	1110	7.9
Oct. 1.....	325	768	--	--	--	--	--	159	0	--	95		--		--			--	--	53	1110	7.7
Oct. 1.....	350	743	--	--	--	--	--	--	--	--	94		--		--			350	--	52	1110	7.8
Oct. 28.....	5	1141	10	75	28	89	5	109	0	290	79		.8		632			304	215	76	995	8.1
Oct. 28.....	25	1121	--	--	--	--	--	109	0	--	79		--		--			--	--	76	998	7.6
Oct. 28.....	50	1096	--	--	--	--	--	--	--	--	79		--		--			302	--	76	998	8.0
Oct. 28.....	75	1071	--	--	--	--	--	140	0	--	74		--		--			--	--	66	983	7.8
Oct. 28.....	100	1046	--	--	--	--	--	--	--	--	73		--		--			312	--	61	978	7.8
Oct. 28.....	125	1021	--	--	--	--	--	143	0	--	72		--		--			--	--	60	972	8.2
Oct. 28.....	150	996	--	--	--	--	--	--	--	--	73		--		--			312	--	59	976	7.8
Oct. 28.....	175	971	10	83	26	82	4	145	0	265	71		2.1		616			314	195	58	970	7.9
Oct. 28.....	200	946	--	--	--	--	--	--	--	--	71		--		--			314	--	56	974	7.9
Oct. 28.....	225	921	10	85	26	83	4	153	0	267	73		2.3		627			319	194	56	988	8.1
Oct. 28.....	250	896	--	--	--	--	--	--	--	--	77		--		--			325	--	55	1020	7.8
Oct. 28.....	275	871	10	87	27	89	4	159	0	273	79		2.6		652			330	200	54	1034	7.9
Oct. 28.....	300	846	--	--	--	--	--	--	--	--	81		--		--			334	--	54	1055	7.7
Oct. 28.....	325	821	--	--	--	--	--	156	2	--	82		--		--			--	--	54	1052	8.4
Oct. 28.....	350	796	--	--	--	--	--	--	--	--	83		--		--			337	--	54	1065	7.6
Oct. 28.....	375	771	11	89	28	94	5	163	0	286	83		2.8		681			339	205	54	1069	7.4
Oct. 28.....	400	746	--	--	--	--	--	--	--	--	84		--		--			340	--	54	1075	7.7
Oct. 28.....	425	721	--	--	--	--	--	173	0	--	84		--		--			--	--	54	1078	7.8
Oct. 28.....	429	717	--	--	--	--	--	--	--	--	85		--		--			342	--	54	1080	7.7
Nov. 22.....	5	1138	10	80	28	87	5	123	0	288	80		1.5		641			315	214	66	1020	8.1
Nov. 22.....	25	1118	--	--	--	--	--	123	1	--	80		--		--			--	--	66	1015	8.3
Nov. 22.....	50	1093	--	--	--	--	--	--	--	--	82		--		--			316	--	66	1015	7.6
Nov. 22.....	75	1068	--	--	--	--	--	123	0	--	81		--		--			--	--	66	1010	7.9
Nov. 22.....	100	1043	--	--	--	--	--	--	--	--	81		--		--			316	--	64	1020	7.8
Nov. 22.....	125	1018	--	--	--	--	--	146	0	--	74		--		--			--	--	61	972	8.2
Nov. 22.....	150	993	--	--	--	--	--	--	--	--	72		--		--			315	--	59	981	8.0
Nov. 22.....	175	968	10	82	26	82	5	151	0	265	72		2.3		621			314	190	58	965	8.2
Nov. 22.....	200	943	--	--	--	--	--	--	--	--	72		--		--			317	--	56	979	7.6
Nov. 22.....	225	918	11	84	26	81	4	151	0	257	74		2.4		615			317	193	56	945	8.3
Nov. 22.....	250	893	--	--	--	--	--	--	--	--	77		--		--			327	--	55	1015	7.7
Nov. 22.....	275	868	10	88	28	92	5	165	0	276	82		2.6		666			335	200	54	1040	8.0

Nov. 22	300	843	--	--	--	--	--	--	--	--	82	--	--	334	--	54	1050	7.7
Nov. 22.....	325	818	--	--	--	--	--	166	0	--	82	--	--	--	--	54	1060	8.0
Nov. 22.....	350	793	--	--	--	--	--	--	--	--	82	--	--	337	--	54	1060	7.7
Nov. 22.....	375	768	10	89	28	92	5	166	0	281	84	2.6	675	339	203	54	1060	8.0
Nov. 22.....	400	743	--	--	--	--	--	--	--	--	84	--	--	340	--	54	1080	7.5
Nov. 22.....	420	723	--	--	--	--	--	172	0	--	86	--	--	344	--	54	1080	8.1
Dec. 17.....	5	1134	--	--	--	--	--	--	--	--	80	--	--	314	--	60	1000	7.7
Dec. 17.....	100	1039	--	--	--	--	--	--	--	--	84	--	--	314	--	59	1000	7.6
Dec. 17.....	150	989	--	--	--	--	--	--	--	--	78	--	--	314	--	59	965	7.5
Dec. 17.....	200	939	--	--	--	--	--	151	--	--	74	--	--	317	--	57	975	8.2
Dec. 17.....	225	914	11	84	26	81		151	0	257	74	2.4	615	317	193	56	945	8.3
Dec. 17.....	250	889	--	--	--	--	--	--	--	--	80	--	--	328	--	56	1020	7.6
Dec. 17.....	300	839	--	--	--	--	--	--	--	--	84	--	--	334	--	55	1040	7.6
Dec. 17.....	325	814	11	88	28	91	5	162	0	275	84	2.0	663	333	200	54	1040	8.3
Dec. 17.....	350	789	--	--	--	--	--	--	--	--	87	--	--	337	--	54	1050	7.6
Dec. 17.....	400	739	--	--	--	--	--	--	--	--	87	--	--	340	--	54	1060	7.5
Jan. 14, 1964.....	5	1129	9.3	84	27	87	5	140	0	279	78	1.9	641	321	206	55	1020	8.0
Jan. 14.....	25	1109	--	--	--	--	--	133	2	--	78	--	--	--	--	55	1020	8.5
Jan. 14.....	50	1084	--	--	--	--	--	--	--	--	78	--	--	320	--	56	1020	7.7
Jan. 14.....	75	1059	--	--	--	--	--	138	0	--	78	--	--	--	--	55	1020	7.7
Jan. 14.....	100	1034	--	--	--	--	--	--	--	--	78	--	--	319	--	55	1020	7.7
Jan. 14.....	125	1009	--	--	--	--	--	138	0	--	78	--	--	--	--	55	1020	7.9
Jan. 14.....	150	984	--	--	--	--	--	--	--	--	78	--	--	319	--	55	1020	7.6
Jan. 14.....	175	959	--	--	--	--	--	138	0	--	78	--	--	--	--	55	1020	8.0
Jan. 14.....	200	934	--	--	--	--	--	--	--	--	78	--	--	319	--	55	1020	7.6
Jan. 14.....	225	909	9.0	84	27	87	5	142	0	277	78	1.8	640	312	205	55	1020	7.3
Jan. 14.....	250	884	--	--	--	--	--	--	--	--	78	--	--	326	--	55	1040	7.9
Jan. 14.....	275	859	9.2	88	27	88	5	151	4	272	79	2.3	650	331	201	55	1040	8.5
Jan. 14.....	300	834	--	--	--	--	--	--	--	--	79	--	--	328	--	54	1040	7.6
Jan. 14.....	325	809	--	--	--	--	--	150	5	--	81	--	--	--	--	54	1050	8.6
Jan. 14.....	350	784	--	--	--	--	--	--	--	--	81	--	--	332	--	54	1060	7.5
Jan. 14.....	375	759	9.2	89	28	92	5	155	4	277	82	2.2	665	335	202	54	1060	8.5
Jan. 14.....	400	734	--	--	--	--	--	--	--	--	81	--	--	332	--	54	1060	7.7
Jan. 14.....	410	724	--	--	--	--	--	--	--	--	82	--	--	333	--	54	1060	7.5
Feb. 3.....	surface	1131	9.6	85	28	87	5	144	0	281	80	2.8	650	325	207	56	1030	8.1
Feb. 3.....	5	1126	--	--	--	--	--	140	2	--	80	--	--	--	--	55	1030	8.4
Feb. 3.....	25	1106	--	--	--	--	--	139	2	--	79	--	--	--	--	54	1020	8.4
Feb. 3.....	50	1081	--	--	--	--	--	--	--	--	79	--	--	322	--	54	1020	7.7
Feb. 3.....	75	1056	--	--	--	--	--	143	0	--	79	--	--	--	--	54	1020	8.0
Feb. 3.....	100	1031	--	--	--	--	--	--	--	--	79	--	--	322	--	54	1030	7.7
Feb. 3.....	125	1006	--	--	--	--	--	143	0	--	79	--	--	--	--	54	1030	7.9
Feb. 3.....	150	981	--	--	--	--	--	--	--	--	79	--	--	322	--	54	1030	7.7
Feb. 3.....	175	956	--	--	--	--	--	143	0	--	79	--	--	--	--	54	1030	8.2
Feb. 3.....	200	931	--	--	--	--	--	--	--	--	79	--	--	323	--	54	1030	7.6
Feb. 3.....	225	906	9.4	85	28	87	5	143	0	280	79	2.2	647	325	208	54	1030	8.0
Feb. 3.....	250	881	--	--	--	--	--	--	--	--	79	--	--	324	--	54	1030	8.1
Feb. 3.....	275		9.4	85	28	87	5	145	0	281	80	2.2	650	325	206	54	1030	8.0
Feb. 3.....	300	831	--	--	--	--	--	--	--	--	80	--	--	325	--	54	1041	7.8
Feb. 3.....	325	806	--	--	--	--	--	145	0	--	80	--	--	--	--	54	1040	8.1
Feb. 3.....	350	781	--	--	--	--	--	--	--	--	82	--	--	331	--	54	1060	7.5
Feb. 3.....	375	756	9.4	88	28	91	5	160	0	278	82	2.2	664	335	204	54	1060	7.9
Feb. 3.....	400	731	--	--	--	--	--	--	--	--	82	--	--	332	--	54	1060	7.5
Feb. 3.....	410	721	--	--	--	--	--	--	--	--	81	--	--	333	--	54	1060	7.5
Mar. 5.....	surface	1128	11	86	28	91	5	148	0	284	84	1.4	664	330	209	55	1050	7.4
Mar. 5.....	5	1123	--	--	--	--	--	148	0	--	84	--	--	--	--	54	1050	8.2
Mar. 5.....	25	1103	--	--	--	--	--	146	1	--	81	--	--	--	--	53	1060	8.3
Mar. 5.....	50	1078	--	--	--	--	--	--	--	--	80	--	--	327	--	53	1050	7.9
Mar. 5.....	75	1053	--	--	--	--	--	140	4	--	80	--	--	--	--	53	1050	8.4
Mar. 5.....	100	1028	--	--	--	--	--	--	--	--	80	--	--	328	--	53	1050	8.0

9-4210. LAKE MEAD AT HOOVER DAM, ARIZ.-NEV.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Elevation (feet)	Depth (feet)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (calculated): Parts per million	Dissolved solids (calculated): Tons per acre-foot	Dissolved solids (calculated): Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Temperature (°F)	Specific conductance (micromhos at 25°C)	pH
Mar. 5, 1964	125	1003	--	--	--	--	--	148	0	--	80		--		--			--	--	53	1050	7.9
Mar. 5	150	978	--	--	--	--	--	--	--	--	80		--		--			329	--	53	1050	7.9
Mar. 5	175	953	--	--	--	--	--	146	--	--	82		--		--			--	--	53	1050	7.9
Mar. 5	200	928	--	--	--	--	--	--	--	--	80		--		--			329	--	53	1050	8.0
Mar. 5	225	903	11	86	28	91	5	142	4	283	82		1.3		662			330	208	53	1050	8.4
Mar. 5	250	878	--	--	--	--	--	--	--	--	80		--		--			328	--	53	1050	7.9
Mar. 5	275	853	11	86	28	91	5	148	0	285	82		1.3		663			330	209	53	1060	8.1
Mar. 5	300	828	--	--	--	--	--	--	--	--	78		--		--			328	--	53	1050	8.0
Mar. 5	325	803	--	--	--	--	--	146	1	--	80		--		--			--	--	53	1050	8.3
Mar. 5	350	778	--	--	--	--	--	--	--	--	81		--		--			331	--	53	1060	7.9
Mar. 5	375	753	11	87	28	92	5	143	4	286	84		1.3		670			334	211	53	1060	8.4
Mar. 5	400	728	--	--	--	--	--	--	--	--	88		--		--			336	--	53	1090	7.9
Mar. 5	405	723	--	--	--	--	--	--	--	--	92		--		--			337	--	53	1090	7.9
Mar. 31	surface	1124	9.1	86	28	90	5	148	0	287	82		1.0		663			332	211	62	1050	7.8
Mar. 31	5	1119	--	--	--	--	--	148	0	--	82		--		--			--	--	62	1040	7.8
Mar. 31	25	1099	--	--	--	--	--	148	0	--	82		--		--			--	--	55	1050	7.6
Mar. 31	50	1074	--	--	--	--	--	--	--	--	82		--		--			330	--	54	1050	8.0
Mar. 31	75	1049	--	--	--	--	--	148	0	--	82		--		--			--	--	53	1050	7.5
Mar. 31	100	1024	--	--	--	--	--	--	--	--	82		--		--			330	--	53	1050	7.9
Mar. 31	125	999	--	--	--	--	--	148	0	--	82		--		--			--	--	53	1050	7.7
Mar. 31	150	974	--	--	--	--	--	--	--	--	82		--		--			330	--	53	1050	8.1
Mar. 31	175	949	9.7	86	28	93	5	148	0	288	84		.9		669			332	211	53	1060	7.7
Mar. 31	200	924	--	--	--	--	--	--	--	--	84		--		--			334	--	53	1080	7.8
Mar. 31	225	899	12	88	28	96	5	150	0	291	88		1.2		685			337	214	53	1090	7.6
Mar. 31	250	874	--	--	--	--	--	--	--	--	90		--		--			338	--	52	1100	8.0
Mar. 31	275	849	9.8	89	29	96	5	153	0	289	90		1.0		685			341	216	52	1100	8.0
Mar. 31	300	824	--	--	--	--	--	--	--	--	90		--		--			338	--	52	1100	7.9
Mar. 31	325	799	--	--	--	--	--	155	0	--	94		--		--			--	--	52	1100	7.7
Mar. 31	350	774	--	--	--	--	--	--	--	--	92		--		--			339	--	52	1100	8.0
Mar. 31	375	749	9.3	89	30	99	5	155	0	294	90		.9		694			343	216	52	1100	7.6
Mar. 31	400	724	--	--	--	--	--	--	--	--	90		--		--			339	--	52	1100	7.9
Apr. 30	surface	1123	11	88	28	90	5	148	0	287	84		1.9		669			335	214	57	1070	7.9
Apr. 30	5	1118	--	--	--	--	--	148	0	--	84		--		--			--	--	56	1070	7.9
Apr. 30	25	1098	--	--	--	--	--	148	0	--	84		--		--			--	--	55	1070	8.0
Apr. 30	50	1073	--	--	--	--	--	--	--	--	85		--		--			334	--	54	1070	7.9
Apr. 30	75	1048	--	--	--	--	--	145	1	--	85		--		--			--	--	54	1070	8.3
Apr. 30	100	1023	--	--	--	--	--	--	--	--	85		--		--			334	--	53	1070	7.7
Apr. 30	125	998	11	88	28	92	5	149	0	291	86		2.0		678			337	215	53	1080	7.8
Apr. 30	150	973	--	--	--	--	--	--	--	--	88		--		--			337	--	53	1090	7.9
Apr. 30	175	948	11	90	28	94	5	151	0	293	89		2.0		688			342	218	52	1100	8.1
Apr. 30	200	923	--	--	--	--	--	--	--	--	90		--		--			341	--	52	1100	7.9
Apr. 30	225	898	11	91	28	96	5	154	0	291	91		2.1		693			344	218	52	1100	8.2
Apr. 30	250	873	--	--	--	--	--	--	--	--	92		--		--			342	--	52	1110	7.9
Apr. 30	275	848	--	--	--	--	--	155	0	--	92		--		--			--	--	52	1120	7.9
Apr. 30	300	823	--	--	--	--	--	--	--	--	92		--		--			343	--	52	1120	7.9
Apr. 30	325	798	11	91	29	97	5	149	2	296	93		2.2		700			246	220	52	1110	8.4
Apr. 30	350	773	--	--	--	--	--	--	--	--	92		--		--			343	--	52	1120	8.0
Apr. 30	375	748	--	--	--	--	--	151	1	--	93		--		--			--	--	52	1120	8.3
Apr. 30	400	723	--	--	--	--	--	--	--	--	93		--		--			345	--	52	1120	7.8
Apr. 30	402	721	--	--	--	--	--	--	--	--	93		--		--			344	--	52	1120	7.7

June 2.....	surface	1119	--	--	--	--	--	--	--	--	86	--	--	341	--	70	1090	8.2
June 2.....	5	1114	10	90	28	94	5	146	0	293	86	1.5	681	340	220	69	1080	8.0
June 2.....	25	1094	--	--	--	--	--	146	0	--	86	--	--	--	--	68	1080	7.9
June 2.....	50	1069	--	--	--	--	--	--	--	--	85	--	--	338	--	65	1080	8.1
June 2.....	75	1044	--	--	--	--	--	146	0	--	85	--	--	--	--	60	1080	7.8
June 2.....	100	1019	--	--	--	--	--	--	--	--	85	--	--	336	--	58	1080	8.1
June 2.....	125	994	--	--	--	--	--	148	0	--	86	--	--	--	--	56	1080	7.7
June 2.....	150	969	--	--	--	--	--	--	--	--	86	--	--	338	--	55	1090	7.8
June 2.....	175	944	10	90	28	94	5	149	0	293	89	1.1	685	340	218	54	1090	7.5
June 2.....	200	919	--	--	--	--	--	--	--	--	89	--	--	340	--	53	1100	7.9
June 2.....	225	894	10	91	28	96	5	151	0	294	90	2.2	692	342	218	52	1100	7.6
June 2.....	250	869	--	--	--	--	--	--	--	--	91	--	--	342	--	52	1110	7.9
June 2.....	275	844	--	--	--	--	--	153	0	--	92	--	--	--	--	52	1110	7.6
June 2.....	300	819	--	--	--	--	--	--	--	--	91	--	--	343	--	52	1110	8.1
June 2.....	325	794	10	91	28	98	5	153	0	292	93	2.1	696	344	219	52	1120	7.6
June 2.....	350	769	--	--	--	--	--	--	--	--	92	--	--	344	--	52	1110	7.9
June 2.....	375	744	--	--	--	--	--	153	0	--	93	--	--	--	--	52	1120	7.7
June 2.....	399	720	--	--	--	--	--	--	--	--	92	--	--	345	--	52	1110	7.9
June 30.....	surface	1112	10	88	29	94	6	146	0	291	92	.9	684	339	219	74	1100	8.0
June 30.....	5	1107	--	--	--	--	--	146	1	--	92	--	--	338	--	74	1100	7.8
June 30.....	25	1087	--	--	--	--	--	146	0	--	92	--	--	--	--	74	1100	7.8
June 30.....	50	1062	--	--	--	--	--	--	--	--	92	--	--	341	--	71	1100	7.7
June 30.....	75	1037	--	--	--	--	--	157	0	--	90	--	--	--	--	64	1090	7.3
June 30.....	100	1012	--	--	--	--	--	--	--	--	88	--	--	340	--	59	1080	8.1
June 30.....	125	987	10	88	30	94	6	156	0	291	88	1.5	686	341	213	58	1090	7.9
June 30.....	150	962	--	--	--	--	--	--	--	--	88	--	--	340	--	56	1090	7.8
June 30.....	175	937	11	88	30	96	6	157	0	291	90	.5	691	341	212	55	1090	8.3
June 30.....	200	912	--	--	--	--	--	--	--	--	92	--	--	340	--	54	1100	7.9
June 30.....	225	887	11	89	30	99	6	160	0	294	92	.5	701	343	212	54	1100	8.1
June 30.....	250	862	--	--	--	--	--	--	--	--	92	--	--	342	--	53	1110	7.8
June 30.....	275	837	--	--	--	--	--	160	0	--	92	--	--	--	--	53	1110	8.1
June 30.....	300	812	--	--	--	--	--	--	--	--	94	--	--	343	--	52	1110	7.8
June 30.....	325	787	10	89	30	101	6	162	0	293	94	.4	704	343	210	52	1120	7.3
June 30.....	350	762	--	--	--	--	--	--	--	--	94	--	--	344	--	52	1120	8.0
June 30.....	375	737	--	--	--	--	--	162	0	--	94	--	--	--	--	52	1120	7.3
June 30.....	380	732	--	--	--	--	--	--	--	--	94	--	--	345	--	52	1120	7.7
July 31.....	surface	1104	11	90	29	100	6	148	0	309	91	.7	711	344	233	72	1110	7.7
July 31.....	5	1099	--	--	--	--	--	145	0	--	91	--	--	--	--	71	1110	7.9
July 31.....	25	1079	--	--	--	--	--	--	--	--	--	--	--	--	--	70	--	--
July 31.....	50	1054	--	--	--	--	--	--	--	--	91	--	--	343	--	68	1110	7.9
July 31.....	75	1029	9.6	89	28	98	6	150	0	298	89	.8	694	339	216	62	1090	7.7
July 31.....	100	1004	--	--	--	--	--	--	--	--	90	--	--	339	--	58	1100	7.7
July 31.....	125	979	--	--	--	--	--	154	0	--	92	--	--	--	--	55	1100	7.3
July 31.....	150	954	--	--	--	--	--	--	--	--	92	--	--	341	--	54	1110	7.7
July 31.....	175	929	11	89	28	100	6	154	0	295	92	1.6	700	339	213	54	1110	7.7
July 31.....	200	904	--	--	--	--	--	--	--	--	92	--	--	340	--	53	1110	7.9
July 31.....	225	879	10	90	28	100	6	156	0	296	92	.5	701	342	214	53	1110	7.4
July 31.....	250	854	--	--	--	--	--	--	--	--	93	--	--	341	--	53	1110	7.9
July 31.....	275	829	--	--	--	--	--	156	0	--	93	--	--	--	--	52	1110	7.3
July 31.....	300	804									93			342		52	1110	7.9
July 31.....	325	779	--	--	--	--	--	157	0	--	93	--	--	--	--	52	1110	7.4
July 31.....	350	754	--	--	--	--	--	--	--	--	93	--	--	343	--	52	1110	7.7
July 31.....	375	729	--	--	--	--	--	157	0	--	93	--	--	--	--	52	1110	7.3
July 31.....	380	724	--	--	--	--	--	--	--	--	93	--	--	343	--	52	1110	8.2
Aug. 31.....	surface	1099	8.1	86	30	104	5	124	0	325	96	.4	717	340	238	78	1130	8.3
Aug. 31.....	5	1094	--	--	--	--	--	124	0	--	96	--	--	341	--	77	1130	7.7
Aug. 31.....	25	1074	--	--	--	--	--	124	0	--	96	--	--	--	--	76	1130	8.3
Aug. 31.....	50	1049	--	--	--	--	--	--	--	--	94	--	--	342	--	72	1120	7.9
Aug. 31.....	75	1024	11	89	30	95	5	149	0	302	88	1.0	695	343	221	65	1100	8.1
Aug. 31.....	100	999	--	--	--	--	--	--	--	--	88	--	--	341	--	61	1100	7.8

COLORADO RIVER MAIN STEM--Continued

9-4210. LAKE MEAD AT HOOVER DAM, ARIZ.-NEV.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Elevation (feet)	Depth (feet)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (calculated)			Hardness as $CaCO_3$		Temperature (°F)	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate			
Aug. 31, 1964.....	125	974	--	--	--	--	--	149	1	--	90		--		--			--	--	59	1090	8.4
Aug. 31.....	150	949	--	--	--	--	--	--	--	--	90		--		--			342	--	57	1100	7.9
Aug. 31.....	175	924	11	90	29	98	5	155	0	296	92		2.0		700			344	217	55	1110	8.0
Aug. 31.....	200	899	--	--	--	--	--	--	--	--	92		--		--			343	--	54	1110	7.9
Aug. 31.....	225	874	11	90	29	98	5	156	0	297	92		.6		700			344	216	54	1110	7.9
Aug. 31.....	250	849	--	--	--	--	--	--	--	--	92		--		--			343	--	53	1110	8.0
Aug. 31.....	275	824	--	--	--	--	--	157	0	--	94		--		--			--	--	53	1110	7.6
Aug. 31.....	300	799	--	--	--	--	--	--	--	--	94		--		--			343	--	53	1120	7.9
Aug. 31.....	325	774	11	90	29	100	5	159	0	296	94		2.0		706			344	214	53	1120	7.6
Aug. 31.....	350	749	--	--	--	--	--	--	--	--	92		--		--			344	--	53	1120	7.9
Aug. 31.....	375	724	--	--	--	--	--	160	0	--	94		--		--			344	--	53	1120	7.9

9-4215. COLORADO RIVER BELOW HOOVER DAM, ARIZ.-NEV.

LOCATION.--At Hoover Dam, on state line between Mohave County, Ariz., and Clark County, Nev., just downstream from gaging station.
DRAINAGE AREA.--167,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1939 to September 1964.
Water temperatures: October 1941 to September 1963.
REMARKS.--Records of specific conductance of individual samples available in district office at Salt Lake City, Utah.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate			
Oct. 1, 15, 25, 1963.....		11	--	--	--	87	4.2	158		273	80	0.2	1.8	0.13	660	0.90		328	198	2.1	979	7.5
Nov. 5, 15, 26....		9.6	--	78	30	80	3.7	156		--	78	.4	2.3	.10	658	.89		316	188	2.0	980	7.4
Dec. 5, 18, 26....		9.7	0.00	83	28	87	3.8	157		274	77	.4	1.1	.15	663	.90		320	191	2.1	967	7.4
Jan. 6, 15, 24, 1964.....		10	.00	83	28	91	4.0	148		285	81	.4	1.8	.14	683	.93		322	201	2.2	997	7.5
Feb. 5, 14, 25....		9.8	.00	90	26	93	4.1	147		286	83	.3	1.3	.15	689	.94		330	209	2.2	1020	7.9
Mar. 6, 13, 25....		9.9	.01	83	29	96	4.2	150		288	86	.4	1.2	.14	696	.95		326	203	2.3	1030	7.7
Apr. 6, 15, 29....		10	.00	88	26	104	4.1	154		304	98	--	1.1	.11	719	.98		328	202	2.5	1050	7.9
May 5, 15, 25.....		9.9	.00	--	--	99	4.4	155		295	98	.4	1.2	--	723	.98		334	207	2.4	1060	7.7
June 5, 16, 25....		9.9	.00	--	--	96	4.4	154		295	97	.4	1.0	--	726	.99		334	208	2.3	1060	7.7
July 6, 15, 24....		9.2	--	92	26	101	4.9	153		299	94	.4	.3	.15	718	.98		335	210	2.4	1070	7.7
Aug. 5, 15, 25....		9.4	.00	90	28	107	4.7	160		305	92	.4	1.1	.13	729	.99		338	207	2.5	1060	7.6
Sept. 4, 15.....		10	--	92	27	103	4.7	160		302	98	.3	.6	.11	726	.99		340	209	2.4	1070	7.6

9-4708. GARDEN CANYON NEAR FORT HUACHUCA, ARIZ.--Continued

Monthly and annual summary of suspended-sediment discharge, water year October 1963 to September 1964

Month	Discharge (cfs)	Suspended sediment (tons)
October 1963.....	49.9	2
November.....	22.6	T
December.....	18.2	T
January 1964.....	14.9	T
February.....	11.7	T
March.....	11.8	T
April.....	8.3	T
May.....	4.55	T
June.....	.49	T
July.....	16.67	A 200
August.....	234.8	A 300
September.....	126.3	A 10
Total for year.....	520.21	512

T Less than 0.5 ton.
A Computed from partly estimated-concentration graph.

Particle-size analyses of suspended sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
July 31, 1964.....	1345		61	10.2	8920		48	60		80		99	100					SPWC

9-4710. SAN PEDRO RIVER AT CHARLESTON, ARIZ.

LOCATION.--At gaging station in Spanish land grant of San Juan de las Boquillas y Nogales, at county highway bridge, 0.2 mile south of Charleston, Cochise County, 1.5 miles upstream from Charleston damsite, 8.5 miles upstream from Babocomari River, and 29 miles upstream from Benson.
DRAINAGE AREA.--1,219 square miles, of which 696 square miles is in Mexico.
RECORDS AVAILABLE.--Water temperatures: July 1963 to September 1964.
Sediment records: July 1963 to September 1964.
EXTREMES, July 1963 to September 1964.--Water temperatures: Maximum, 89°F Sept. 9, 1963; minimum, freezing point Jan. 9, 10, 1964.
Sediment concentrations: Maximum daily, 28,000 ppm July 30, 1963; minimum daily, 3 ppm June 2-6, 1964.
Sediment loads: Maximum daily, 410,000 tons Aug. 14, 1964; minimum daily, less than 0.05 ton on several days each year.
REMARKS.--Records of specific conductance of daily samples available in district office at Tucson, Ariz.

Temperature (°F) of water, July to September 1963

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	70	70	70	68	69	--	--
August	--	--	78	--	--	--	--	--	--	--	--	--	--	--	74	72	73	72	74	74	78	73	80	73	75	68	70	85	71	77	69	--
September	77	78	67	74	70	75	--	80	89	69	84	68	76	66	71	77	--	--	64	--	76	65	76	--	68	67	62	--	--	61	--	--

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	--	80	58	58	52	--	59	55	--	56	56	73	--	--	--	62	64	--	60	54	52	55	70	--	--	--	55	55	56	56	57	--
November	56	55	--	--	64	64	53	48	48	50	50	50	48	46	51	46	47	53	45	--	45	40	40	44	43	45	41	42	42	45	--	48
December	45	58	51	--	43	44	--	42	41	--	40	46	41	39	37	39	38	39	39	40	56	48	37	35	35	40	36	38	37	38	51	42
January	55	37	37	35	39	54	51	37	32	32	33	44	45	--	47	--	49	49	50	47	40	40	52	35	33	33	--	51	59	60	61	44
February	61	60	38	35	35	37	33	37	36	38	42	46	38	47	55	56	55	55	36	40	36	35	36	40	37	39	52	52	37	--	--	43
March	44	40	41	36	40	40	39	42	37	--	63	63	63	45	46	42	49	50	55	45	45	--	48	42	48	63	62	48	52	48	55	48
April	51	52	45	--	44	--	47	45	--	--	48	--	48	53	50	52	52	59	50	50	47	55	48	--	--	48	47	57	51	55	--	--
May	53	--	52	48	51	49	65	74	48	55	51	73	55	60	57	62	56	62	80	81	61	65	61	65	62	68	52	62	58	60	56	60
June	68	60	63	59	61	80	75	60	63	58	65	87	82	82	86	81	79	61	80	61	70	83	83	75	65	--	66	72	68	67	--	71
July	72	67	72	70	75	72	72	--	68	74	68	76	80	71	73	80	--	69	73	71	70	72	--	--	70	--	--	--	70	70	71	--
August	70	77	72	72	61	72	--	82	69	72	73	75	72	73	79	85	73	74	85	80	69	85	67	78	69	70	75	78	68	71	62	74
September	70	82	67	66	70	67	69	68	72	--	73	69	77	70	69	63	65	63	67	60	--	61	71	72	74	60	66	57	70	59	--	68

9-4710. SAN PEDRO RIVER AT CHARLESTON, ARIZ.--Continued

Suspended sediment, July to September 1963
(Where no concentrations are reported, loads are estimated)

Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	1.1	--	T	264	4700	S 3700	285	12000	S 10000
2..	1.1	--	T	528	4900	K 14000	187	12000	S 7100
3..	1.1	--	T	321	6400	S 7600	1580	19000	S 100000
4..	1.4	--	T	186	11000	S 5900	220	5300	3100
5..	1.4	--	T	138	9600	3600	223	8400	S 6100
6..	1.3	--	T	169	10000	4600	150	4200	1700
7..	2.4	--	8	93	8900	B 2200	105	4200	1200
8..	2.7	--	.4	38	7700	B 790	110	7400	S 3000
9..	1.9	--	.1	22	6400	B 380	67	3700	670
10..	35	--	1600	46	6600	K 1200	31	420	35
11..	158	--	4100	101	7000	S 2800	22	130	B 8
12..	14	--	90	25	800	B 54	18	120	6
13..	5.6	--	2	159	9400	S 5500	18	160	8
14..	3.5	--	.1	268	8200	K 2100	16	100	4
15..	2.8	--	.1	70	5300	S 1100	39	2800	S 610
16..	3.7	--	1	73	6600	S 1600	41	4600	B 510
17..	175	--	5300	42	6000	B 680	20	1200	65
18..	23	--	100	21	2400	B 140	15	380	15
19..	44	--	1400	125	9500	S 7000	15	220	9
20..	171	--	7600	40	4400	S 550	108	1600	K 2200
21..	54	--	700	144	19000	S 8700	31	890	S 150
22..	72	--	1600	205	12000	S 8600	18	780	S 62
23..	40	--	300	262	11000	S 10000	12	180	6
24..	12	--	30	93	5500	S 1500	10	80	2
25..	74	1200	S 650	120	6200	S 5300	8.1	60	2
26..	10	1200	32	304	17000	S 15000	7.4	35	1
27..	1640	22000	S 170000	514	17000	S 29000	6.4	18	.3
28..	209	7100	S 5200	136	5300	1900	5.6	28	.4
29..	1210	21000	S 87000	83	3100	S 720	4.8	23	B .3
30..	2130	28000	S 210000	270	16000	S 12000	4.7	18	.2
31..	303	9500	S 8800	163	10000	S 6100	--	--	
Total	6404.0	--	504513.9	5023	--	164314	3378.0	--	136564.2

Total discharge for period (cfs-days)..... 14,805.0
Total load for period (tons)..... 805,392.1

S Computed by subdividing day.
T Less than 0.05 ton.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.

9-4710. SAN PEDRO RIVER AT CHARLESTON, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	4.3	21	0.2	6.0	9	0.1	13	10	0.3
2..	4.2	23	.2	6.6	23	.4	12	10	.3
3..	4.2	14	.2	7.6	20	B .4	12	14	.5
4..	3.8	17	.2	7.8	18	B .4	12	12	B .4
5..	4.0	15	.2	7.8	16	.3	12	11	.4
6..	4.0	20	B .2	7.8	22	.5	12	18	.6
7..	4.0	25	.3	9.0	10	.2	12	29	.9
8..	3.8	19	.2	9.4	24	.6	12	14	.5
9..	3.8	32	.3	9.4	9	.2	12	8	.3
10..	3.7	21	.2	9.4	8	.2	12	14	.5
11..	3.7	25	B .2	9.4	10	.3	13	20	.7
12..	3.8	30	.3	9.0	18	.4	14	24	.9
13..	3.7	12	.1	8.7	11	.3	14	25	.9
14..	3.5	19	.2	8.7	8	.2	14	30	1.1
15..	3.7	18	.2	8.7	12	.3	14	21	.8
16..	5.8	310	S 5.0	9.0	16	.4	14	12	.5
17..	4.8	35	.4	9.0	29	.7	14	12	.5
18..	4.8	23	.3	10	20	.5	14	10	.4
19..	6.4	78	1.3	11	21	.6	14	16	.6
20..	7.1	73	1.4	11	21	B .6	14	12	.5
21..	6.6	32	.6	45	2400	S 630	14	11	B .4
22..	6.6	36	.6	22	1000	59	15	10	.4
23..	6.4	34	.6	16	98	4.2	15	11	.4
24..	6.2	21	.4	15	50	2.0	15	8	.3
25..	6.2	20	B .3	14	45	1.7	15	11	.4
26..	6.2	21	.4	14	29	1.1	15	15	.6
27..	5.4	36	.5	14	35	1.3	15	10	.4
28..	5.0	35	.5	13	20	.7	14	9	.3
29..	5.0	23	.3	13	13	.4	14	12	.5
30..	5.0	19	.3	13	12	.4	14	8	.3
31..	5.1	20	.3	--	--	--	14	12	.5
Total	150.8	--	16.4	354.3	--	708.4	420	--	16.1
	JANUARY			FEBRUARY			MARCH		
1..	14	14	0.5	12	9	0.3	11	9	0.3
2..	14	20	.8	11	7	.2	12	7	.2
3..	14	14	.5	11	5	.1	13	9	.3
4..	14	13	.5	11	7	.2	12	7	.2
5..	13	12	.4	11	6	.2	12	7	.2
6..	12	10	.3	11	7	.2	12	8	.3
7..	12	16	.5	11	6	.2	11	11	B .3
8..	12	13	.4	11	7	.2	11	14	.4
9..	12	81	2.6	11	8	.2	12	9	.3
10..	12	27	.9	11	7	.2	12	23	.7
11..	11	21	.6	11	10	.3	12	14	.5
12..	11	14	.4	10	12	.3	12	12	.4
13..	11	21	.6	10	8	.2	12	12	.4
14..	11	18	B .5	9.8	10	.3	13	12	.4
15..	12	15	.5	11	30	.9	14	8	.3
16..	12	15	B .5	9.8	13	.3	13	9	.3
17..	12	14	.5	11	9	.3	14	10	.4
18..	12	8	.3	9.8	30	.8	18	34	1.7
19..	11	6	.2	9.4	10	.3	31	2800	S 320
20..	11	10	.3	9.0	6	.1	25	3000	200
21..	12	10	.3	9.0	7	.2	18	5400	260
22..	11	5	.1	9.4	10	.3	15	250	10
23..	12	7	.2	9.8	5	.1	15	89	3.6
24..	12	5	.2	10	9	.2	14	84	3.2
25..	12	51	1.7	11	7	.2	14	50	1.9
26..	12	6	.2	10	5	.1	14	38	1.4
27..	13	4	.1	11	8	.2	14	35	1.3
28..	15	13	.5	10	5	.1	13	19	.7
29..	13	9	.3	10	5	.1	12	17	.6
30..	12	7	.2	--	--	--	12	23	.7
31..	13	9	.3	--	--	--	12	20	.6
Total	380	--	15.9	302.0	--	7.3	435	--	811.6

S Computed by subdividing day.
B Computed from estimated-concentration graph.

9-4734. SAN PEDRO RIVER NEAR WINKELMAN, ARIZ.

LOCATION.--At gaging station, 3.5 miles southeast of Winkelman, Pinal County, and 4 miles upstream from mouth.
DRAINAGE AREA.--4,449 square miles, of which 696 square miles is in Mexico.
RECORDS AVAILABLE.--Water temperatures: July 1962 to September 1963.
Sediment records: July 1962 to September 1964.
EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 94,000 ppm Aug. 15; minimum daily, 5 ppm on several days during June and July.
Sediment loads: Maximum daily, 1,100,000 tons Aug. 15; minimum daily, less than 0.50 ton on many days.
EXTREMES, 1962-64.--Water temperatures (1962-63): Maximum, 101°F Sept. 20, 1962; minimum, 48°F Feb. 11, 12, 1963.
Sediment concentrations: Maximum daily, 110,000 ppm July 29, 1962, Aug. 2, 1963; minimum daily, 2 ppm May 3, 5, 1963.
Sediment loads: Maximum daily, 1,100,000 tons Aug. 15, 1964; minimum daily, less than 0.50 ton on many days each year.
REMARKS.--Records of specific conductance of daily samples available in district office at Tucson, Ariz. Water temperatures unreliable and not published.

Suspended sediment, water year October 1963 to September 1964
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	5.8	C 20	T	5.1	C 20	T	12	C 20	1
2..	5.8	C 20	T	5.1	C 20	T	12	C 20	1
3..	5.8	C 20	T	5.1	C 20	T	12	C 20	1
4..	5.8	C 20	T	5.4	C 20	T	12	C 20	1
5..	5.8	C 20	T	5.1	C 20	T	12	C 20	1
6..	5.8	C 20	T	5.4	C 20	T	12	C 20	1
7..	5.4	C 20	T	8.9	C 20	1	11	C 20	1
8..	5.4	C 20	T	15	C 24	1	11	C 20	1
9..	5.4	C 20	T	14	C 24	1	11	C 20	1
10..	5.4	C 20	T	13	C 24	1	12	C 20	1
11..	5.4	C 20	T	12	C 24	1	12	C 20	1
12..	5.4	C 20	T	12	C 24	1	12	C 20	1
13..	5.4	C 20	T	11	C 24	1	12	C 20	1
14..	5.4	C 20	T	11	C 24	1	12	C 20	1
15..	5.4	C 20	T	11	C 24	1	12	C 20	1
16..	5.4	C 20	T	11	C 24	1	12	C 20	1
17..	5.4	C 20	T	11	C 24	1	12	C 20	1
18..	5.1	C 20	T	12	C 24	1	12	C 20	1
19..	5.4	C 20	T	12	C 24	1	12	C 20	1
20..	5.4	C 20	T	12	C 24	1	12	C 20	1
21..	5.4	C 20	T	14	1700	64	12	C 20	1
22..	5.4	C 20	T	18	2400	120	12	C 20	1
23..	5.1	C 20	T	15	3500	140	12	C 20	1
24..	5.1	C 20	T	13	1000	35	11	C 20	1
25..	5.1	C 20	T	12	280	9	11	C 20	1
26..	5.1	C 20	T	11	90	3	11	C 20	1
27..	5.1	C 20	T	11	C 20	1	11	C 20	1
28..	5.1	C 20	T	11	C 20	1	11	C 20	1
29..	5.1	C 20	T	11	C 20	1	12	C 20	1
30..	5.1	C 20	T	11	C 20	1	12	C 20	1
31..	5.1	C 20	T	--	--	--	12	C 20	1
Total	166.8	--	9	324.1	--	391	364	--	31

T Less than 0.50 ton.
C Composite period.

9-4734. SAN PEDRO RIVER NEAR WINKELMAN, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	13	C 20	1	11	C 16	T	11	C 40	1
2..	13	C 20	1	11	C 16	T	12	C 40	1
3..	13	C 9	T	11	C 16	T	15	C 40	2
4..	13	C 9	T	11	C 16	T	16	C 40	2
5..	12	C 9	T	11	C 16	T	15	C 40	2
6..	12	C 9	T	11	C 16	T	15	C 40	2
7..	13	C 9	T	11	C 16	T	15	C 40	2
8..	12	C 9	T	11	C 16	T	14	C 40	2
9..	12	C 9	T	11	C 16	T	14	C 40	2
10..	12	C 9	T	11	C 16	T	14	C 40	2
11..	12	C 9	T	11	C 51	2	14	C 40	2
12..	12	C 9	T	11	C 51	2	14	C 40	2
13..	12	C 9	T	11	C 51	2	14	C 40	2
14..	12	C 9	T	12	C 51	2	14	C 40	2
15..	12	C 9	T	12	C 51	2	12	C 40	1
16..	11	C 9	T	12	C 51	2	11	C 40	1
17..	10	C 9	T	13	C 51	2	11	C 40	1
18..	11	C 9	T	12	C 51	2	11	C 40	1
19..	12	C 9	T	12	C 51	2	11	C 40	1
20..	12	C 9	T	12	C 51	2	11	C 40	1
21..	12	C 9	T	12	C 51	2	11	C 40	1
22..	12	C 9	T	12	C 51	2	11	C 40	1
23..	12	C 9	T	12	C 51	2	11	C 40	1
24..	11	C 9	T	12	C 51	2	11	C 40	1
25..	11	C 9	T	12	C 51	2	12	C 40	1
26..	11	C 9	T	12	C 51	2	12	C 40	1
27..	11	C 9	T	12	C 51	2	12	C 40	1
28..	11	C 9	T	11	C 51	2	12	C 40	1
29..	11	C 9	T	11	C 51	2	12	C 40	1
30..	11	C 9	T	--	--	--	11	C 40	1
31..	11	C 9	T	--	--	--	11	C 40	1
Total	365	--	11	334	--	43	390	--	43

Day	APRIL			MAY			JUNE		
1..	11	C 40	1	7.3	C 18	T	3.6	C 12	T
2..	11	C 40	1	7.3	C 18	T	3.2	C 12	T
3..	11	C 40	1	7.3	C 18	T	3.2	C 12	T
4..	11	C 40	1	6.9	C 18	T	2.9	C 12	T
5..	11	C 40	1	6.5	C 18	T	2.9	C 12	T
6..	11	C 40	1	7.3	C 18	T	3.2	C 12	T
7..	11	C 40	1	7.3	C 18	T	2.9	C 12	T
8..	10	C 40	1	6.9	C 18	T	2.9	C 12	T
9..	9.4	C 40	1	6.9	C 18	T	2.7	C 12	T
10..	7.6	C 18	T	6.9	C 18	T	2.9	C 12	T
11..	7.3	C 18	T	6.5	C 18	T	2.7	C 12	T
12..	6.9	C 18	T	5.4	C 18	T	2.5	C 12	T
13..	6.9	C 18	T	5.4	C 18	T	2.5	C 12	T
14..	6.5	C 18	T	5.4	C 18	T	2.3	C 12	T
15..	6.1	C 18	T	5.4	C 18	T	2.1	C 12	T
16..	6.5	C 18	T	5.4	C 18	T	2.3	C 5	T
17..	5.8	C 18	T	5.4	C 18	T	2.7	C 5	T
18..	6.1	C 18	T	5.8	C 18	T	2.7	C 5	T
19..	6.1	C 18	T	5.4	C 18	T	2.7	C 5	T
20..	6.5	C 18	T	5.1	C 18	T	2.7	C 5	T
21..	5.8	C 18	T	5.1	C 18	T	2.5	C 5	T
22..	5.8	C 18	T	5.1	C 18	T	2.5	C 5	T
23..	5.6	C 18	T	5.4	C 18	T	2.3	C 5	T
24..	5.8	C 18	T	5.4	C 18	T	2.3	C 5	T
25..	5.8	C 18	T	4.5	C 18	T	2.1	C 5	T
26..	6.1	C 18	T	4.5	C 12	T	1.9	C 5	T
27..	6.5	C 18	T	3.9	C 12	T	1.9	C 5	T
28..	6.5	C 18	T	3.6	C 12	T	1.7	C 5	T
29..	6.9	C 18	T	3.6	C 12	T	1.7	C 5	T
30..	6.9	C 18	T	3.6	C 12	T	1.7	C 5	T
31..	--	--	--	3.6	C 12	T	--	--	--
Total	230.4	--	16	174.1	--	8	76.2	--	2

T Less than 0.50 ton.
C Composite period.

9-4734. SAN PEDRO RIVER NEAR WINKELMAN, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	1.8	C 5	T	1200	77000	S 310000	25	--	50
2..	1.6	C 5	T	1680	90000	J 480000	19	--	20
3..	1.4	--	T	748	78000	J 160000	14	--	20
4..	1.2	--	T	227	30000	J 26000	13	400	14
5..	1.0	--	T	130	40000	14000	12	260	8
6..	1.0	--	T	1280	65000	S 300000	18	400	A 19
7..	1.0	--	T	204	42000	B 24000	25	300	B 20
8..	1.0	--	T	40	36000	A 4000	25	300	B 20
9..	11	7600	J 440	60	37000	J 7200	498	24000	K 76000
10..	2.8	1500	A 11	40	27000	B 3000	1010	47000	J 260000
11..	1.0	110	L	402	25000	J 30000	1960	70000	S 410000
12..	.5	79	L	981	38000	J 150000	571	33000	J 57000
13..	.5	16	L	292	44000	J 47000	758	52000	J 120000
14..	17	9800	J 1000	302	53000	J 71000	553	57000	K 100000
15..	73	24000	J 8300	4050	94000	J 1100000	2580	85000	B 610000
16..	7.0	12000	A 230	1270	84000	A 300000	266	40000	B 30000
17..	2.0	3000	A 16	515	78000	A 110000	36	12000	A 1200
18..	.7	2500	A 5	803	60000	J 150000	20	3300	A 180
19..	18	--	1000	180	17000	B 8300	42	7300	J 1200
20..	47	--	4700	70	3500	B 660	56	7000	K 1200
21..	55	24000	S 6300	52	8500	J 1400	75	6300	B 1300
22..	25	52000	A 3600	44	6000	B 710	64	5100	K 1100
23..	246	59000	J 77000	31	2000	B 170	88	4200	J 1100
24..	879	48000	J 170000	23	1000	62	1120	25000	J 120000
25..	844	40000	J 150000	19	1000	B 51	155	1100	B 460
26..	102	6000	1700	967	--	260000	106	1500	K 480
27..	32	1100	95	86	--	12000	69	800	B 150
28..	14	920	35	44	--	1000	44	520	62
29..	11	900	A 27	66	--	800	37	510	51
30..	546	36000	S 120000	66	--	600	32	370	32
31..	700	86000	S 180000	40	--	200	--	--	--
Total	3644.5	--	724460	15912	--	3572153	10291	--	1791686

Total discharge for year (cfs-days)..... 32,272.1
Total load for year (tons).....6,088,853

S Computed by subdividing day.
T Less than 0.50 ton.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
C Composite period.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.
L Less than 0.50 ton, computed from partly estimated-concentration graph.

GILA RIVER BASIN--Continued

9-4734. SAN PEDRO RIVER NEAR WINKELMAN, ARIZ.--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
July 25, 1964.....	1430		82	500	18600		27	34		46		77	83	86	90	96		VPWC
Sept. 11.....	0700		74	2810	69100		38	48		68		95	100	--	--			VPWC
Sept. 11.....	1400		67	1540	70100		35	44		64		88	95	99	100			VPWC

GILA RIVER BASIN--Continued

9-4739. MINERAL CREEK AT KELVIN, ARIZ.

LOCATION.--At mouth, at Kelvin, Pinal County, Ariz.
DRAINAGE AREA.--97.9 square miles.
RECORDS AVAILABLE.--Chemical analyses: June 1956 to September 1964.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K).

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 31, 1963.....		44	0.80	574	204	44	8.0	0	0	2350	30	3.6	0.8	0.11	3290	4.47		2390	2390	0.4	3400	3.4
Dec. 31.....		28	.00	613	175	45	7.5	20	0	2210	30	2.0	.3	.07	3120	4.24		2250	2230	.4	3130	6.2
Jan. 31, 1964.....		26	.00	624	181	46	7.7	66	0	2220	28	1.8	.6	.08	3170	4.31		2300	2250	.4	3190	7.1
Feb. 29.....		26	.00	648	139	44	6.6	170	0	2040	30	1.1	.4	.05	3020	4.11		2190	2050	.4	3090	7.3
Mar. 31.....		29	.00	622	126	43	6.5	240	0	1930	28	.6	.1	.06	2900	3.94		2070	1870	.4	2990	7.6

9-4740. GILA RIVER AT KELVIN, ARIZ.

LOCATION.--Just upstream from mouth of Mineral Creek, 1,200 feet upstream from gaging station at Kelvin, Pinal County, 17 miles downstream from San Pedro River, and 19.5 miles upstream from Ashurst-Hayden Dam.
DRAINAGE AREA.--18,011 square miles upstream from gaging station, of which 5,125 square miles is downstream from Coolidge Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1964.
Water temperatures: December 1950 to September 1964.
Sediment records: January 1958 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 2,160 ppm Jan. 24-31; minimum, 396 ppm Aug. 11.
Hardness: Maximum, 1080 ppm Jan. 24-31; minimum, 205 ppm Aug. 16-18.
Specific conductance: Maximum daily, 2,780 micromhos Jan. 30; minimum daily, 586 micromhos Aug. 2.
Water temperatures: Maximum, 91°F July 13, 27; minimum, 42°F Jan. 12.
Sediment concentrations: Maximum daily, 110,000 ppm July 24; minimum daily, 120 ppm May 1.
Sediment loads: Maximum daily, 670,000 tons Aug. 15; minimum daily, 20 tons Feb. 3.
EXTREMES, 1950-64.--Dissolved solids: Maximum, 3,780 ppm May 13-25, 1961; minimum, 294 ppm Sept. 24, 1954, Feb. 12, 1963.
Hardness: Maximum, 1,970 ppm May 13-25, 1961; minimum, 152 ppm Sept. 1-30, 1957.
Specific conductance: Maximum daily, 5,120 micromhos May 22, 1961; minimum daily, 407 micromhos Jan. 20, 1952.
Water temperatures: Maximum, 98°F July 25, Aug. 20, 1953; minimum, 38°F Jan. 13, 1962.
Sediment concentrations (1958-64): Maximum daily, 139,000 ppm July 30, 1961; minimum daily, 1 ppm May 8, 1961.
Sediment loads (1958-64): Maximum daily, 670,000 tons Aug. 15, 1964; minimum daily, less than 0.50 ton on many days during May to July 1961.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Tucson, Ariz. No appreciable inflow from Mineral Creek between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, Magnesium	Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-15, 1963...	150	27	0.02	98	19	119	10	178	0	224	154	1.2	1.5	0.10	752	1.02	305	324	178	2.9	1170	8.0
Oct. 16-31.....	125	--	--	125	23	134	--	162	0	--	--	--	--	--	914	1.24	308	408	275	2.9	1380	8.0
Nov. 1-11.....	130	--	--	120	22	131	--	164	0	--	--	--	--	--	880	1.20	309	388	253	2.9	1340	7.8
Nov. 12-17.....	105	--	--	167	31	144	--	142	0	--	--	--	--	--	1150	1.56	326	544	428	2.7	1640	7.8
Nov. 18-22.....	156	--	--	122	22	143	--	154	0	--	--	--	--	--	920	1.25	388	396	270	3.1	1400	8.0
Nov. 23.....	136	--	--	184	39	152	--	108	0	--	--	--	--	--	1260	1.71	463	620	531	2.7	1720	8.0
Nov. 24-30.....	112	--	--	126	22	146	--	164	0	--	--	--	--	--	946	1.29	286	404	269	3.2	1440	8.0
Dec. 1-9.....	138	--	--	132	26	155	--	170	0	--	--	--	--	--	1020	1.39	380	436	297	3.2	1520	7.8
Dec. 10, 11.....	158	--	--	165	30	176	--	134	0	--	--	--	--	--	1210	1.65	516	536	426	3.3	1770	7.6
Dec. 12-31.....	255	--	--	118	22	176	--	194	0	--	--	--	--	--	964	1.31	664	384	225	3.9	1530	7.9
Jan. 1-21, 1964...	125	23	.00	149	29	191	2.5	192	0	379	258	1.1	.1	.14	1170	1.59	395	492	334	3.7	1770	7.9
Jan. 22, 23.....	72	--	--	194	38	208	--	214	0	--	--	--	--	--	1450	1.97	282	640	464	3.6	2030	8.0
Jan. 24-31.....	35.6	--	--	343	54	204	--	74	0	--	--	--	--	--	2160	2.94	208	1080	1019	2.7	2600	7.2
Feb. 1-8.....	34.0	--	--	301	53	205	--	108	0	--	--	--	--	--	1950	2.65	179	968	879	2.9	2450	7.4
Feb. 9-29.....	132	--	--	152	29	212	--	190	0	--	--	--	--	--	1240	1.69	442	500	344	4.1	1900	7.9
Mar. 1-31.....	252	--	--	134	30	234	--	213	0	--	--	--	--	--	1200	1.63	816	456	281	4.8	1930	7.9
Apr. 1-30.....	197	--	--	141	35	272	--	212	0	--	--	--	--	--	1470	2.00	782	494	320	5.3	2180	7.9
May 1-31.....	142	--	--	157	41	309	--	190	0	--	--	--	--	--	1700	2.31	652	560	404	5.7	2440	7.9
June 1-30.....	152	24	.01	156	42	350	13	180	0	406	542	1.2	1.0	.39	1840	2.50	755	562	414	6.4	2660	7.8
July 1-14.....	197	--	--	124	43	383	--	219	0	--	--	--	--	--	1620	2.20	862	485	305	7.6	2690	7.8
July 15.....	313	--	--	157	43	231	--	372	0	--	--	--	--	--	1300	1.77	1099	570	265	4.2	2040	7.5
July 16-22.....	221	--	--	132	39	358	--	247	0	--	--	--	--	--	1560	2.12	931	488	194	4.9	2580	7.5
July 23.....	407	--	--	154	40	152	--	796	0	--	--	--	--	--	956	1.30	1050	550	0	2.8	1630	7.5
July 24, 25.....	1110	--	--	87	17	77	--	406	0	--	--	--	--	--	486	.66	1456	288	0	2.0	882	7.5
July 26.....	313	--	--	79	9.5	40	10	192	0	--	--	--	--	--	422	.57	357	236	78	1.1	645	7.7
July 27-29.....	62.7	--	--	148	35	206	--	286	0	--	--	--	--	--	1260	1.71	213	515	280	4.0	1900	7.5
July 30, 31.....	765	--	--	82	16	86	5.8	272	0	--	--	--	--	--	574	.78	1186	272	49	2.3	908	7.4
Aug. 1-4.....	938	18	.77	72	15	47	4.8	280	0	82	22	.9	.6	.16	421	.57	1066	240	10	1.3	646	7.5
Aug. 5.....	95	--	--	90	22	77	--	264	0	--	--	--	--	--	612	.83	157	315	98	1.9	930	7.5
Aug. 6, 7.....	663	--	--	73	14	50	--	290	0	--	--	--	--	--	430	.58	770	240	2	1.4	654	7.5
Aug. 8-10.....	142	--	--	100	20	102	--	240	0	--	--	--	--	--	706	.96	271	330	133	2.4	1100	7.5
Aug. 11.....	634	--	--	70	15	47	--	360	0	--	--	--	--	--	396	.54	678	238	0	1.3	640	7.5

9-4740. GILA RIVER AT KELVIN, ARIZ.--Continued

Chemical analyses, in parts per million, water year October 1963 to September 1964--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C): Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Aug. 12, 1964.....	1460	--	--	212	29	46	--	234	0	--	--	--	--	--	888	1.21	3500	648	456	0.8	1300	7.2
Aug. 13-15.....	1125	--	--	94	15	63	--	227	0	--	--	--	--	--	550	.75	1670	295	109	1.6	829	7.6
Aug. 16-18.....	973	--	--	58	15	65	--	211	0	--	--	--	--	--	433	.59	1138	205	32	2.0	663	7.7
Aug. 19.....	220	--	--	90	18	75	--	278	0	--	--	--	--	--	568	.77	337	298	70	1.9	865	7.4
Aug. 20.....	196	--	--	122	24	118	--	272	0	--	--	--	--	--	826	1.12	437	405	182	2.6	1300	7.5
Aug. 21-31.....	401	--	--	85	14	88	--	217	0	--	--	--	--	--	567	.77	614	268	90	2.3	911	7.6
Sept. 1-10.....	363	--	--	80	15	101	7.6	228	0	--	--	--	--	--	568	.77	557	260	73	2.7	963	7.7
Sept. 11-16.....	1206	--	--	83	13	50	--	254	0	--	--	--	--	--	456	.62	1485	262	54	1.3	704	7.7
Sept. 17.....	166	--	--	124	22	92	--	228	0	--	--	--	--	--	756	1.03	339	400	213	2.0	1120	7.6
Sept. 18-20.....	95.3	--	--	232	32	129	--	186	0	--	--	--	--	--	1330	1.81	342	710	557	2.1	1770	7.5
Sept. 21-23.....	149	--	--	174	27	116	--	212	0	--	--	--	--	--	1050	1.43	422	545	371	2.2	1470	7.6
Sept. 24.....	878	--	--	71	13	48	--	288	0	--	--	--	--	--	414	.56	981	232	0	1.4	627	7.7
Sept. 25.....	245	--	--	123	20	77	--	184	0	--	--	--	--	--	734	1.00	485	390	239	1.7	1050	7.6
Sept. 26-30.....	117	--	--	169	27	121	--	192	0	--	--	--	--	--	1050	1.43	332	532	374	2.3	1490	7.5
Weighted average	232	--	--	118	25	164	--	225	--	--	--	--	--	--	976	1.33	612	397	215	3.4	1490	7.7
Time-weighted average.....	--	--	--	140	30	204	--	200	--	--	--	--	--	--	1210	--	--	474	310	4.0	1810	7.7
Tons per day....	--	--	--	74	16	103	--	141	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Average
October	80	80	80	78	76	80	79	77	76	74	75	75	75	74	75	73	75	73	71	71	74	74	71	72	72	71	70	70	71	69	70	74
November	70	65	67	68	68	65	60	60	61	65	67	67	67	69	64	61	60	59	59	59	54	54	54	58	58	56	57	57	56	56	--	61
December	57	--	57	56	56	55	55	53	53	53	52	52	52	52	50	50	50	47	50	50	49	49	50	50	59	49	59	50	50	49	50	52
January.....	50	53	50	50	50	49	48	46	45	45	45	42	45	45	45	45	45	46	50	54	54	55	55	53	52	54	56	54	60	60	60	50
February.....	59	55	54	54	55	54	54	55	54	55	50	55	55	53	--	50	54	55	56	57	57	55	52	55	55	55	55	57	54	--	--	55
March.....	57	52	48	55	55	62	--	--	54	51	58	56	58	53	60	60	60	62	62	62	62	52	57	54	57	52	54	66	64	68	66	58
April.....	65	62	60	--	62	60	65	68	72	68	70	70	72	--	75	75	74	73	68	70	70	--	72	65	--	--	70	65	72	73	--	69
May.....	76	76	74	69	67	70	70	72	70	74	77	79	75	74	77	77	77	78	80	80	82	82	80	81	78	83	80	79	79	79	83	77
June	--	82	84	85	86	83	78	81	82	82	85	83	83	84	85	85	85	84	85	82	83	84	86	84	86	85	89	88	89	88	--	84
July.....	85	86	86	85	86	87	88	81	87	89	90	90	91	87	84	90	90	90	90	90	88	90	85	85	80	80	91	85	90	83	79	87
August.....	79	79	89	80	87	81	85	--	--	--	86	83	84	84	87	85	88	85	85	85	88	86	86	88	83	85	85	85	86	86	86	85
September.....	86	85	87	85	85	84	85	86	85	83	81	82	82	74	74	78	--	80	82	81	78	51	55	55	63	68	64	65	67	66	--	76

9-4740. GILA RIVER AT KELVIN, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	145	650	250	119	560	180	113	680	210
2..	149	640	260	129	1500	520	117	570	180
3..	152	560	230	125	580	200	119	670	220
4..	152	560	230	119	400	130	147	750	300
5..	149	490	200	119	430	140	147	780	310
6..	149	520	210	119	460	150	157	710	300
7..	147	480	190	144	650	S 290	154	590	250
8..	149	590	240	149	1600	640	145	330	130
9..	149	540	220	138	730	270	145	210	82
10..	149	690	280	166	530	240	157	350	150
11..	154	610	250	107	340	98	159	710	300
12..	157	440	190	107	320	92	176	850	400
13..	149	320	130	105	360	100	189	500	260
14..	149	300	120	103	410	110	187	530	270
15..	154	320	130	102	510	140	217	580	340
16..	159	920	390	102	380	100	249	1100	740
17..	161	780	340	111	810	S 240	258	1100	770
18..	161	750	330	145	3000	1200	270	1900	1400
19..	164	830	370	147	1600	640	279	1700	1300
20..	159	1300	560	157	1200	510	276	1700	1300
21..	154	2200	910	169	1000	460	295	1200	960
22..	127	750	260	164	730	320	279	1400	1100
23..	107	390	110	136	730	270	267	1300	940
24..	105	300	85	115	450	140	267	1700	1200
25..	100	270	73	113	230	70	270	1000	730
26..	98	370	98	111	470	140	270	1000	730
27..	95	390	100	115	480	150	273	1400	1000
28..	96	310	80	113	700	210	273	920	680
29..	98	320	85	107	430	120	273	970	710
30..	102	1200	330	107	870	250	273	1500	1100
31..	115	1100	350	--	--	--	267	1700	1200
Total	4254	--	7601	3763	--	8120	6668	--	19562
	JANUARY			FEBRUARY			MARCH		
1..	175	880	420	35	380	36	184	870	430
2..	135	410	150	35	230	22	192	830	430
3..	105	440	120	35	210	20	203	2200	1200
4..	105	490	140	33	240	21	174	1200	560
5..	105	410	120	32	370	32	152	680	280
6..	105	390	110	35	770	73	145	580	230
7..	105	640	180	33	730	65	143	470	B 180
8..	103	550	150	34	670	62	149	580	B 230
9..	100	600	160	66	1700	S 330	205	1600	A 890
10..	100	520	140	96	1700	450	208	900	500
11..	103	760	210	105	1300	370	205	700	390
12..	103	580	160	109	4600	1400	203	730	400
13..	102	700	190	115	2200	680	205	460	250
14..	102	860	240	117	1300	410	214	740	430
15..	103	1400	380	121	1200	390	219	2300	1400
16..	105	1000	280	134	930	340	228	1300	800
17..	129	1200	S 480	134	800	290	246	1200	800
18..	181	1600	760	132	680	240	285	1800	1400
19..	179	880	430	136	680	250	320	1300	1100
20..	181	730	360	140	730	280	317	1200	1000
21..	192	1000	520	140	670	250	343	1900	1800
22..	88	530	130	134	580	210	364	1600	1600
23..	55	200	30	145	590	230	368	2100	2100
24..	40	1800	190	143	580	220	371	1800	1800
25..	35	950	90	140	540	200	368	1300	1300
26..	35	450	40	149	750	300	343	2100	1900
27..	35	380	34	161	820	360	311	1400	1200
28..	35	520	49	174	1000	470	279	800	600
29..	35	730	69	181	1000	490	288	1300	1000
30..	35	580	55	--	--	--	291	1500	1200
31..	35	540	51	--	--	--	282	1100	840
Total	3046	--	6438	3044	--	8491	7805	--	28240

S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.

9-4740. GILA RIVER AT KELVIN, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	258	970	680	107	120	35	147	300	120
2..	252	1200	820	105	2300	650	147	350	140
3..	276	1400	1000	105	900	260	140	270	100
4..	252	1400	950	103	300	83	138	310	120
5..	231	1300	810	98	260	69	134	210	76
6..	211	1000	570	100	270	73	132	180	64
7..	203	750	410	125	340	110	125	210	71
8..	190	780	400	132	320	110	123	350	120
9..	180	520	250	129	280	98	123	450	150
10..	180	740	360	129	300	100	123	350	120
11..	190	750	380	129	230	80	127	300	100
12..	190	450	230	127	220	75	138	350	130
13..	190	650	330	129	260	91	140	500	190
14..	189	630	320	137	460	170	145	550	210
15..	189	480	240	152	1800	740	147	350	140
16..	192	340	180	178	1200	580	145	350	140
17..	197	320	170	211	680	390	149	200	80
18..	205	410	230	214	600	350	164	400	180
19..	205	490	270	194	490	260	161	380	170
20..	205	540	300	176	480	230	159	350	150
21..	205	470	260	164	390	170	157	320	140
22..	208	430	240	154	320	130	157	310	130
23..	208	500	280	149	350	140	159	310	130
24..	208	420	240	143	370	140	161	350	150
25..	181	360 B	180	140	280	110	171	650	300
26..	169	340 B	160	140	220	83	184	600	300
27..	149	320	130	144	300	120	184	380	190
28..	143	250	97	160	380	160	192	500	260
29..	143	170	66	147	300	120	187	450	230
30..	117	130	41	147	320	130	189	370	190
31..	--	--	--	147	320	130	--	--	--
Total	5916	--	10594	4415	--	5987	4548	--	4591

Day	JULY			AUGUST			SEPTEMBER		
1..	208	420	240	1210	76000	S 310000	330	5000	4400
2..	211	420	240	1630	90000	S 460000	285	2800	2200
3..	205	380	210	650	59000	110000	285	2300	1800
4..	203	500	270	260	56000	S 44000	262	1600	1100
5..	203	450	250	95	39000	10000	222	1300	780
6..	197	370	200	954	65000	S 250000	219	1100	650
7..	194	450	240	372	63000	66000	253	15000	S 11000
8..	197	400	210	116	35000	11000	231	4000	2500
9..	205	380	210	113	24000	S 11000	848	41000	S 110000
10..	214	500	290	197	12000	6400	699	57000	S 140000
11..	197	350	190	634	52000	S 110000	2290	82000	S 570000
12..	174	230	110	1460	64000	S 340000	591	47000	S 85000
13..	174	250	120	356	30000	S 36000	575	48000	S 83000
14..	178	660 S	370	299	60000	S 56000	701	37000	S 82000
15..	313	33000 S	31000	2720	77000	S 670000	2560	57000	S 420000
16..	197	7500	4000	1790	78000	S 430000	520	35000	S 56000
17..	184	900	450	406	49000	56000	166	16000	7200
18..	179	790	380	724	74000	S 160000	100	5100	1400
19..	264	17000 S	15000	220	49000	30000	86	6000	S 1800
20..	187	3000 S	1600	196	28000	S 14000	100	11000	3000
21..	276	15000 S	12000	288	11000	8600	154	33000	S 15000
22..	260	3300	2300	304	13000	11000	150	17000	6900
23..	407	51000 S	120000	291	9500	7500	144	9500	3700
24..	1220	110000 S	440000	291	7200	5700	878	46000	S 150000
25..	1000	90000 S	310000	288	3100	2400	245	22000	15000
26..	313	34000 S	39000	1000	29000	S 160000	153	12000	S 5500
27..	94	6400	1600	401	10000	S 12000	148	23000	9200
28..	56	4700	710	354	5800	5500	105	8000	2300
29..	38	2500	260	368	15000	15000	91	2300	570
30..	601	36000 S	93000	441	29000	34000	88	1900	450
31..	929	34000 S	96000	390	12000	13000	--	--	--
Total	9278	--	1170450	18818	--	3455100	13479	--	1792450

Total discharge for year (cfs-days)..... 85,034
Total load for year (tons)..... 6,517,624

S Computed by subdividing day.
B Computed from estimated-concentration graph.

9-4740. GILA RIVER AT KELVIN ARIZ.--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Nov. 2, 1963	1700		65	127	1570		42	59		86		98	100	--	--			SPWC
Dec. 18	1115		47	273	1980		12	15		23		45	75	94	100			VPWC
Jan. 24, 1964	1700		53	40	2610		45	62		96		100	--	--	--			PWC
Feb. 12	1700		55	109	7230		32	44		88		94	96	99	100			VPWC
July 28	1230		93	58	4550		80	91		100		--	--	--	--			PWC
Aug. 1	0015		79	2440	75500		34	41		62		93	97	99	100			VPWC
Aug. 1	0510		78	540	48400		37	46		72		97	99	100	--			VPWC
Aug. 6	1415		81	2280	90600		38	47		68		91	97	100	--			VPWC
Aug. 15	0700		81	3250	93900		33	42		60		90	97	100	--			VPWC
Aug. 15	1900		87	3660	80300		42	51		68		84	94	99	100			VPWC
Sept. 8	1700		86	237	1410		42	55		66		97	100	--	--			SPWC
Sept. 15	1800		74	3210	62000		29	37		56		87	97	100	--			VPWC
Sept. 16	1700		78	320	29900		49	64		85		96	99	100	--			VPWC
Sept. 18	1700		80	85	4240		64	81		92		98	99	100	--			SPWC
Sept. 29	1700		67	82	1990		57	69		80		94	98	100	--			SPWC

9-4985. SALT RIVER NEAR ROOSEVELT, ARIZ.

LOCATION.--Temperature recorder at gaging station 100 feet downstream from bridge on State Highway 288 (revised), 0.2 mile downstream from Pinal Creek, 1 mile upstream from diversion dam for power canal, 14 miles east of village of Roosevelt, Gila County, and 17 miles upstream from Roosevelt Dam.
DRAINAGE AREA.--4,306 square miles.
RECORDS AVAILABLE.--Water temperatures: April 1958 to September 1964.
EXTREMES, 1963-64.--Water temperatures: Maximum, 90°F July 18; minimum, 36°F Jan. 13-16.
EXTREMES, 1958-64.--Water temperatures: Maximum, 92°F July 18, 20, 23, 26, 1963; minimum, 34°F Jan. 13, 14, 1963.

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October																																
Maximum	73	73	73	72	71	72	72	72	73	74	74	74	74	75	75	75	75	74	73	72	71	71	71	70	69	69	68	68	69	68	67	72
Minimum	67	67	66	66	67	67	67	67	68	69	70	70	70	70	70	71	71	71	71	67	67	67	66	66	66	64	63	63	64	64	63	67
November																																
Maximum	66	66	65	64	63	63	63	59	59	60	61	61	61	61	61	61	56	56	54	54	54	54	54	53	52	52	52	50	50	50	--	58
Minimum	62	62	60	59	59	58	58	55	54	55	57	57	57	58	56	58	52	52	51	51	52	51	50	50	50	49	49	48	48	48	--	54
December																																
Maximum	50	50	50	49	49	49	48	47	47	47	47	47	45	43	43	43	44	44	44	45	45	44	44	44	44	44	45	45	45	44	44	46
Minimum	48	48	48	47	47	47	47	45	45	47	44	45	43	42	41	41	42	42	42	42	43	42	42	42	42	42	43	43	43	42	42	44
January																																
Maximum	44	45	45	45	45	44	43	43	41	40	40	39	38	38	38	38	39	41	45	46	46	47	47	46	44	44	45	47	48	48	48	43
Minimum	42	43	44	43	43	41	41	39	38	38	38	37	36	36	36	36	37	38	41	44	44	46	45	42	41	42	42	45	45	45	46	41
February																																
Maximum	48	48	48	46	46	45	45	45	46	47	47	48	48	48	47	47	47	48	49	49	49	49	49	49	49	50	49	50	50	--	--	48
Minimum	46	46	45	43	43	43	42	42	42	43	45	45	45	45	43	44	44	44	45	46	46	45	46	45	46	46	45	46	47	--	--	45
March																																
Maximum	51	51	48	50	52	53	54	52	51	51	52	53	54	55	56	56	55	58	58	57	58	58	54	53	56	57	59	61	62	65	65	55
Minimum	47	47	46	45	47	49	50	49	46	47	46	49	51	50	50	52	52	52	53	51	52	54	52	51	49	50	52	54	56	56	59	50
April																																
Maximum	61	59	56	57	55	55	59	61	64	64	64	63	61	61	61	63	63	64	63	62	63	64	64	60	60	61	64	62	66	65	--	62
Minimum	58	56	54	52	52	50	50	52	54	56	57	59	57	57	57	58	59	61	59	58	57	57	57	57	54	53	54	57	58	60	--	56
May																																
Maximum	68	66	66	64	64	64	62	64	66	68	70	72	71	72	73	73	74	74	76	77	78	77	76	77	74	75	74	72	73	74	76	71
Minimum	60	60	59	59	57	56	58	56	56	59	60	63	64	64	64	64	65	65	66	69	71	70	69	68	69	68	68	68	66	65	67	64
June																																
Maximum	79	79	79	79	80	80	79	76	77	79	79	80	80	81	82	79	79	80	81	81	81	83	86	84	85	84	83	85	86	85	--	81
Minimum	70	72	73	72	73	74	73	69	70	71	72	73	73	74	75	75	74	72	73	73	73	74	76	79	76	79	80	78	78	79	--	74
July																																
Maximum	85	86	86	84	86	88	89	85	88	86	88	88	87	86	87	88	88	90	89	89	87	88	86	85	86	84	82	86	85	85	80	86
Minimum	80	79	79	81	79	80	80	81	79	82	80	80	82	84	80	82	81	83	82	83	82	82	82	76	79	81	78	79	80	80	78	80
August																																
Maximum	80	79	82	82	82	84	84	85	84	85	85	85	82	82	82	84	85	85	84	83	83	84	84	84	83	83	83	82	81	82	81	83
Minimum	78	78	77	79	78	79	80	80	81	82	83	81	80	80	78	77	79	78	79	78	77	77	75	76	78	78	76	76	76	75	75	78
September																																
Maximum	80	81	80	80	82	80	82	82	82	81	82	83	80	80	77	74	74	73	75	76	74	72	68	71	71	69	71	72	73	75	--	77
Minimum	75	76	75	76	77	78	76	77	77	77	78	76	76	74	72	71	71	71	69	69	69	67	66	66	59	67	67	67	67	68	--	72

9-5020. SALT RIVER BELOW STEWART MOUNTAIN DAM, ARIZ.

LOCATION.--Just downstream from dam, 3.5 miles upstream from gaging station below Stewart Mountain Dam, which is 6 miles upstream from Verde River, Maricopa County.
DRAINAGE AREA.--6,232 square miles, upstream from gaging station, of which 21 miles is downstream from Stewart Mountain Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1964.
Water temperatures: December 1950 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 742 ppm Sept. 1-30; minimum, 615 ppm Dec. 1-31.
Hardness: Maximum, 188 ppm Aug. 1-31, Sept. 1-30; minimum, 168 ppm Mar. 1-31.
Specific conductance: Maximum daily, 1,380 micromhos July 31, Aug. 7, 20, 23, 24, 27, Sept. 9; minimum daily, 1,100 micromhos Dec. 27-31, Feb. 19.
Water temperatures: Maximum, 69°F Sept. 5, 6, 8, 9, 17; minimum, 51°F on several days during February, Mar. 2-6.
EXTREMES, 1950-64.--Dissolved solids: Maximum, 1,300 ppm Aug. 21-28, 1951; minimum, 361 ppm Mar. 21-31, 1953.
Hardness: Maximum, 270 ppm Nov. 1-30, 1956; minimum, 138 ppm Apr. 1-10, 1953.
Specific conductance: Maximum daily, 2,490 micromhos Aug. 20, 1951; minimum daily, 620 micromhos Mar. 28, 1953.
Water temperatures: Maximum, 84°F Aug. 24, 26, 27, 1951; minimum, 49°F Feb. 14, 1951.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Tucson, Ariz. No samples collected during October and November. No inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C): Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Dec. 1-31, 1963...	104	--	--	49	12	155	--	156	0	--	--	--	--	--	615	0.84	173	170	42	5.1	1110	8.0
Jan. 1-31, 1964...	26.4	--	--	48	14	160	--	159	0	--	--	--	--	--	619	.84	44.1	176	46	5.2	1120	7.8
Feb. 1-29.....	199	18	0.00	52	9.8	161	5.8	159	0	53	242	0.4	2.7	0.12	618	.84	332	170	40	5.4	1110	8.0
Mar. 1-31.....	1206	--	--	49	11	166	--	160	0	--	--	--	--	--	636	.86	2070	168	37	5.6	1130	8.0
Apr. 1-30.....	928	--	--	51	12	178	--	163	0	--	--	--	--	--	665	.90	1670	178	44	5.8	1210	8.0
May 1-31.....	999	18	.00	50	13	181	5.4	163	0	47	282	.3	.3	.08	680	.92	1830	178	44	5.9	1240	7.9
June 1-30.....	1298	--	--	50	13	185	--	162	0	--	--	--	--	--	716	.97	2510	180	47	6.0	1290	7.8
July 1-31.....	1343	23	.00	50	14	201	5.6	168	0	49	304	.3	.6	.12	730	.99	2650	184	46	6.5	1340	7.9
Aug. 1-31.....	590	--	--	51	15	205	--	170	0	--	--	--	--	--	737	1.00	1170	188	49	6.5	1370	7.8
Sept. 1-30.....	517	19	.00	52	14	205	5.8	172	0	46	315	.3	.4	.08	742	1.01	1040	188	47	6.5	1370	7.9
Weighted average	A 614	--	--	50	13	185	--	164	--	--	--	--	--	--	693	0.94	1350	179	44	6.0	1260	7.9
Time-weighted average.....	--	--	--	50	13	180	--	163	--	--	--	--	--	--	676	--	--	178	44	5.8	1230	7.9
Tons per day....	--	--	--	98	25	361	--	320	--	--	--	--	--	--	--	--	--	--	--	--	--	--

A Mean discharge based on 366 days; mean discharge for 305 days of chemical analyses, 723 cfs.

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Average
October																																
November																																
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	57	57	56	57	57	--
January.....	56	56	57	--	--	--	--	--	54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	52	52	52	52	51	51	51	51	51	51	51	51	--	--	--
March.....	52	51	51	51	51	51	53	52	52	52	52	52	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	54	54	53	53	52
April.....	53	53	53	54	54	54	54	54	55	54	55	55	55	55	55	55	56	56	55	56	56	55	55	55	55	55	55	55	55	54	--	55
May.....	54	56	56	57	56	56	56	56	57	57	57	57	57	57	58	57	58	58	58	58	58	58	58	58	58	58	58	58	58	60	60	57
June	--	--	60	60	60	60	60	60	60	60	60	60	61	60	61	61	61	61	61	61	61	61	61	61	61	61	63	64	64	64	--	61
July.....	64	64	64	63	63	63	63	63	63	63	66	65	65	65	65	65	64	64	64	64	64	65	65	65	66	66	66	66	66	67	67	65
August.....	66	65	66	66	66	66	66	67	67	67	67	67	67	67	67	67	67	67	67	67	67	68	68	68	68	68	68	68	--	--	--	67
September.....	--	67	67	67	69	69	68	69	69	68	68	68	68	68	68	68	69	68	--	--	--	67	68	68	68	68	68	68	68	68	--	68

9-5045. OAK CREEK NEAR CORNVILLE, ARIZ.

LOCATION.--Temperature recorder at gaging station at county highway bridge, 0.2 mile upstream from Page Springs, 4 miles northeast of Cornville, Yavapai County, and 15 miles upstream from mouth.
DRAINAGE AREA.--357 square miles.
RECORDS AVAILABLE.--Water temperatures: June 1954 to September 1964.
EXTREMES, 1963-64.--Water temperatures: Maximum, 84°F July 28; minimum, 36°F on several days during January.
EXTREMES, 1954-64.--Water temperatures: Maximum, 90°F July 28, 1954, July 11, 1958; minimum, 36°F Jan. 11, 12, 14-16, 1962, and on several days during January 1964.

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October																																
Maximum	75	74	72	72	73	73	73	71	70	71	70	68	68	68	68	68	68	67	65	64	66	66	67	67	66	66	66	65	65	64	64	68
Minimum	68	66	66	67	66	67	66	66	65	65	64	62	62	62	62	64	63	63	63	62	61	62	63	63	62	62	62	62	62	62	60	64
November																																
Maximum	62	60	59	60	60	60	59	58	58	59	59	59	59	60	60	59	57	55	55	54	54	51	50	50	50	50	50	49	50	50	--	56
Minimum	58	58	58	58	57	57	56	54	55	56	57	57	57	57	57	57	53	52	53	52	52	50	48	49	48	48	48	48	48	48	--	54
December																																
Maximum	49	50	49	49	48	49	48	48	48	49	48	47	45	44	43	44	44	43	43	42	43	42	42	42	43	43	43	44	44	43	43	45
Minimum	48	48	48	47	47	47	47	46	46	48	46	45	44	42	42	43	43	42	42	41	42	40	40	40	41	41	42	42	42	41	41	44
January																																
Maximum	44	44	43	42	41	40	41	41	39	38	37	37	37	37	37	37	38	38	41	44	45	45	44	42	41	42	44	44	44	45	45	41
Minimum	42	42	42	39	40	38	39	39	37	37	36	36	36	36	36	36	36	37	38	41	43	44	42	39	38	39	41	42	42	42	42	39
February																																
Maximum	45	44	42	42	42	42	41	42	43	44	44	45	45	44	43	42	44	46	47	47	46	46	46	46	48	48	47	48	47	--	--	45
Minimum	42	42	39	38	39	39	38	38	39	41	43	42	40	40	39	40	39	41	43	43	42	42	44	41	41	44	42	43	43	--	--	41
March																																
Maximum	48	48	43	46	49	50	50	48	48	47	49	50	52	52	52	54	56	57	57	55	54	52	48	51	53	54	56	58	59	59	56	52
Minimum	43	42	40	40	43	44	45	44	43	44	43	46	48	46	47	49	50	52	51	48	49	48	45	44	44	47	49	51	53	52	48	46
April																																
Maximum	52	50	47	50	50	53	57	56	54	54	56	58	60	62	65	66	67	66	64	66	67	66	66	64	60	65	68	67	70	70	--	61
Minimum	48	47	46	46	48	48	48	48	48	49	48	52	52	55	58	58	60	60	58	55	57	60	60	59	56	56	59	62	61	65	--	54
May																																
Maximum	68	67	69	66	66	66	63	67	67	71	74	76	73	76	77	77	77	78	79	78	77	76	75	75	73	76	74	73	74	75	77	73
Minimum	64	60	60	61	58	60	60	57	61	61	65	67	68	67	68	69	68	68	70	71	69	68	67	68	69	68	68	65	64	66	67	65
June																																
Maximum	78	77	76	76	76	76	74	72	73	75	75	76	78	78	79	78	74	76	76	77	76	78	78	79	79	75	77	78	79	81	--	77
Minimum	68	69	68	67	68	68	69	66	66	65	65	66	67	68	70	69	69	67	68	68	68	68	69	70	71	70	71	72	72	71	--	68
July																																
Maximum	80	81	80	79	80	82	82	80	80	79	79	79	80	78	79	82	82	82	82	83	80	82	80	80	82	78	81	84	81	82	81	81
Minimum	71	72	72	72	72	72	72	74	75	74	74	74	74	74	74	73	76	76	76	76	77	75	75	76	75	72	73	76	78	76	69	74
August																																
Maximum	72	73	75	76	75	78	80	80	80	80	77	75	75	78	74	78	80	79	78	78	80	80	81	81	79	76	77	79	81	80	79	78
Minimum	69	68	61	64	66	69	72	72	72	72	71	72	70	50	62	69	70	72	72	72	71	71	71	72	72	69	68	72	73	72	72	69
September																																
Maximum	78	78	79	79	81	79	81	80	82	82	83	82	80	75	76	76	76	74	74	72	71	69	67	74	62	64	67	69	69	68	--	75
Minimum	71	69	69	70	72	73	72	73	75	74	74	75	74	72	70	68	69	69	67	67	66	63	65	48	56	58	61	64	64	63	--	68

9-5053.5. DRY BEAVER CREEK NEAR RIMROCK, ARIZ.

LOCATION.--At gaging station on upstream side of abandoned highway bridge, 300 feet upstream from present county highway No. 179, and 5.5 miles north of Rimrock, Yavapai County.
DRAINAGE AREA.--139 square miles.
RECORDS AVAILABLE.--Sediment records: October 1963 to September 1964.
EXTREMES, 1963-64.--Sediment concentrations: Maximum daily, 4,100 ppm Sept. 24; minimum daily, 0 ton on many days.
Sediment loads: Maximum daily, 5,800 tons Mar. 30; minimum daily, no flow on many days.
REMARKS.--Records of specific conductance and water temperatures available in district office at Tucson, Ariz.

Suspended sediment, water year October 1963 to September 1964
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0			0					
2..	0			0					
3..	0			0					
4..	0			0					
5..	0			0					
6..	0			0					
7..	0			0					
8..	0			0					
9..	0			0					
10..	0			0					
11..	0			0					
12..	0			0					
13..	0			0					
14..	0			0					
15..	0			0					
16..	0			0					
17..	0			0					
18..	0			0					
19..	.3			0					
20..	.04			0					
21..	0			3.0					
22..	0			.3					
23..	0			0					
24..	0			0					
25..	0			0					
26..	0			0					
27..	0			0					
28..	0			0					
29..	0			0					
30..	0			0					
31..	0			--					
Total	0.34		T	3.3		5	0		0

T Less than 0.50 ton.

9-5053.5. DRY BEAVER CREEK NEAR RIMROCK, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..							0	--	0
2..							0	--	0
3..							0	--	0
4..							0	--	0
5..							0	--	0
6..							0	--	0
7..							0	--	0
8..							0	--	0
9..							0	--	0
10..							0	--	0
11..							0	--	0
12..							0	--	0
13..							0	--	0
14..							0	--	0
15..							0	--	0
16..							0	--	0
17..							0	--	0
18..							0	--	0
19..							0	--	0
20..							0	--	0
21..							0	--	0
22..							0	--	0
23..							0	--	0
24..							0	--	0
25..							0	--	0
26..							0	--	0
27..							0	--	0
28..							0	--	0
29..							53	--	1400
30..							383	2300	S 5800
31..							496	1100	S 2300
Total	0		0	0		0	932	--	9500

	APRIL			MAY		JUNE		
1..	348	310	S 430	0.07	T	0		
2..	187	46	S 27	.04	T	0		
3..	104	26	7	.02	T	0		
4..	60	14	2	.01	T	0		
5..	91	20	5	0	0	0		
6..	96	25	6	0	0	0		
7..	170	160	S 220	0	0	0		
8..	385	370	S 780	0	0	0		
9..	402	230	S 380	0	0	0		
10..	418	170	S 300	0	0	0		
11..	495	180	S 320	0	0	0		
12..	426	150	K 210	0	0	0		
13..	298	82	S 92	0	0	0		
14..	222	39	S 31	0	0	0		
15..	192	28	16	0	0	0		
16..	163	23	S 11	0	0	0		
17..	115	17	5	0	0	0		
18..	67	12	2	0	0	0		
19..	64	10	B 2	0	0	0		
20..	34	--	1	0	0	0		
21..	13	--	T	0	0	0		
22..	80	--	T	0	0	0		
23..	4.3	--	T	0	0	0		
24..	2.9	--	T	0	0	0		
25..	2.0	--	T	0	0	0		
26..	1.2	--	T	0	0	0		
27..	.6	--	T	0	0	0		
28..	.4	--	T	0	0	.2		
29..	.4	--	T	0	0	0		
30..	.2	--	T	0	0	0		
31..	--	--	--	0	0	--		
Total	4370.0	--	2848	0.14	T	0.2		10

S Computed by sbudividing day.
T Less than 0.50 ton.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.

9-5053.5. DRY BEAVER CREEK NEAR RIMROCK, ARIZ.--Continued

Suspended sediment, water year October 1963 to September 1964--Continued

Day	JULY				AUGUST				SEPTEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	0	--		0	1.4	670	K	15	0	--		0
2..	0	--		0	7.2	2000	S	90	0	--		0
3..	0	--		0	.7	910	S	2	0	--		0
4..	0	--		0	.02	--		T	0	--		0
5..	0	--		0	2.1	230	S	2	0	--		0
6..	0	--		0	.2	--		T	0	--		0
7..	0	--		0	0	--		0	0	--		0
8..	0	--		0	0	--		0	0	--		0
9..	0	--		0	0	--		0	0	--		0
10..	0	--		0	0	--		0	0	--		0
11..	0	--		0	0	--		0	0	--		0
12..	0	--		0	0	--		0	0	--		0
13..	.7	2000	S	43	8.0	1100	S	100	0	--		0
14..	0	--		0	1.6	1600	S	18	0	--		0
15..	0	--		0	.7	630	S	3	0	--		0
16..	0	--		0	.02	--		T	0	--		0
17..	0	--		0	0	--		0	0	--		0
18..	0	--		0	0	--		0	0	--		0
19..	0	--		0	15	1100	S	210	0	--		0
20..	0	--		0	.9	520	K	2	0	--		0
21..	0	--		0	.02	--		T	0	--		0
22..	0	--		0	0	--		0	0	--		0
23..	1.3	1400	S	26	0	--		0	0	--		0
24..	1.3	2500	S	18	0	--		0	28	4100	S	900
25..	1.0	770	S	4	0	--		0	26	2900	S	1000
26..	1.1	1300	S	7	0	--		0	.33	--		T
27..	0	--		0	0	--		0	0	--		0
28..	0	--		0	0	--		0	0	--		0
29..	0	--		0	0	--		0	0	--		0
30..	0	--		0	0	--		0	0	--		0
31..	0	--		0	0	--		0	--	--		--
Total	5.4	--		98	37.66	--		442	54.33	--		1900

Total discharge for year (cfs-days)..... 5,403.6
Total load for year (tons)..... 14,803

S Computed by subdividing day.
T Less than 0.50 ton.
K Computed from estimated-concentration graph and subdividing day.

9-5053.5. DRY BEAVER CREEK NEAR RIMROCK, ARIZ.--Continued

Particle-size analyses of suspended sediment, water year October 1963 to September 1964

(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
						0.001	0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	
ETR SAMPLES																	
(Complete)																	
Mar. 31, 1964.....	2100		48	1160	3330		6	6		9		38	79	96	100	--	VPWC
Apr. 8.....	1905		49	824	1700		5	6		8		39	83	95	98	100	VPWC
Apr. 8.....	2015		48	1050	2110		6	7		10		36	78	95	99	100	VPWC
Apr. 8.....	2100		48	1030	1410		7	9		12		40	74	91	98	100	VPWC
Aug. 2 A.....	1530		--	128	5440		--	--		--		99	100	--	--	--	S
Sept. 24.....	1626		--	154	8580		27	38		55		89	94	98	100	--	VPWC
(0.062 mm break)																	
Sept. 24, 1964.....	1605		--	208	12800		--	--		--		89	--	--	--	--	S
Sept. 24.....	1730		--	69.2	9740		--	--		--		94	--	--	--	--	S
Sept. 24.....	1812		--	67.3	12000		--	--		--		81	--	--	--	--	S
Sept. 24.....	1908		--	126	9660		--	--		--		98	--	--	--	--	S
Sept. 24.....	2010		--	45	5210		--	--		--		99	--	--	--	--	S
Sept. 25.....	1055		--	126	9150		--	--		--		96	--	--	--	--	S
Sept. 25.....	1311		--	20.6	3310		--	--		--		99	--	--	--	--	S
PUMP, middle intake																	
(complete)																	
Apr. 8, 1964.....	1840		50	705	1190		6	7		8		40	83	96	100	--	VPWC
Apr. 8.....	1945		--	960	1510		8	9		12		43	82	97	100	--	VPWC
Apr. 8.....	2095		48	1050	1790		8	9		12		43	80	97	100	--	VPWC
July 23 B.....	1850		--	16.6	8980		53	70		96		100	--	--	--	--	PWC
Sept. 24.....	1430		--	226	51400		19	27		43		79	96	100	--	--	VPWC
Sept. 24.....	1620		--	158	9870		28	38		59		91	97	100	--	--	VPWC
(0.062 mm break)																	
Aug. 2, 1964.....	1600		--	59.7	6170		--	--		--		100	--	--	--	--	S
Sept. 24.....	1616		--	164	11900		--	--		--		89	95	--	--	--	S
Sept. 24.....	1736		--	67.3	9870		--	--		--		95	--	--	--	--	S
Sept. 24.....	1839		--	194	16600		--	--		--		87	--	--	--	--	S
Sept. 24.....	1920		--	95	9050		--	--		--		98	--	--	--	--	S
Sept. 24.....	2016		--	43.5	5100		--	--		--		99	--	--	--	--	S
Sept. 25.....	1102		--	92.8	8660		--	--		--		98	--	--	--	--	S
Sept. 25.....	1317		--	19.6	3220		--	--		--		100	--	--	--	--	S

A Distribution of material >0.062.
B Lower intake.

9-5100. VERDE RIVER BELOW BARTLETT DAM, ARIZ.

LOCATION.--At gaging station 0.2 mile downstream from Bartlett Dam, Maricopa County, 5.5 miles upstream from Camp Creek, and 18 miles east of Cave Creek.
DRAINAGE AREA.--6,185 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1964.
Water temperatures: December 1950 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 491 ppm Dec. 26-31; minimum, 239 ppm June 16-30.
Hardness: Maximum, 328 ppm Dec. 26-31; minimum, 166 ppm June 16-30.
Specific conductance: Maximum daily, 779 micromhos Dec. 26; minimum daily, 381 micromhos June 20.
Water temperatures: Maximum, 80°F on several days during August, Sept. 13-16; minimum, 48°F on several days during January and February.
EXTREMES, 1950-64.--Dissolved solids: Maximum, 550 ppm Dec. 18-21, 1956; minimum, 158 ppm Jan. 11-20, 1952.
Hardness: Maximum, 413 ppm Dec. 18-21, 1956; minimum, 108 ppm Jan. 11-20, 1952.
Specific conductance: Maximum daily, 958 micromhos Nov. 10, 1956; minimum daily, 234 micromhos Jan. 13, 15, 1952.
Water temperatures: Maximum, 90°F July 18, Aug. 14, 1951; minimum, 41°F Jan. 30, 1952.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Tucson, Ariz.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, Magnesium	Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-31, 1963...	490	24	0.00	56	21	29	4.4	248	0	62	20	0.3	1.3	0.20	347	0.47	459	224	21	0.8	542	8.1
Nov. 1-30.....	313	--	--	52	27	34	--	262	4	--	--	--	--	--	361	.49	305	240	18	1.0	572	8.3
Dec. 1-25.....	634	--	--	54	27	34	--	270	4	--	--	--	--	--	379	.52	649	246	18	.9	587	8.3
Dec. 26-31.....	287	20	.00	71	37	47	4.5	376	0	73	28	.4	7.0	.23	491	.67	380	328	20	1.1	772	7.7
Jan. 1-9, 1964....	51.0	--	--	67	36	49	--	360	0	--	--	--	--	--	454	.62	62.5	314	19	1.2	754	8.2
Jan. 10-31.....	270	--	--	63	30	36	--	318	6	--	--	--	--	--	387	.53	282	282	11	.9	646	8.4
Feb. 1-29.....	170	--	--	64	26	38	--	311	2	--	--	--	--	--	371	.50	170	268	10	1.0	642	8.3
Mar. 1-31.....	116	--	--	56	31	38	--	311	5	--	--	--	--	--	377	.51	118	268	5	1.0	652	8.4
Apr. 1-30.....	93.4	--	--	52	32	38	--	297	4	--	--	--	--	--	370	.50	93.3	263	13	1.0	621	8.3
May 1-13.....	88.5	--	--	49	29	34	--	275	4	--	--	--	--	--	350	.48	83.6	243	11	1.0	575	8.3
May 14-31.....	201	21	.01	42	26	27	2.6	243	0	44	19	.3	.9	.10	290	.39	157	210	11	.8	494	8.2
June 1-15.....	312	--	--	39	21	23	--	214	0	--	--	--	--	--	267	.36	225	183	7	.7	438	8.0
June 16-30.....	753	20	.02	36	18	19	2.6	196	0	32	11	.3	1.0	.18	239	.33	486	166	5	.6	395	7.9
July 1-31.....	510	--	--	42	24	30	--	238	0	--	--	--	--	--	309	.42	425	204	9	.9	513	8.0
Aug. 1-7.....	83.6	--	--	42	26	35	--	243	0	--	--	--	--	--	339	.46	76.5	213	14	1.0	558	8.0
Aug. 8-31.....	717	--	--	40	18	23	--	197	0	--	--	--	--	--	272	.37	527	176	14	.8	443	7.9
Sept. 1-16.....	910	--	--	44	20	24	--	208	0	--	--	--	--	--	284	.39	698	194	23	.8	479	8.0
Sept. 17-30.....	617	--	--	45	25	30	--	238	0	--	--	--	--	--	339	.46	565	214	19	.9	537	8.0
Weighted average	376	--	--	48	24	29	--	244	--	--	--	--	--	--	324	0.44	328	217	15	0.8	526	8.0
Time-weighted average.....	--	--	--	51	26	32	--	265	--	--	--	--	--	--	342	--	--	234	13	0.9	563	8.1
Tons per day....	--	--	--	49	24	30	--	247	--	--	--	--	--	--	--	--	--	--	--	--	--	--

GILA RIVER BASIN--Continued

9-5100. VERDE RIVER BELOW BARTLETT DAM, ARIZ.--Continued

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	79	79	79	79	79	79	79	79	79	79	79	78	78	79	79	79	79	79	79	78	77	77	77	76	77	77	77	77	77	77	77	78
November	70	70	70	70	70	70	69	69	69	69	69	69	69	67	67	67	67	--	67	67	65	64	64	62	61	60	60	--	61	61	--	67
December	60	--	60	61	60	61	61	60	60	60	60	--	60	60	59	59	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	59
January.....	50	50	--	50	50	50	50	50	50	50	49	49	48	48	48	48	48	48	48	48	48	48	50	50	50	51	51	52	52	52	52	50
February.....	52	50	50	50	50	50	50	50	50	50	51	51	48	48	48	48	48	48	48	48	49	49	49	49	49	49	49	49	49	--	--	49
March.....	49	49	49	49	49	49	49	49	49	49	50	50	50	50	50	50	50	50	51	51	51	51	51	50	51	51	52	52	52	53	53	50
April.....	52	52	53	53	54	54	54	54	54	54	54	54	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	--	56
May.....	58	58	--	--	58	58	58	58	--	60	63	63	63	63	63	63	63	63	59	59	59	59	59	59	59	60	60	60	60	60	60	60
June	60	60	59	59	60	60	58	58	58	58	58	58	60	60	60	60	60	59	59	59	59	59	59	59	59	59	59	60	60	60	--	59
July.....	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	75	75	75	58	58	58	58	58	58	58	78	78	71
August.....	78	78	78	78	78	78	78	78	78	78	80	80	80	80	80	80	79	79	79	79	79	79	79	79	79	79	79	79	79	79	79	79
September	79	79	79	79	79	79	78	78	78	78	78	78	80	80	80	80	78	78	78	78	--	78	78	78	78	78	77	77	77	77	--	78

9-5113. VERDE RIVER NEAR SCOTTSDALE, ARIZ.

LOCATION.--At gaging station on downstream side of bridge on State Highway 87, in Fort McDowell Indian Reservation, Maricopa County, 2.5 miles upstream from mouth, 3.8 miles downstream from Fort McDowell, and 16 miles northeast of Scottsdale.
DRAINAGE AREA.--6,600 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1961 to September 1964 (discontinued).
REMARKS.--Sediment loads computed on the basis of less than 6 samples per month. Flow regulated by Bartlett and Horseshoe Dams.

Monthly and annual summary of suspended-sediment discharge, water year October 1963 to September 1964

Month	Discharge (cfs)	Suspended sediment (tons)
October 1963.....	13296	1500
November.....	8793	750
December.....	17543	3300
January 1964.....	5832	720
February.....	4547	490
March.....	3062	290
April.....	2394	170
May.....	3628	830
June.....	13538	3200
July.....	15014	17000
August.....	17314	130000
September.....	21669	16000
Total for year.....	126630	174250

Particle-size analyses of suspended sediment, water year October 1963 to September 1964
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 23, 1964.....	1410		--	645	137		37	50		62		90	95	97	100			SPWC

9-5195. GILA RIVER BELOW GILLESPIE DAM, ARIZ.

LOCATION.--Approximately 1 mile downstream from gaging station on Gila Bend Canal, which is 200 feet downstream from Gillespie Dam, Maricopa County, and 8 miles downstream from Hassayampa River. Gila Bend Canal diverts from left bank and Enterprise Canal diverts from right bank at Gillespie Dam.
DRAINAGE AREA.--49,650 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1964.
Water temperatures: December 1950 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 7,430 ppm Dec. 1-31; minimum, 298 ppm Aug. 2, 3.
Hardness: Maximum, 1,940 ppm Dec. 1-31; minimum, 109 ppm Aug. 2, 3.
Specific conductance: Maximum daily, 10,400 micromhos on several days during December; minimum daily, 454 micromhos Aug. 3.
Water temperatures: Maximum, 86°F on several days during July to September; minimum, 42°F on several days during January.
EXTREMES, 1950-64.--Dissolved solids: Maximum, 7,720 ppm Dec. 1-31, 1962; minimum, 227 ppm Aug. 2, 1955.
Hardness: Maximum, 2,000 ppm Dec. 21-31, 1961; minimum, 87 ppm Oct. 1-5, 1962.
Specific conductance: Maximum daily, 11,000 micromhos Nov. 10, 12-15, 1962; minimum daily, 370 micromhos Aug. 2, 1955.
Water temperatures: Maximum, 98°F July 8, 1958, July 22, 1959; minimum, 35°F Jan. 1, 1951.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Tucson, Ariz. Samples from canal are believed to be representative of total flow passing Gillespie Dam, including spill and amounts diverted into Gila Bend and Enterprise Canals. No samples collected during November.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C): Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-12, 1963...	6.0	--	--	307	149	1290	--	236	0	--	--	--	--	--	5290	0.19	85.7	1380	1190	15	7710	7.7
Oct. 13-18.....	5.8	--	--	245	124	830	--	274	0	--	--	--	--	--	3560	4.84	56.2	1120	895	11	5430	7.7
Oct. 19-21.....	38.2	--	--	72	14	124	--	194	0	--	--	--	--	--	625	.85	64.5	238	79	3.5	1050	7.7
Oct. 22.....	95.0	--	--	212	93	806	--	188	12	--	--	--	--	--	3400	4.62	872	910	736	12	5210	8.4
Oct. 23.....	94.0	--	--	69	15	126	--	176	0	--	--	--	--	--	636	.86	161	234	90	3.6	1050	7.9
Oct. 24-31.....	18.6	--	--	230	88	690	--	272	0	--	--	--	--	--	3230	4.39	162	935	712	9.8	4760	7.8
Dec. 1-31.....	11.5	26	0.01	474	184	1780	13	423	0	1840	2490	3.1	55	3.6	7430	10.1	231	1940	1590	18	10300	8.0
Jan. 1-31, 1964...	10.3	--	--	414	182	1580	--	386	0	--	--	--	--	--	6720	9.14	187	1780	1460	16	9400	8.2
Feb. 1-29.....	10.9	--	--	397	197	1610	--	315	0	--	--	--	--	--	6680	9.08	197	1800	1540	17	9590	7.9
Mar. 1-15.....	13.8	--	--	387	186	1520	--	315	0	--	--	--	--	--	6300	8.57	235	1730	1470	16	9080	8.0
Mar. 16-18.....	13.7	--	--	300	134	1050	--	284	0	--	--	--	--	--	4450	6.05	165	1300	1070	13	6690	8.0
Mar. 19-31.....	13.3	--	--	373	185	1500	--	305	0	--	--	--	--	--	6300	8.57	226	1690	1440	16	9030	7.8
Apr. 1-30.....	12.0	--	--	357	165	1510	--	282	0	--	--	--	--	--	5960	8.11	193	1570	1340	17	8650	7.8
May 1-12.....	11.7	--	--	357	163	1430	--	324	0	--	--	--	--	--	5720	7.78	181	1560	1290	16	8330	7.6
May 13-18.....	11.7	28	.00	325	143	1320	13	315	0	1340	1800	4.2	24	2.8	5210	7.09	165	1400	1140	15	7690	7.6
May 19-31.....	7.0	--	--	372	178	1620	--	302	0	--	--	--	--	--	6410	8.72	121	1660	1410	17	9190	7.8
June 1-30.....	4.5	--	--	322	177	1540	--	194	0	--	--	--	--	--	6160	8.38	75.3	1530	1370	17	8990	7.5
July 1-13.....	3.8	--	--	320	171	1480	--	183	0	--	--	--	--	--	6050	8.23	61.9	1500	1350	17	8590	7.5
July 14.....	2.8	--	--	119	26	180	--	370	0	--	--	--	--	--	1020	1.39	7.71	405	101	3.9	1600	7.7
July 15, 16.....	19.0	--	--	244	83	740	--	262	0	--	--	--	--	--	3360	4.57	172	950	735	10	4920	7.7
July 17.....	5.6	--	--	330	169	1480	--	224	0	--	--	--	--	--	6180	8.40	93.4	1520	1340	17	8680	7.6
July 18.....	4.4	--	--	332	139	1100	--	248	0	--	--	--	--	--	4890	6.65	58.1	1400	1200	13	6930	7.6
July 19-24.....	3.4	--	--	325	172	1510	--	176	0	--	--	--	--	--	6220	8.46	57.6	1520	1380	17	8740	7.4
July 25.....	3.8	--	--	335	118	1120	--	244	0	--	--	--	--	--	4850	6.60	49.8	1320	1120	13	6930	7.5
July 26-31.....	30.0	26	.04	227	84	714	12	256	0	740	1020	1.6	15	2.1	3160	4.30	256	910	700	10	4690	7.6
Aug. 1.....	91.0	--	--	56	5.5	56	17	252	0	--	--	--	--	--	360	.49	88.5	162	0	1.9	616	7.7
Aug. 2, 3.....	127	23	.17	36	4.6	56	13	176	0	18	57	.8	.6	.26	298	.41	102	109	0	2.3	497	8.0
Aug. 4-7.....	163	--	--	58	9.6	114	--	204	0	--	--	--	--	--	568	.77	250	184	17	3.7	903	7.7
Aug. 8, 9.....	158	--	--	42	3.2	90	--	212	0	--	--	--	--	--	398	.54	170	118	0	3.6	641	8.0
Aug. 10, 11.....	49.0	--	--	182	44	343	--	296	0	--	--	--	--	--	1750	2.38	232	635	392	5.9	2720	7.6
Aug. 12.....	25.0	--	--	46	3.2	52	11	182	0	--	--	--	--	--	328	.45	22.1	128	0	2.0	511	7.8
Aug. 13-16.....	91.8	--	--	71	10	106	--	210	0	--	--	--	--	--	580	.79	144	220	48	3.1	915	7.8
Aug. 17.....	191	--	--	85	14	149	--	216	0	--	--	--	--	--	764	1.04	394	268	91	3.9	1210	7.7
Aug. 18.....	248	--	--	63	7.1	100	--	220	0	--	--	--	--	--	498	.68	333	186	6	3.2	827	7.7
Aug. 19.....	260	--	--	332	115	1100	--	354	0	--	--	--	--	--	4600	6.26	3230	1300	1010	13	6810	7.8

Aug. 20.....	195	--	--	70	1.3	39	6.3	202	0	--	--	--	--	--	326	.44	172	180	14	1.3	489	7.7
Aug. 21.....	212	--	--	70	6.9	91	--	212	0	--	--	--	--	--	522	.71	299	203	29	2.8	806	7.7
Aug. 22.....	106	--	--	82	13	148	--	208	0	--	--	--	--	--	756	1.03	216	256	85	4.0	1170	7.9
Aug. 23.....	33.0	--	--	60	7.2	31	--	200	0	--	--	--	--	--	322	.44	28.7	179	15	1.0	490	7.6
Aug. 24.....	22.0	--	--	59	5.6	90	--	164	4	--	--	--	--	--	510	.69	30.3	170	29	3.0	759	8.4
Aug. 25-28.....	67.8	--	--	340	139	1250	--	344	0	--	--	--	--	--	5330	7.25	976	1420	1140	14	7500	7.8
Aug. 29.....	50.0	--	--	62	7.7	45	--	204	0	--	--	--	--	--	380	.52	51.3	186	19	1.4	506	7.7
Aug. 30, 31.....	83.0	--	--	200	66	625	--	228	0	--	--	--	--	--	2750	3.74	616	770	583	9.8	4120	7.6
Sept. 1-14.....	22.1	--	--	94	19	232	--	150	0	--	--	--	--	--	1010	1.37	60.3	314	191	5.7	1750	7.7
Sept. 15-18.....	261	--	--	51	6.6	80	--	162	0	--	--	--	--	--	407	.55	287	154	21	2.8	693	7.9
Sept. 19, 20.....	253	--	--	372	154	1370	--	416	0	--	--	--	--	--	5630	7.66	3850	1560	1220	15	8240	8.0
Sept. 21-24.....	94.2	--	--	48	6.3	70	--	160	0	--	--	--	--	--	365	.50	92.8	146	15	2.5	634	7.8
Sept. 25-30.....	22.8	--	--	392	156	1450	--	402	0	--	--	--	--	--	5860	7.97	361	1620	1290	16	8670	7.8
Weighted average	A 25.7	--	--	198	76	684	--	254	--	--	--	--	--	--	2890	3.93	209	806	600	8.7	4220	7.8
Time-weighted average.....	--	--	--	319	144	1260	--	285	--	--	--	--	--	--	5220	--	--	1390	1150	14.1	7510	7.7
Tons per day....	--	--	--	14	5.5	50	--	18	--	--	--	--	--	--	--	--	--	--	--	--	--	--

A Mean discharge based on 366 days; mean discharge for 336 days of chemical analysis, 26.8 cfs.

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	74	74	--	73	73	73	--	72	72	--	--	70	--	70	70	70	70	70	69	69	68	68	68	67	67	66	66	65	64	--	--	--
November	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	46	--	48	46	48	--	46	48	44	--	--	46	48	45	46	44	46	46	44	44	46	46	46	46	--	44	46	--	46	46	--	--
January.....	44	44	44	42	42	42	42	42	44	44	42	42	42	42	--	42	--	42	42	40	40	42	--	42	42	42	44	44	46	46	48	43
February.....	46	46	46	46	48	46	48	48	48	48	48	48	48	48	46	48	46	48	48	50	48	48	50	50	50	52	52	52	54	--	--	48
March.....	56	54	56	56	56	56	54	56	56	56	56	56	58	58	58	58	58	58	58	58	60	60	60	62	62	62	62	62	64	64	--	58
April.....	56	56	--	54	58	--	56	58	--	58	--	58	--	58	--	58	56	58	58	60	60	60	60	60	60	54	54	56	58	56	--	58
May.....	64	64	64	65	64	66	66	66	66	68	68	68	68	68	68	68	--	68	68	68	70	68	68	70	72	--	72	72	72	74	74	68
June	78	76	76	78	80	78	78	80	78	80	80	80	80	78	78	80	78	--	80	78	80	82	80	--	82	--	80	--	--	--	--	79
July.....	85	85	86	--	85	84	85	85	--	86	--	86	85	86	84	85	85	84	85	86	86	--	--	86	88	85	85	84	--	--	--	--
August.....	86	86	84	84	84	84	84	84	82	84	84	86	84	84	--	--	84	86	84	84	86	84	82	82	84	84	82	84	86	84	--	84
September.....	--	--	--	--	--	--	--	--	--	--	--	--	86	84	84	84	84	84	82	84	84	82	82	78	78	78	76	78	78	76	--	--

9-5225. GILA GRAVITY MAIN CANAL AT IMPERIAL DAM, ARIZ.-CALIF.

LOCATION.--At gaging station 3,200 feet downstream from intake at east end of Imperial Dam, Yuma County, Ariz.
RECORDS AVAILABLE.--Water temperatures: January 1956 to September 1964.
EXTREMES, 1963-64.--Water temperatures: Maximum, 89°F on several days during August; minimum, 45°F Jan. 13-17.
EXTREMES, 1956-64.--Water temperatures: Maximum, 89°F on several days during July 1956, July and August 1957, August 1961, and August 1964; minimum, 45°F Jan. 13-17, 1964.

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October																																
Maximum	83	83	83	83	82	81	80	80	80	79	79	79	77	75	75	75	74	73	72	71	72	73	74	74	74	74	74	74	74	74	73	77
Minimum	82	82	82	82	80	79	78	78	78	78	78	77	75	74	73	74	74	71	71	71	71	72	72	73	73	73	73	73	73	73	72	75
November																																
Maximum	70	68	68	68	67	67	67	65	64	63	64	65	65	65	65	65	64	63	61	59	57	57	57	57	57	57	57	57	57	57	--	62
Minimum	68	67	67	67	66	66	65	63	63	63	63	63	64	65	65	64	63	61	59	58	57	57	56	57	57	57	57	57	57	57	--	62
December																																
Maximum	57	57	57	57	57	57	57	57	57	56	56	56	56	55	54	52	51	51	51	52	52	52	51	51	50	50	51	51	51	51	51	54
Minimum	57	57	57	57	57	57	57	57	56	56	56	56	55	54	52	51	51	51	51	51	52	51	51	50	50	50	50	51	51	51	51	53
January																																
Maximum	51	51	51	51	51	50	49	49	48	47	47	46	46	45	45	45	45	46	48	49	51	51	51	51	50	50	49	49	50	50	51	49
Minimum	51	51	51	51	50	49	49	48	47	46	46	46	45	45	45	45	45	46	47	47	50	51	51	50	49	49	48	48	48	50	50	48
February																																
Maximum	50	50	50	50	49	50	49	50	50	51	51	51	51	50	50	49	50	51	53	53	53	53	53	53	53	53	53	53	53	--	--	51
Minimum	50	50	50	49	48	49	49	49	49	50	51	50	50	50	49	49	49	50	51	53	53	53	53	53	53	53	52	52	53	--	--	51
March																																
Maximum	55	55	55	54	55	56	56	55	55	56	56	57	58	59	59	59	59	59	61	62	61	60	58	58	57	58	60	62	64	66	66	58
Minimum	54	55	54	54	54	55	55	55	55	55	55	55	56	58	58	58	58	58	59	59	59	57	57	57	57	57	58	61	62	65	65	57
April																																
Maximum	66	65	62	62	63	63	63	65	66	68	70	71	70	71	71	70	70	70	69	65	66	67	67	67	65	67	68	69	71	72	--	67
Minimum	65	62	61	60	61	61	62	63	64	66	67	69	68	68	69	69	69	69	66	65	65	66	66	65	62	64	66	68	69	70	--	66
May																																
Maximum	72	72	70	68	64	62	60	62	65	69	72	74	75	75	75	76	77	77	78	79	79	79	79	80	79	77	75	75	75	76	80	73
Minimum	70	69	68	65	63	61	60	60	62	66	69	71	73	73	73	74	74	74	77	77	77	78	78	78	77	75	73	74	72	73	76	71
June																																
Maximum	82	82	81	81	81	81	81	77	76	76	77	78	80	82	82	82	80	79	79	79	80	81	82	83	83	84	85	85	84	83	--	81
Minimum	79	80	79	79	79	79	77	75	74	74	74	75	77	79	80	80	78	77	78	78	78	79	80	80	82	82	83	83	82	82	--	79
July																																
Maximum	83	83	83	83	83	83	84	83	83	85	86	88	88	86	86	86	86	86	86	85	85	85	85	84	83	85	86	88	88	87	86	85
Minimum	81	81	82	81	80	81	81	82	81	82	84	87	86	84	83	83	84	84	84	84	83	83	83	82	81	82	83	86	86	85	84	83
August																																
Maximum	85	84	87	88	88	88	89	89	89	89	88	88	87	87	88	88	88	89	89	89	88	87	87	87	87	87	87	85	84	84	82	87
Minimum	84	83	84	86	87	86	87	88	88	87	86	86	85	86	85	86	86	86	87	87	86	85	85	86	85	85	85	83	83	82	81	85
September																																
Maximum	81	80	80	81	81	82	82	82	83	83	84	85	85	85	84	82	81	81	81	80	79	78	76	76	76	77	77	78	78	78	--	81
Minimum	80	79	79	79	79	80	80	80	81	82	82	83	84	83	80	80	80	79	79	78	78	76	75	75	75	75	76	77	77	77	--	79

9-5255. YUMA MAIN CANAL BELOW COLORADO RIVER SIPHON, AT YUMA, ARIZ.

LOCATION.--At gaging station on Yuma Main Canal below Colorado River siphon on Arizona side of river, 3.5 miles downstream from siphon-drop powerplant, and 0.2 mile downstream from upper highway bridge over Colorado River at Yuma, Yuma County.
RECORDS AVAILABLE.--Chemical analyses: September 1926 to September 1928, October 1942 to September 1964.
Water temperatures: May 1961 to September 1964.
EXTREMES, 1963-64.--Dissolved solids: Maximum, 856 ppm Sept. 1-30; minimum, 798 ppm Mar. 1-31.
Hardness: Maximum, 364 ppm Jan. 1-31; minimum, 344 ppm Oct. 1-31, Feb. 1-29.
Specific conductance: Maximum daily, 1,380 micromhos Jan. 29; minimum daily, 1,130 micromhos Feb. 28, Apr. 20.
EXTREMES, 1943-64.--Dissolved solids: Maximum, 1,000 ppm Jan. 1-31, 1957; minimum, 532 ppm Jan. 1-10, 1953.
Hardness: Maximum, 520 ppm July 7, 1962; minimum, 260 ppm Jan. 1-10, 1953.
Specific conductance: Maximum daily, 1,600 micromhos July 7, 1962; minimum daily, 795 micromhos Jan. 5, 1953.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Tucson, Ariz.

Chemical analyses, in parts per million, water year October 1963 to September 1964

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, Magnesium	Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-31, 1963...	452	15	0.01	95	26	133	5.1	166		316	122	0.5	1.1	0.17	830	1.08	1010	344	208	3.1	1230	8.1
Nov. 1-30.....	332	14	.01	96	28	138	5.0	172		324	128	.5	1.1	.16	844	1.12	757	356	215	3.2	1270	8.1
Dec. 1-31.....	238	13	.00	97	29	138	5.2	174		322	130	.4	3.2	.17	848	1.13	545	360	218	3.2	1270	8.1
Jan. 1-31, 1964...	371	13	.00	97	30	134	5.5	174		321	130	.4	2.6	.15	852	1.12	853	364	222	3.1	1270	8.1
Feb. 1-29.....	469	17	.00	92	28	127	4.8	162		316	118	.4	1.4	.13	808	1.07	1020	344	211	3.0	1200	8.1
Mar. 1-31.....	399	16	.00	93	28	124	4.9	169		313	113	.4	1.6	.12	798	1.06	860	348	210	2.9	1190	8.0
Apr. 1-30.....	519	15	.00	93	29	124	4.9	165		320	116	.4	1.3	.13	818	1.07	1150	350	215	2.9	1200	8.1
May 1-31.....	600	14	.00	96	29	130	5.1	168		329	123	.4	1.1	.13	842	1.10	1360	360	222	3.0	1240	8.1
June 1-30.....	525	16	.01	97	27	128	5.1	160		330	121	.6	1.2	.21	847	1.15	1200	354	223	3.0	1250	8.1
July 1-31.....	583	17	.01	96	28	129	5.2	163		326	117	.5	1.1	.22	844	1.09	1330	356	222	3.0	1250	8.0
Aug. 1-31.....	517	17	.01	92	30	131	5.4	161		326	120	.5	1.1	.23	842	1.09	1180	352	220	3.0	1270	8.0
Sept. 1-30.....	613	17	.01	95	29	140	5.3	160		338	132	.5	1.1	.24	856	1.14	1420	358	227	3.2	1310	8.2
Weighted average	468	16	0.01	95	28	131	5.1	165		324	122	0.5	1.4	0.18	836	1.14	1060	354	218	3.0	1250	8.1
Time-weighted average.....	--	15	0.00	95	28	131	5.1	166		323	123	0.5	1.5	0.17	836	--	--	354	218	3.0	1250	8.1
Tons per day....	--	20	0.01	120	36	165	6.5	209		410	154	0.6	1.7	0.22	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1963 to September 1964

Month	Day 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Average
October	82	82	82	83	--	--	79	78	78	78	79	--	--	75	73	74	73	73	--	--	73	74	75	78	73	--	--	75	74	74	73	--
November	71	--	--	68	63	67	67	67	--	--	--	67	66	66	66	--	--	64	63	61	59	59	--	--	--	58	58	--	58	--	--	--
December	--	59	58	58	56	55	--	--	--	--	--	53	52	--	--	50	50	50	54	53	--	--	52	51	--	52	49	--	--	53	52	--
January.....	--	55	52	--	--	50	48	51	46	48	--	--	46	46	45	45	46	--	--	50	49	55	53	51	--	--	48	49	50	51	51	--
February.....	--	--	52	52	50	49	49	--	--	50	52	52	53	--	--	--	50	49	50	52	--	--	--	52	52	52	53	53	--	--	--	--
March.....	--	54	53	52	54	55	--	--	52	54	56	56	57	--	--	58	58	63	60	60	--	--	60	58	57	57	57	--	--	65	66	--
April.....	65	63	61	--	--	62	59	61	65	66	--	--	68	67	68	70	68	--	--	64	65	66	66	66	--	--	65	68	70	70	--	--
May.....	70	--	--	68	65	63	63	64	--	--	69	72	75	--	76	--	--	75	76	77	77	77	--	--	77	76	74	--	--	--	--	--
June	78	79	80	78	78	--	--	76	73	72	75	75	--	--	80	79	77	79	78	--	--	78	80	80	82	83	--	--	--	82	--	--
July.....	82	82	--	82	--	82	82	82	84	83	--	--	86	85	85	85	85	--	--	86	85	85	85	85	--	--	86	86	86	--	85	--
August.....	--	--	84	85	86	85	86	--	--	87	86	87	85	87	--	--	88	86	86	88	--	--	--	85	85	85	84	84	--	--	81	--
September.....	80	80	80	80	--	--	--	84	85	85	84	--	--	85	83	82	81	81	--	--	79	77	75	76	76	--	--	78	80	77	--	--

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