Quality of Surface Waters for Irrigation Western United States 1957

Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

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PREFACE

This report was prepared by the Geological Survey in cooperation with other State and Federal Agencies by personnel of the Water Resources Division under the direction of L. B. Leopold, chief hydraulic engineer, and S. K. Love, chief, Quality of Water Branch.

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QUALITY OF SURFACE WATERS FOR IRRIGATION, WESTERN UNITED STATES, 1957

INTRODUCTION

The records of chemical analyses, other physical measurements, and discharge given in this report comprise the seventh annual compilation of data for 82 irrigation network stations in operation west of the Mississippi River.

Geological Survey Water Supply Papers 1264 and 1362, the annual compilations for water years 1951 and 1952, respectively, describe briefly the development of this series of reports. In summary, there is an expressed need for comprehensive continuing information about the chemical quality of surface waters used for irrigation and the changes resulting from the drainage of irrigated lands.

In recognition of this problem the Subcommittee on Hydrology, Interagency Committee on Water Resources (formerly the Federal Interagency River Basin Committee) on February 6, 1950, approved a list of 106 network stations on streams in Western United States at which water samples were to be collected and analyzed with particular reference to the use of these stream waters for irrigation. These stations, with pertinent information about periods of operation, are shown in the following table. Of the 106 stations selected, 39 were already being operated by the Geological Survey and 7 by the International Boundary and Water Commission. From the remaining stations on the list, 30 were selected for activation by the U.S. Geological Survey during the fiscal year 1951. In addition, 3 stations previously operated in connection with other programs and scheduled to be discontinued were to be included in the list to be operated by the Geological Survey (the Subcommittee amended the list on October 2, 1952, to include the three additional stations, bringing the recommended number of irrigation network stations to a total of 109).

It was contemplated that the network stations would be located at streamflow gaging stations and that the program of collecting and analyzing the samples and reporting the findings would be the

Irrigation-Quality Network Stations in Western United States

[Selected by Subcommittee on Hydrology, Federal Interagency River Basin Committee, 1950]

No.	Geological Survey Part No.	Stream	Location	Date established
1	5	Souris River	near Westhope, N. Dak	June 1954
2	6	Missouri River	near Williston, N. Dak	Dec. 5, 1950
3		Missouri River	at Pierre, S. Dak	Oct. 3, 1950
4		Missouri River	at Nebraska City, Nebr	Jan. 4, 1951
5		Yellowstone River	at Billings, Mont	Dec. 15, 1950
6		Yellowstone River	near Sidney, Mont	Jan. 3, 1951
7		Bighorn River [a]	at Thermopolis, Wyo	Jan. 1, 1951
		Wind River [b]	below Boysen Dam, Wyo	Nov. 24, 1953
8		Bighorn River	at Bighorn, Mont	Oct. 2, 1950
9		Tongue River	at Miles City, Mont	Jan. 4, 1951
10		Powder River	near Locate, Mont	Jan. 4, 1951
11		Grand River [c]	near Wakpala, S. Dak	Jan. 17, 1951
12		Moreau River	at Promise, S. Dak	.....
13		Cheyenne River [c]	near Eagle Butte, S. Dak	Jan. 17, 1951
14		White River	near Oacoma, S. Dak	.....
15		James River	near Huron, S. Dak	Aug. 1956
16		N. Platte River	below Alcona Dam, Wyo	.....
17		N. Platte River	below Guernsey Reservoir, Wyo	Dec. 7, 1950
18		Platte River	at Brady, Nebr	Feb. 28, 1951
18a		Supply Canal (Tri-County Diversion).	near Maxwell, Nebr	Mar. 1, 1951
19		South Platte River	at Julesburg, Colo	Oct. 1, 1945
20		Republican River	above Medicine Creek at Cambridge, Nebr.	Dec. 22, 1950
21		Republican River	near Hardy, Nebr	Aug. 1956
22		Smoky Hill River	near Langley, Kan	.....
23		Saline River [d]	near Wilson (or Russell), Kans	.....
		Saline River [e]	at Tescott, Kans	Apr. 3, 1950
24	7	Arkansas River	below John Martin Reservoir, Colo.	Jan. 10, 1951
25		Arkansas River	at Arkansas City, Kans	Oct. 8, 1951
26		Arkansas River	at Ralston, Okla	Jan. 1, 1950
27		Arkansas River	at Van Buren, Ark	Oct. 1, 1945
28		Cimarron River [f]	at Mannford, Okla	Oct. 1, 1949
		Cimarron River	at Perkins, Okla	Oct. 1, 1952
29		Canadian River [e]	near Tascosa, Tex	June 2, 1948
30		Canadian River	near Whitfield, Okla	Sept. 1, 1946
31		Red River	at Denison Dam, near Dennison, Tex.	May 1, 1944
32		Washita River [g]	near Tabler, Okla	Sept. 10, 1946
33	8	Sabine River	near Ruliff, Tex	Oct. 1, 1947
34		Neches River	at Evadale, Tex	Oct. 1, 1947
35		Trinity River	at Romayor, Tex	Sept. 1, 1945
36		San Jacinto River [h]	near Huffman, Tex	Sept. 1, 1945
37		Brazos River	at Richmond, Tex	Sept. 1, 1945
38		Colorado River [i]	at Robert Lee, Tex	Oct. 1, 1947
39		Colorado River	at Austin, Tex	Oct. 1, 1947
40		Colorado River	at Wharton, Tex	Apr. 11, 1944
41		Guadalupe River	at Victoria, Tex	Sept. 1, 1945
42		Nueces River	near Mathis, Tex	Oct. 1, 1947
43		Rio Grande	above Culebra Creek near Lobatos, Colo.	Oct. 11, 1946
44		Rio Grande	at Otowi Bridge near San Ildefonso, N. Mex.	Oct. 23, 1947
45		Rio Grande	at San Marcial, N. Mex	July 1, 1948
46		Rio Grande	below Elephant Butte Dam, N. Mex.	1933
47		Rio Grande [j]	near El Paso, Tex	1930
48		Rio Grande [j]	below Old Fort Quitman, Tex	1930
49		Rio Grande [j]	at Upper Presidio, Tex	1935
50		Rio Grande [j]	at Langtry, Tex	1945
51		Rio Grande [j, k]	at Eagle Pass, Tex	1938
		Rio Grande [j]	at Laredo, Tex	July 1, 1955
52		Rio Grande [j, m]	at Roma, Tex	1944

Irrigation-Quality Network Stations in Western United States—Continued

[Selected by Subcommittee on Hydrology, Federal Interagency River Basin Committee, 1950]

No.	Geological Survey Part No.	Stream	Location	Date established
52		Rio Grande [j,s]	at Chapeno, Tex	July 1955
		Rio Grande [j]	at Falcon Dam-U. S. tailrace	July 1955
53		Pecos River	below Alamorgordo Dam, N. Mex.	June 26, 1937
54		Pecos River	near Artesia, N. Mex	July 1, 1937
55		Pecos River	near Orla, Tex	July 1, 1937
56		Pecos River [j,n]	near Comstock, Tex	1935
		Pecos River [j]	near Shumla, Tex	Jan. 1, 1955
57	9	Colorado River	near Glenwood Springs, Colo.	Oct. 1941
58		Colorado River	near Cisco, Utah	Oct. 1928
59		Colorado River	at Lees Ferry, Ariz.	Oct. 1, 1947
60		Colorado River	near Grand Canyon, Ariz.	Oct. 1925
61		Colorado River	below Hoover Dam, Ariz.-Nev.	Oct. 1939
62		Colorado River	below Parker Dam, Calif.	.....
63		Colorado River (Yuma Main Canal)	below Colorado River Siphon at Yuma, Ariz.	Oct. 1942
64		Gunnison River	near Grand Junction, Colo.	Oct. 1931
65		Green River	near Linwood, Utah	.....
66		Green River	at Green River, Utah	Oct. 1928
67		San Juan River [o]	near Blanco, N. Mex.	Oct. 1, 1945
		San Juan River	near Archuleta, N. Mex.	Dec. 31, 1954
68		San Juan River	near Bluff, Utah	Oct. 1929
69		Little Colorado River	at Cameron, Ariz.	Jan. 17, 1951
70		Gila River	at Kelvin, Ariz.	Dec. 1, 1950
71		Gila River	below Gillepsie Dam, Ariz.	Dec. 1, 1950
72		Salt River	at Stewart Mountain Dam, Ariz.	Dec. 9, 1950
73		Verde River	below Barlett Dam, Ariz.	Dec. 9, 1950
74		Agua Fria River	below Lake Pleasant Dam, Ariz.	Dec. 1, 1950
75	10	Bear River	near Collinston, Utah	.....
76		Sevier River	near Marysville, Utah	.....
77		Sevier River	near Lynndyl, Utah	Mar. 22, 1951
78		Humboldt River	at Palisade, Nev.	.....
79		Humboldt River	near Rye Patch, Nev.	Dec. 10, 1951
80	11	San Joaquin River	below Friant Dam, Calif.	.....
81		San Joaquin River	near Mendota, Calif.	.....
82		San Joaquin River	near Vernalis, Calif.	Mar. 1, 1951
83		San Joaquin River	at Antioch, Calif.	.....
84		Calaveras River (Stockton diverting canal). [p]	at Stockton, Calif.	Mar. 1, 1951
		San Joaquin River	near Biola, Calif.	Nov. 1952
85		Mokelumne River	at Woodbridge, Calif.	Mar. 1, 1951
86		Sacramento River	near Red Bluff, Calif	.....
87		Sacramento River	at Knights Landing, Calif.	Feb. 26, 1951
88		Feather River	at Nicolaus, Calif.	Feb. 26, 1951
89		American River	at Fair Oaks, Calif.	May 1, 1951
90	12	Columbia River	at International Boundary	Nov. 15, 1951
91		Columbia River	at Grand Coulee Dam, Wash.	Nov. 25, 1950
92		Kootenai River	at Porthill, Idaho	.....
93		Pend Oreille, River	near Metaline Falls, Wash.	.....
94		Yakima River	at Kiona, Wash.	Dec. 30, 1952
95	13	Snake River	near Heise, Idaho	Jan. 8, 1953
96		Snake River	near Minidoka, Idaho	.....
97		Snake River	at King Hill, Idaho	Mar. 27, 1951
98		Snake River	at Weiser, Idaho	.....
99		Snake River [q]	near Clarkston, Wash.	Nov. 14, 1951
		Snake River	at Central Ferry, near Pomeroy, Wash.	Sept. 28, 1955
100		Boise River	near Arrowrock, Idaho	.....
101		Boise River	at Notus, Idaho	Nov. 21, 1950
102	14	Columbia River	at Maryhill Ferry near Rufus, Oreg.	Dec. 1, 1950
103		Dischutes River [r]	at Moody near Biggs, Oreg.	Dec. 1952
104		Willamette River	at Salem, Oreg.	Feb. 1, 1951

Irrigation-Quality Network Stations in Western United States—Continued

[Selected by subcommittee on Hydrology, Federal Interagency River Basin Committee, 1950]

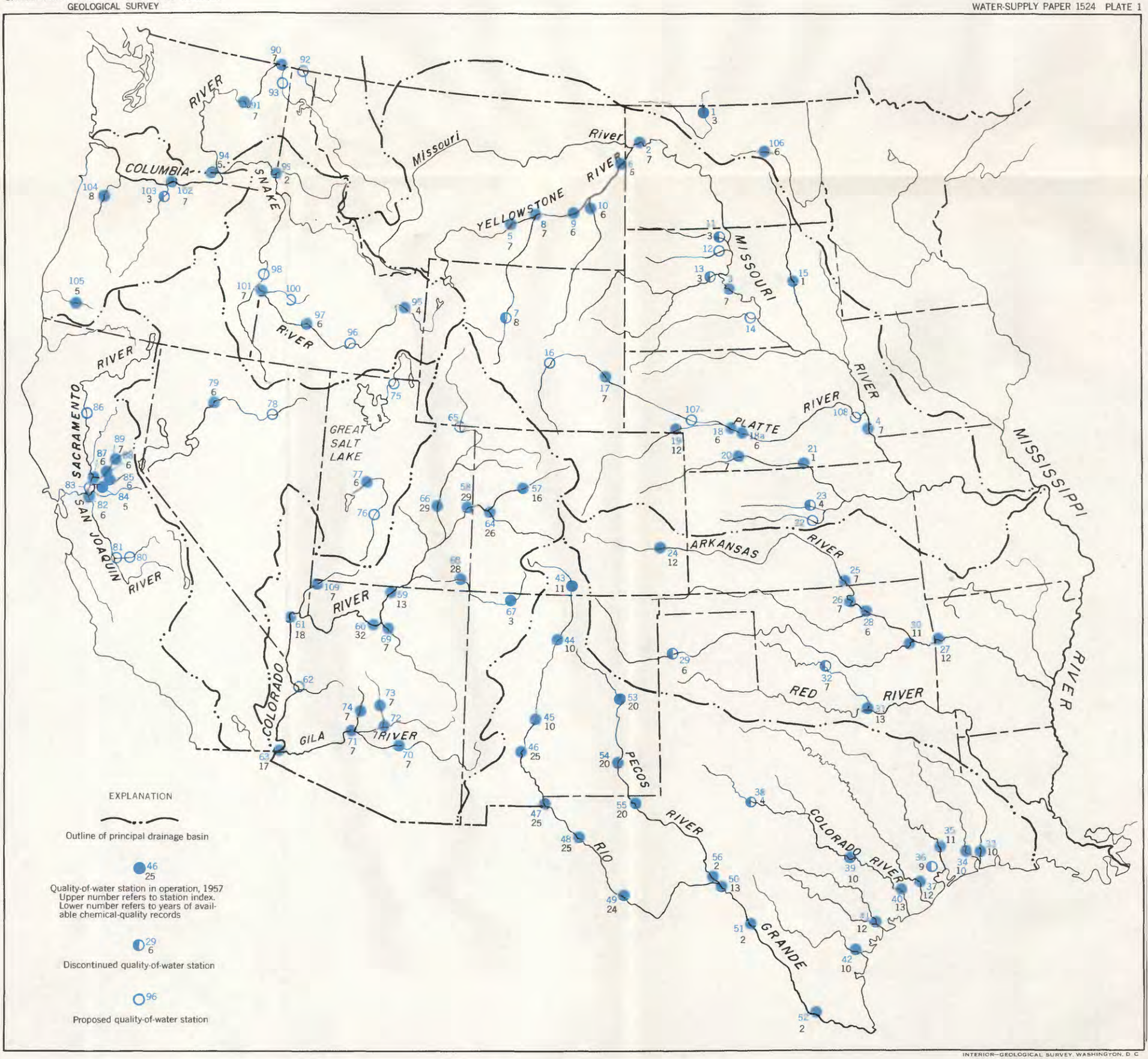
No.	Geological Survey Part No.	Stream	Location	Date established
105		Rogue River	at Grants Pass, Oreg	Jan. 5, 1953
106	5	Sheyenne River	near Warwick, N. Dak	Jan. 8, 1951
Stations added by Subcommittee, October 2, 1952				
107	6	North Platte River	at Lewellen, Nebr	
108		Platte River	near Louisville, Nebr	
109	9	Virgin River	at Littlefield, Ariz	July 1949

[a] Dropped from list Jan 21, 1954; replaced by Wind River below Boysen Dam, Wyo.
[b] Discontinued Sept. 30, 1954.
[c] Discontinued Nov. 20, 1953.
[d] Dropped from list Oct. 3, 1952; replaced by station at Tescott, Kans.
[e] Discontinued Sept. 30, 1953.
[f] Discontinued Sept. 30, 1952; replaced by station at Perkins, Okla.
[g] Dropped from list Oct. 3, 1952.
[h] Dropped from list Apr. 5, 1954.
[i] Discontinued Sept. 30, 1951.
[j] Operated by International Boundary and Water Commission.
[k] Discontinued Jan. 30, 1955; replaced by station at Laredo, Tex.
[m] Discontinued Jan. 31, 1955; replaced by station at Chapeno, Tex.
[n] Discontinued December 1954; replaced by station near Shumla, Tex.
[o] Discontinued Dec. 31, 1954; replaced by station near Archuleta, N. Mex.
[p] Dropped from list Oct. 3, 1952; replaced by San Joaquin River near Biola, Calif.
[q] Discontinued February 1956; replaced by station near Pomeroy, Wash.
[r] Discontinued Feb. 15, 1954.
[s] Replaced by Falcon Dam - U.S. tailrace.

responsibility of the Geological Survey. The scope of the chemical analyses would provide for the calculation of the salt burden of stream and in general would conform with the current Geological Survey standards for the comprehensive investigation of the chemical quality of surface waters.

The following criteria were recommended in the selection of the key network stations.

1. All recommended stations should be located on streams west of the main stem of the Mississippi River.
2. All proposed stations should relate primarily to irrigation although multiple-purpose needs which include irrigation may be considered.
3. All stations should be located at or near stream-flow gaging stations. The most nearly up-to-date list of gaging stations currently operated by the U.S. Geological Survey (which comprises all but a small percentage of all gaging stations) will be found in the most recently published Geological Survey water-supply papers for the areas involved.
4. Consideration should be given to the location of irrigation development areas that are now affecting or are likely to affect the chemical quality of the river water.



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QUALITY-OF-WATER STATIONS IN WESTERN UNITED STATES RECOMMENDED FOR IRRIGATION STUDY

5. Only those stations should be proposed that are likely to reflect important changes in chemical quality over a period of years. Stations operated for relatively short periods (5 years or less), as would be required for intensive studies of specific projects, should not in general be included.

Plate 1 is a plot of the recommended list of 109 network stations on streams in Western United States. The 82 stations in operation in 1957 are identified by a solid circle. The period of record, in years, is also shown at each of these stations. In a few instances the period of record differs from that obtained from the date established by the Subcommittee, as earlier records were included also. Proposed stations are identified by an open circle.

During the 1957 water year, two stations on the original list were activated; James River at Huron, S. Dak., and Republican River near Hardy, Nebr. Although the Republican River near Hardy, Nebr., was in operation for only 14 months (August 1956 to September 1957) it has been included in this report because it contributes to a more accurate understanding of water quality in the Kansas River basin.

ACKNOWLEDGMENTS

Agencies that have each contributed to some part of the data published herein include: The Agriculture Research Service, and the Soil Conservation Service, U. S. Department of Agriculture; the Bureau of Reclamation, U. S. Department of the Interior; the Corps of Engineers, U. S. Department of the Army; the State engineers for each of the 17 Western States and for Louisiana and Arkansas, the State Boards of Health, the El Paso, Tex., Department of Water and Sewage; the Ministry of Hydraulic Resources of Mexico.

During 1956-57, the United States Section of the International Boundary and Water Commission operated the stream gaging stations for the following Rio Grande stations included in this report: El Paso, Fort Quitman, Upper Presidio, Langtry, Falcon Dam U. S. tailrace and it operated the station Pecos River near Shumla, also. The Mexican Section operated the stream gaging station on the main stem at Laredo. Each section operated the gaging stations on tributary streams, floodways, and diversions within its own country.

Descriptive headings and discharge data for the seven stations operated by the International Boundary and Water Commission, were obtained from Water Bulletins 26 and 27 prepared jointly by

the United States and Mexican Sections of the International Boundary and Water Commission. These publications contain stream discharge and related data for 1956 and 1957. Analyses for seven Rio Grande main stem stations and for the Pecos River near Shumla, Tex., were obtained from the U. S. Salinity Laboratory, Riverside, Calif.

Additional contributions of data have been made by individuals, corporations and other State and Federal agencies, and their cooperation is acknowledged with appreciation.

COLLECTION OF SAMPLES

In accordance with the recommendation of the Subcommittee, where practicable, one sample was collected each day throughout the water year. In general, each sample was taken in an 8- or 12-ounce glass bottle provided with a pressure-type or positive-seal closure to prevent escape of dissolved gases. Each sample was integrated in the vertical section of a stream usually at about midpoint of flow by lowering the open sample bottle to the bottom and returning it to the surface during the filling process.

At most stations the samples were collected by local residents hired for the purpose. The local sample collector recorded on each bottle the name of the stream, location, gage height (if practicable), water temperature, time of day, date, and collector's name or initials. Samples were shipped to the laboratory or picked up by technical personnel on a predetermined schedule. Visits were made periodically by technical personnel to check on sampling procedures.

EXAMINATION OF SAMPLES

Upon receipt of samples in the laboratory, they were recorded and stored away from direct sunlight until opened for analysis. Specific conductance was determined with a conductance bridge on each sample as soon as opened. These data provided a basis for compositing a series of daily samples, for complete analysis. In general, a minimum of three composites a month consisting of equal volumes of approximately 10 daily samples, were prepared for chemical analysis. Individual samples that showed differences in conductance of more than 30 percent of the mean for the period were not included in the composite, but were grouped separately for additional composite samples—or analysis of the individual sample was made. For those stations where acceptable discharge values were reported with the samples, or could be obtained

promptly from rating tables, samples were prepared by mixing volumes of individual samples in proportion to water discharge.

The following series of 15 determinations (schedule 1) were made on all composite samples for all new network stations during the first year of operation: Silica, iron, calcium, magnesium, solium, potassium, bicarbonate, carbonate, sulfate, chloride, fluoride, nitrate, boron, dissolved solids, and specific conductance. The following values were calculated from the analytical data: Dissolved solids in tons per acre-foot, dissolved solids in total tons, total hardness, noncarbonate hardness, and percent sodium.

It was further recommended by the Subcommittee that during the second and third years the following series of 11 determinations (schedule 2) would be made on all composite samples: Calcium, magnesium, sodium, bicarbonate, carbonate, sulfate, chloride, nitrate, boron, dissolved solids, and specific conductance. Hardness, noncarbonate hardness, percent sodium, total tons and tons per acre-foot would be calculated as in schedule 1.

In the fourth and succeeding years (unless significant changes become apparent) it was recommended that the following determinations (schedule 3) would be made on all composite samples as long as the program is in effect: Calcium and magnesium (either separately, or together by the recently developed ethylenediamine tetraacetic acid titration test for hardness), sodium, dissolved solids, and specific conductance. In addition, four complete analyses (schedule 1) would be made each year, one analysis to be made on a composite sample during each quarter. Certain additional determinations above these minimum requirements were to be made if deemed necessary to define widely varying characteristics of the stream water.

All laboratory determinations were to be made in accordance with standard procedures used by the Geological Survey. These procedures are based on methods found in authoritative publications on water analysis.

REPORTING OF DATA

In order to release the data in the form most widely used in the evaluation of irrigation waters, the results of analyses in this compilation are given in equivalents per million, rather than the conventional unit part per million. Some agencies that actively participate in irrigation water-quality investigations prefer to express results in milligrams per liter (mg/l) and milliequivalents per liter (meq/l). However, for all practical purposes where

concentrations of dissolved solids are less than about 7,000 parts per million, no correction for density of the water is necessary and the units reported in each method are considered to be synonymous.

If results are desired in parts per million they can be calculated by multiplying the reported values in equivalents per million by the chemical combining weights of the individual constituents. Pertinent physical data and water discharge are also included in the tables.

EXPLANATION OF TABLES

The tables of analyses beginning on page 22 include a brief descriptive heading summarizing the more pertinent features at each station as follows:

Location of Station is given generally as the distance in land or river miles from a town or other political or geographic feature. In Survey practice the term "at" generally implies that the station is within a mile radius of the named town whereas "near" implies that it is beyond a mile radius.

Drainage area above the gaging station was obtained from the most recent published records of the annual reports of the Geological Survey on Surface Water of the United States, and from the International Boundary and Water Commission.

Records available are given for all periods during which samples, other than infrequent, were collected for chemical analyses. It does not include the periods for which discharge records are available.

Extremes for the current year and for the period of record are reported for specific conductance and percent sodium because of their widespread application in the evaluation of analyses of water used for irrigation. The results for specific conductance are based on the measurement made at the laboratory upon receipt of the sample from the field. Data for percent sodium were obtained from the composite-samples analysis.

Remarks include sources of data, additional explanation concerning the records, and offices where the records of chemical quality may be obtained.

Discharge of records were obtained from the responsible Geological Survey Surface Water Branch offices except for the seven stations

operated by the International Boundary and Water Commission. Discharge data are shown in acre-feet, calculated from the mean daily discharge in cubic feet per second by multiplying by the factor 1.983.

Analytical values are reported in equivalents per million for cations and anions. The equivalent is the weight with reference to some standard (such as the combining weight—either of oxygen, 8, or of hydrogen, 1.008) of that quantity of an element, radical, or compound to complete a definite chemical reaction. An equivalent of an element or ion is exactly equal in combining power to one equivalent of another element or ion. As previously discussed, for concentrations of dissolved solids that are normally encountered in water for irrigation, an equivalent per million is equal to a milliequivalent per liter. Silica, which is considered to be present in the colloidal state, and boron, are reported in parts per million. Percent sodium is calculated as follows:

$\frac{Na \times 100}{Na + K + Ca + Mg}$, where all constituents are reported in equivalents per million.

At the recommendation of the Subcommittee, sodium-adsorption-ratio (SAR) is published for all network stations beginning October 1952. The term is defined and described under "Sodium hazard" on page 19.

DISCUSSION OF RESULTS

Discharge data and dissolved-solids loads for stations operated in 1957 are summarized in the following table.

HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

Red River of the North basin.— Although rainfall was plentiful in most of North Dakota in 1957, drought conditions prevailed in the northwest and north-central parts of the state so that runoff in the Sheyenne River and Souris River was low. Runoff in Sheyenne River near Warwick dropped from 57,750 acre-feet in 1956 to 18,480 acre-feet in 1957 and in the Souris River near Westhope dropped from 321,500 acre-feet in 1956 to 56,290 acre-feet in 1957.

The average composition of the water in the Sheyenne River near Warwick in 1957, although the mineralization was higher than in 1956, was about the same as the average for previous years of water-quality record. The mineralization of the water in the Souris River increased considerably over the average mineralization of the 2 previous years.

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Summary of water discharge, and tonnages of dissolved solids

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Red River of the North basin		
Sheyenne River near Warwick, N. Dak	18,480	0.58
Souris River near Westhope, N. Dak	56,290	.77
Missouri River main stem		
Missouri River near Williston, N. Dak	15,350,000	.56
Missouri River at Pierre, S. Dak	12,060,000	.65
Missouri River at Nebraska City, Nebr	18,360,000	.57
Yellowstone River basin		
Yellowstone River at Billings, Mont	6,129,000	.24
Yellowstone River near Sidney, Mont	9,942,000	.53
Bighorn River at Bighorn, Mont	3,435,000	.80
Tongue River at Miles City, Mont	298,900	.53
Powder River near Locate, Mont	285,100	1.40
James River basin		
James River at Huron, S. Dak	59,920	1.05
Platte River basin		
North Platte River below Guernsey Reservoir, Wyo	889,300	.55
Platte River at Brady, Nebr	313,200	.72
Supply Canal (Tri-County Diversion) near Maxwell, Nebr	805,800	.74
South Platte River at Julesburg, Colo	379,900	1.34
Kansas River basin		
Republican River above Medicine Creek at Cambridge, Nebr	258,400	.40
Republican River near Hardy, Nebr	400,400	.30
Arkansas River basin		
Arkansas River below John Martin Reservoir, Colo	203,200	1.27
Arkansas River at Arkansas City, Kans	2,099,000	.66
Arkansas River at Ralston, Okla	6,259,000	.78
Cimarron River at Perkins, Okla	2,498,000	1.94
Arkansas River at Van Buren, Ark	39,910,000	.48
Canadian River near Whitefield, Okla	8,370,000	.54
Red River basin		
Red River at Denison Dam, near Denison, Tex	7,886,000	1.14
Sabine River basin		
Sabine River near Ruliff, Tex	6,983,000	.12
Neches River basin		
Neches River at Evadale, Tex	3,336,000	.11
Trinity River basin		
Trinity River at Romayor, Tex	9,186,000	.27
Brazos River basin		
Brazos River at Richmond, Tex	11,070,000	.43
Colorado River basin		
Colorado River at Austin, Tex	3,548,000	.27
Colorado River at Wharton, Tex	4,298,000	.27
Guadalupe River basin		
Guadalupe River at Victoria, Tex	1,429,000	.31
Nueces River basin		
Nueces River near Mathis, Tex	1,421,000	.28
Rio Grande basin		
Rio Grande above Culebra Creek, near Lobatos, Colo	382,800	.30
Rio Grande at Otowi Bridge, near San Ildefonso, N. Mex	1,297,000	.27
Rio Grande conveyance channel at San Marcial, N. Mex	334,400	.69
Rio Grande Floodway at San Marcial, N. Mex	637,800	.66
Rio Grande below Elephant Butte Dam, N. Mex	384,400	.69
Rio Grande near El Paso, Tex	136,800	.76
Rio Grande below Fort Quitman, Tex	3,750	.....
Rio Grande at Upper Presidio, Tex	3,830	.....
Rio Grande at Langtry, Tex	777,100	.67
Rio Grande at Laredo, Tex	3,012,000	.52
Rio Grande at Falcon Dam-U.S. tailrace	1,328,000	.59
Pecos River below Alamogordo Dam, N. Mex	116,600	1.90
Pecos River near Artesia, N. Mex	88,510	3.86
Pecos River below Red Bluff Dam, near Orla, Tex	43,900	10.9
Pecos River near Shumla, Tex	369,000	1.48
Colorado River main stem		
Colorado River near Glenwood Springs, Colo	2,409,000	.32
Colorado River near Cisco, Utah	8,486,000	.60

Summary of water discharge, and tonnages of dissolved solids

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Colorado River main stem—Continued		
Colorado River at Lees Ferry, Ariz.	17,320,000	0.64
Colorado River near Grand Canyon, Ariz.	17,500,000	.66
Colorado River below Hoover Dam, Ariz.-Nev.	8,088,000	1.08
Diversions and return flows at and below Imperial Dam		
Yuma Main Canal below Colorado River siphon at Yuma, Ariz.	314,800	1.21
Gunnison River basin		
Gunnison River near Grand Junction, Colo.	3,208,000	.59
Green River basin		
Green River at Green River, Utah	5,501,000	.51
San Juan River basin		
San Juan River near Archuleta, N. Mex.	1,501,000	.19
San Juan River near Bluff, Utah	2,597,000	.49
Little Colorado River basin		
Little Colorado River at Cameron, Ariz.	.....	.....
Virgin River basin		
Virgin River at Littlefield, Ariz.	100,200	2.83
Gila River basin		
Gila River at Kelvin, Ariz.	67,470	.79
Gila River below Gillespie Dam, Ariz.	13,580	7.56
Salt River at Stewart Mountain Dam, Ariz.	361,300	1.24
Verde River below Bartlett Dam, Ariz.	282,200	.33
Aqua Fria River below Lake Pleasant Dam, Ariz.	17,060	.37
Sevier Lake basin		
Sevier Lake near Lynndyl, Utah	85,270	1.67
Humbolt River basin		
Humboldt River near Rye Patch, Nev.	123,100	.70
San Joaquin River basin		
San Joaquin River near Biola, Calif.	134,000	.06
San Joaquin River near Vernalis, Calif.	442,000	.42
Mokelumne River at Woodbridge, Calif.	356,400	.05
Sacramento River basin		
Sacramento River at Knights Landing, Calif.	6,392,000	.17
Feather River at Nicolaus, Calif.	4,624,000	.10
American River at Fair Oaks, Calif.	2,196,000	.06
Columbia River main stem		
Columbia River at International Boundary	69,420,000	.11
Columbia River at Grand Coulee Dam, Wash.	78,430,000	.11
Yakima River basin		
Yakima River at Kiona, Wash.	2,798,000	.18
Snake River main stem		
Snake River near Heise, Idaho	4,651,000	.30
Snake River at King Hill, Idaho	8,064,000	.43
Snake River at Central Ferry near Pomeroy, Wash.	42,700,000	.19
Boise River basin		
Boise River at Notus, Idaho	1,410,000	.23
Columbia River main stem		
Columbia River at Maryhill Ferry, near Rufus, Oreg.	140,500,000	.14
Willamette River basin		
Willamette River at Salem, Oreg.	16,630,000	.07
Rogue River basin		
Rogue River at Grants Pass, Oreg.	2,948,000	.10

Runoff in the Souris River near Westhope in 1956 was less than in the only previous year of chemical-quality record, 1955. The water was less mineralized than in 1955 but of about the same percentage composition. The sampling station is located just below several reservoirs on the Souris River in the Lower Souris National Wildlife Refuge.

MISSOURI RIVER BASIN

Missouri River main stem.—The Missouri River is a highly regulated stream. Dams along the main stem that regulate flow and consequently influence the chemical quality of the water are Fort Peck, upstream from Williston, N. Dak.; Garrison, between Williston, N. Dak.; and Pierre, S. Dak.; and Fort Randall and Gavins Point, between Pierre, S. Dak., and Nebraska City, Nebr. In 1957 construction continued on the Oahe Dam which is also between Williston and Pierre. Although some of the water stored in the reservoirs is eventually to be used for irrigation, the water is now used almost exclusively for power generation, flood control, pollution control, municipal water supply, navigation, and recreation. Some water is released continously for power generation; high flows are impounded for flood control and for regulating the flow of the stream for navigation from early spring until late fall.

The severe drought in 1952–56 prevalent throughout much of the drainage basin, especially in the Plains States from Nebraska southward was broken in 1957; precipitation during the summer of 1957 was one of the highest of record for many parts of the drainage basin. Because of the close regulation of the flows in the Missouri River through the dams, the annual flows at the chemical-quality stations on the main stem did not reflect the increased runoff that accompanied the increased precipitation. However, the amount of water stored in the Missouri River reservoirs increased to record highs. Near the end of June 1957 the water stored behind the four upstream dams was 20,790,000 acre-feet, or more water than flowed past Nebraska City in the entire year of 1956. The most water previously stored behind the Missouri River dams was 18,100,000 acre-feet in 1948.

Both the amount of water and the total tons of dissolved solids passing Williston, Pierre, and Nebraska City were less than in previous years because of the increased storage of water in the reservoirs. The average chemical composition of the water passing Williston and Pierre during 1957 was very similar to that of the previous 6 years. The water passing Nebraska City was less mineralized in 1957 than in the previous several years because much of the flow at Nebraska City was the result of heavy runoff in the part of the basin downstream from Fort Randall Dam.

Yellowstone River basin.— During the 1957 water year, the chemical quality of the water within the basin was similar to that observed during the 1956 water year. Dissolved solids load was lower on major tributaries to the Yellowstone River by as much as 10 to 15 percent, although percentage compositions changed but little.

Percent sodium was essentially the same during both water years at all points. Due to increased precipitation, runoff was 10 to 20 percent greater than the long term average. There were no significant changes made with regard to impoundment and diversion, and no variations in methodology from that proposed for irrigation network stations.

James River basin.—The 1957 water year was the first complete year of water-quality record for the James River at Huron. Runoff in the basin in 1957 was low (59,920 acre-feet at Huron) compared to a 15-year average runoff of 172,300 acre-feet.

Platte River basin.—Abundant precipitation broke the drought that existed in the Platte River basin from 1952 to 1956. May 1957 was the wettest in Colorado's climatological history and the year had one of the heaviest snowfalls since 1938. Melting of a heavy snowpack in the high mountains and heavy spring thunderstorms throughout the basin caused high runoff.

The South Platte River is relatively unregulated, and the runoff at Julesburg was 379,900 acre-feet, the highest since 1949 and about six times as much as in either of the two previous years. Much of the runoff in the North Platte River was intercepted in the reservoirs, in which storage water had become badly depleted during the drought years. Little water was released from Lake McConaughy until mid-July, and the amounts released then were small in comparison with the amounts released in the preceding years.

Water in the South Platte River at Julesburg was considerably less mineralized in 1957 than in the several preceding years although it was still over twice as mineralized as the normal flow in the North Platte River below Guernsey Reservoir, Wyo. The water in the Platte River at Brady and Supply Canal near Maxwell was more mineralized in 1957 than in the several preceding years because the proportion of flow from the South Platte River was greater than in the preceding years.

Kansas River basin.—Drought conditions prevalent in the basin for several years ceased. The abundant rains in 1957 contrasted sharply with the scanty rainfall in 1956, which was the driest year of record for 44 of the 105 counties in the State of Kansas.

Runoff at Republican River above Medicine Creek at Cambridge was 258,400 acre-feet in 1957, which was the largest amount of runoff since the flood year of 1951 and was from three to four times the amount of runoff in each of three preceding years. The average composition of the water during 1957 was similar to that in

previous years despite the high runoff. Near Hardy, Nebr., the runoff was about one third greater than above Medicine Creek at Cambridge, and the water was less mineralized. The apparent improvement in water quality probably is caused principally by the effects of water storage in Harlan County Reservoir, which is between the two stations.

Regulation of flow by Trenton Dam (Swanson Lake) and Harlan County Reservoir on the Republican River, Enders Reservoir on Frenchman Creek, Harry Strunk Lake on Medicine Creek, and Bonny Reservoir on the South Fork Republican River tends to make the quality of water uniform throughout the year and from year to year. The average quality of water for irrigation continued to improve slightly in 1957, as it has each year since 1952.

LOWER MISSISSIPPI RIVER BASIN

Arkansas River basin.—Runoff in the Arkansas River basin in Oklahoma for the 1957 water year increased about 600 percent from the 1956 water year.

The weighted-average concentration for the Arkansas River below John Martin Reservoir for the 1957 water year was the lowest since the station was established as a daily record station. Some water was stored in John Martin Reservoir during the winter months, but all of the storage had been released by April. On May 16 heavy rains in the watershed contributed 9,449 acre-feet of water to the reservoir. Heavy rains on the main stem and Purgatoire River watersheds in the early summer months caused the storage pool to reach the highest level of record to that time.

Annual discharges were about twice the long-term averages at Arkansas City, Kans., Ralston, Okla., Cimarron River at Perkins, Okla., and Canadian River near Whitefield, Okla.

The increased runoff throughout the Arkansas River basin was reflected in corresponding decreased concentrations of dissolved solids at the four stations. The greatest decrease was observed in the Canadian River near Whitefield, Okla., where the weighted-average concentration of dissolved solids dropped from 2.67 tons per acre-foot in 1956 to 0.54 ton per acre-foot in 1957. At the four stations, the percent sodium and sodium-adsorption-ratios for 1957 were lowered from the 1956 year, and minimum percent sodium values at the Cimarron and Canadian River stations for 1957 were lowest for the period of record. The wide range in maximum and minimum concentration of various chemical constituents however, of chemical quality in the Arkansas River and its major western tributaries.

Red River basin.—Discharge of the Red River at Denison Dam near Denison, Tex., was more than twice the average for the 34 years of discharge record for the station. However, the weighted-average concentration of dissolved solids of 1.14 tons per acre-foot was only slightly lower than the average for the 7 years of network operation.

WESTERN GULF OF MEXICO BASIN

Heavy rainfall in the spring of 1957 produced excessive runoff in all streams from the Sabine River to the Nueces River. General improvement of water quality resulted. Largest percentages of decrease in dissolved-solids concentrations from the previous year occurred at Romayor on the Trinity River and at Richmond on the Brazos River. Quality of water in other streams is less sharply affected by variations in discharge.

Rio Grande basin.—Runoff in the Rio Grande basin was higher than for the past several years. The effect of higher runoff is shown in lower weighted-average concentration of analyses for stations in this basin. The waters of this basin are primarily of a mixed carbonate type. The solubility of these constituents is related more to the amount of dissolved carbon dioxide present than to the amount of solvent.

Inflow into Alamogordo Reservoir was almost twice that of the previous year resulting in water being released that had lower weighted-average concentration. The better quality of water was reflected in the weighted-average concentration of dissolved solids for the station on the Pecos River near Artesia, N. Mex.

However, drouth conditions continued in the Pecos River where the runoff at Orla, Tex., was less than half that of 1956, and the dissolved-solids concentrations increased 50 percent.

COLORADO RIVER BASIN

Colorado River main stem.—A considerable increase in discharge in the Colorado River basin was reflected by a decrease in dissolved-mineral concentrations for the stations at Glenwood Springs, Colo., and Cisco, Utah. Dissolved-solids concentration decreased by 21 percent and 27 percent respectively. There was no significant change in chemical character of the water at either station.

The relatively constant concentration of dissolved-mineral constituents for the station below Hoover Dam continues to show the mixing effect of Lake Mead.

Diversions and return flows at and below Imperial Dam.— The effect of the improvement in the quality of water extended downstream to the Yuma Main Canal. Prior to this year the weighted-average concentrations of dissolved solids for Yuma Main Canal station at Yuma, Ariz., had increased each year since 1953.

Gunnison River basin.— A threefold increase in discharge in the Gunnison River near Grand Junction, Colo., was accompanied by a 29 percent decrease in weighted-average concentration of dissolved solids. The concentration decreased by 288 ppm from the previous year. The chemical character of the water for the weighted-average concentration remained unchanged.

Green River basin.—Runoff in the Green River basin continued to increase for the third consecutive year. Relatively little change was noted in the average concentrations of dissolved solids for the station at Green River, Utah.

San Juan basin.— A 26 percent decrease in concentration of dissolved-mineral constituents was noted in the weighted average of the analyses for the San Juan River at Bluff, Utah. Discharge at this station was three times greater than for the preceding year. The weighted average concentrations show the quality of the water to be of the mixed type. During periods of low flow there is a considerable increase in the concentrations of the sodium and sulfate ions.

Virgin River basin.— The quality of the water remained relatively unchanged for the Virgin River at Littlefield, Ariz. A slight increase in runoff was accompanied by a 4 percent decrease in weighted-average concentration of dissolved solids. As compared with the previous two years the indirect variation may be the result of improved irrigation practices in the heavily irrigated Virgin River basin.

Gila River basin.— The lower weighted-average concentrations of the analyses on the Gila River at Kelvin, Ariz., was due to a decrease in the amount of water released from Coolidge Dam upstream. A small amount of storm runoff during the summer irrigation season accounted for the lower weighted-average concentration on the Gila River below Gillespie Dam.

THE GREAT BASIN

Sevier Lake basin.— Chemical character of the water and percent sodium remained the same as in 1956 for the Sevier River at Lynndyl, Utah. However, the weighted-average concentration of dissolved solids decreased 170 ppm, probably as the result of a continued

increase in storage at Sevier Bridge Reservoir. Total loads decreased by 24 percent with only a 3 percent decrease in runoff.

Humboldt River basin.—Runoff in the Humbolt River near Rye Patch, Nev., was 10 percent less than in 1956. Although the entire year is presented by samples, 97 percent of the runoff occurred during the period Apr. 1 to Sept. 15. The percentage composition and the weighted-average concentration of dissolved solids remained relatively unchanged as compared with the 1956 water year.

PACIFIC SLOPE BASINS IN CALIFORNIA

San Joaquin River basin.—Flow in the San Joaquin River basin was less than the previous year and approximately 50 percent of long term average for the basin. The outflow from the basin was more mineralized than outflow during the 1956 water year. The weighted average concentration of dissolved solids for the San Joaquin River at Vernalis increased from 0.18 to 0.42 ton per acre-foot.

Because of the impoundment of water behind Friant Dam and extensive irrigation in the valley, at times the San Joaquin Channel carries mainly irrigation return water of poor quality.

Sacramento River basin.— Flows in the Sacramento River basin were considerably less than the previous year, but approximately 90 percent of long term average. This year the concentration of dissolved-mineral constituents increased slightly except for the American River at Fair Oaks. A small improvement in water quality of the American River occurred, probably oweing to the operation of Folsom Reservoir just upstream from the station. This is the second year of the reservoir operation and a decrease in water-quality fluctuations of the river can be noted.

Release of water from Shasta Reservoir for salinity control in the delta area and the large quantities of dilute waters from the Feather River and American River help to maintain better water quality in the Sacramento River than in the water from San Joaquin River.

PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER

Columbia River main stem.—The average concentration of dissolved solids in tons per acre-foot, for Columbia River at international boundary was approximately the same as that for the previous four years. Downstream at Grand Coulee Dam the tons per acre-foot value was the same as last year, although the water discharge was

80 percent of the 1956 water year. Consequently the total salt load decreased 20 percent from the 10,960,000 tons computed for 1956.

Yakima River basin.— The slight increases in tons per acre-foot can be explained by the 45 percent decrease in discharge from the preceding year. The total salt load also decreased to 60 percent of the 1956 value.

SNAKE RIVER BASIN

Percentage composition for the water in the upper reaches of the Snake River remained relatively constant compared with previous years. Weighted average dissolved solids increased by 6 percent from 1956, probably as a result of a 28 percent decrease in runoff past the Heise station. Total loads decreased by 24 percent for the 1957 water year.

Snake River main stem.— The record for the Snake River at King Hill was similar to previous years with little or no variation in tons per acre-foot, SAR, percent sodium and dissolved solids. Downstream at Central Ferry there were minor increases in concentrations of mineral constituents over the previous year.

Boise River basin.— Minor increases in total salt concentration and tons per acre-foot can be attributed to slight decreases in discharge; however, the SAR and percent sodium remained the same.

PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN

Willamette River basin.—Discharge was nearly average for this station and total salt concentration and tons per acre-foot values were very nearly the same as preceding years, exclusive of the 1956 water year, when the runoff was 61 percent above average.

Rogue River basin.—The total salt load was 62 percent of the previous year but tons per acre-foot and SAR values were nearly the same.

CRITERIA OF WATER QUALITY

Many different classifications of water for irrigation appear in the literature; however, most of the development in this field has been made in the last 30 years. Scofield and Headley (1921) were among the first important contributors to water-quality criteria; they pointed out the hazards from the use of high-sodium water. A brief historical resume of these early developments is given in Water-Suppply Paper 1264, the first of this series of reports.

Although the above classifications have relied principally on specific conductance as the criterion for total salt concentrations, investigators generally place emphasis on the composition of the water, as indicated by the analysis of dissolved constituents in equivalents per million. For example, Eaton (1950) discusses precipitation of calcium and magnesium carbonate and its effects on the sodium percentage in the soil solution. Eaton's suggestion of "residual sodium carbonate" in irrigation waters as related to the base exchange of the soil has assumed added importance in soil permeability studies.

Thorne and Thorne (1951) in developing a system for classifying Utah waters for irrigation used a diagram similar to that of Wilcox (1948) and designated categories by a series of numbers and letters: 1A.....5E. The numbers 1 to 5 denote increasing concentrations of dissolved solids, and the letters A to E increasing sodium percentages in the water with increasing probabilities for developing alkali soil conditions. Class 1A water, in which specific conductance ranges from 0 to 750 micromhos and the percent sodium from 0 to an approximate maximum of 70, can be used safely on most soils. Class 5E waters, those having specific conductance greater than 5,000 micromhos and percent sodium of about 90 and above, are generally unsatisfactory for irrigation.

The United States Salinity Laboratory Staff (1954) recently released a classification that incorporates many of the desirable features of the early classifications together with more recent developments. Empirical equations are used in developing a diagram for the classification of irrigation waters. Although the classification embodies both research and field observations, it is tentative and should be used for general guidance only.

A. Salinity hazard

Waters are divided into four classes: low salinity, medium salinity, high salinity, and very high salinity, the dividing points between classes being 250, 750, and 2,250 micromhos per centimeter. They range from water that can be used for irrigation of most crops on most soils to that which is not suitable for irrigation under ordinary conditions.

B. Sodium hazard

The Salinity Laboratory introduced the term "sodium-adsorption-ratio (SAR)," a ratio for irrigation waters and soil extracts used to express the relative activity of sodium ions in exchange reactions with the soil. This ratio is expressed by the equation.

$$SAR = \frac{Na^{+}}{\sqrt{\frac{Ca^{++}+Mg^{++}}{2}}}$$

where the concentrations of the ions are expressed in milliequivalents per liter (or equivalents per million for most irrigation waters). It has more significance than percent sodium for use as an index of the sodium or alkali hazard of the water because it relates more directly to the adsorption of sodium by the soil.

Waters are divided into four classes with respect to sodium or alkali hazard: low, medium, high, and very high, depending upon the SAR value and the specific conductance. At a conductance of 100 micromhos per centimeter the dividing points are at SAR values of 10, 18, and 26, but at 5,000 micromhos the corresponding dividing points are at SAR values of approximately 2.5, 6.5, and 11. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

C. Boron hazard

In assessing water quality on the basis of boron only, the classification uses the limits proposed by Scofield (1936). This grouping involves the ranges for sensitive, semitolerant, and tolerant crops, with respect to boron, for each of five classes.

D. Bicarbonate ion hazard

The effect of bicarbonate ion concentration on water quality is expressed in terms of "residual sodium carbonate" (RSC) which is defined by the equation:

$$RSC = (HCO_3^{-} + CO_3^{=}) - (Ca^{++} + Mg^{++})$$

Then in appraising quality of irrigation water with the above classifications, the Salinity Laboratory Staff recommends that first consideration be given to salinity and alkali hazards, then to independent characteristics, boron or toxic elements, any one of which may change the quality rating. Factors such as drainage and management practices, largely determine the effectiveness of irrigation activity.

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PART 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

RED RIVER OF THE NORTH BASIN

SHEYENNE RIVER NEAR WARWICK, N. DAK.

LOCATION.--At gaging station at highway bridge, 3.3 miles south of Warwick, Benson County.
DRAINAGE AREA.--2,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1957.
Water temperatures: January 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,760 micromhos Mar. 12; minimum daily, 333 micromhos Mar. 27.
Percent sodium: Maximum, 57 Aug. 19 to Sept. 1; minimum, 29 Jan. 27 to Feb. 13.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 1,940 micromhos Feb. 1, 1955; minimum daily, 240 micromhos Apr. 4, 1955.
Percent sodium: Maximum, 66 July 8-18, 1955; minimum, 11 Feb. 2, 1955.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956 .	372	--	5.20		3.78	--	a6.56	--	--	--	--	--	521	0.71	264	42	2.3	821	8.2
Nov. 1-30	1,410	--	5.72		3.35	--	b6.69	--	--	--	--	--	533	.72	1,020	37	2.0	829	8.2
Dec. 1-31	420	25	3.19	3.21	3.78	0.16	7.26	2.71	0.45	0.01	0.01	0.19	601	.82	344	37	2.1	926	8.1
Jan. 1-26, 1957 .	151	--	6.84		4.18	--	7.57	--	--	--	--	--	638	.87	131	38	2.3	958	7.9
Jan. 27-Feb. 13.	36	--	6.72		2.78	--	6.23	--	--	--	--	--	508	.69	25	29	1.5	781	7.9
Feb. 14-25	27	--	6.48		3.52	--	7.01	--	--	--	--	--	587	.80	22	35	2.0	881	8.0
Feb. 26-Mar. 5.	95	--	9.76		7.96	--	11.46	--	--	--	--	--	1,030	1.40	133	45	3.6	1,500	8.2
Mar. 6-8	155	--	8.04		5.13	--	9.03	--	--	--	--	--	791	1.08	167	39	2.6	1,180	8.2
Mar. 9-10	149	--	6.72		3.87	--	c7.25	--	--	--	--	--	634	.86	128	37	2.1	956	8.4
Mar. 11-13	220	--	9.16		9.87	--	d11.29	--	--	--	--	--	1,110	1.51	332	52	4.6	1,610	8.3

Mar. 14-17, 1957	151	--	5.28	4.61	--	6.21	--	--	--	--	--	612	0.83	125	47	2.8	929	8.2
Mar. 18-20	139	--	3.94	3.05	--	4.49	--	--	--	--	--	443	.60	83	44	2.2	676	7.8
Mar. 21-31	1,770	13	1.50 | 1.10	1.22	0.23	2.72	0.96	0.18	0.01	0.07	0.11	250	.34	602	30	1.1	383	7.5
Apr. 1-3	518	--	2.98	2.78	--	3.88	--	--	--	--	--	364	.50	259	48	2.3	565	7.9
Apr. 4-11.....	1,050	--	2.34	1.78	--	2.90	--	--	--	--	--	268	.36	378	43	1.6	414	7.8
Apr. 12-24	1,050	--	2.66	2.26	--	3.46	--	--	--	---	--	295	.40	420	46	2.0	477	7.8
Apr. 25-May 12 .	1,410	--	4.00	2.61	--	4.87	--	--	--	--	--	392	.53	747	39	1.8	622	8.1
May 13-31	1,260	--	5.20	3.35	--	6.39	--	--	--	--	--	503	.68	857	39	2.1	789	8.0
June 1-July 1 ...	1,290	16	2.79 | 2.83	4.00	.21	7.03	2.10	.56	.02	.02	.20	558	.76	980	41	2.4	872	8.0
July 2-16	344	--	5.06	3.22	--	6.41	--	--	--	--	--	466	.63	217	39	2.0	748	7.7
July 17-26	956	--	3.34	1.91	--	4.06	--	--	--	--	--	315	.43	411	36	1.5	498	7.8
July 27-Aug. 18 .	797	--	4.56	3.52	--	5.93	--	--	--	--	--	471	.64	510	44	2.3	742	7.8
Aug. 19-Sept. 1 .	1,030	--	4.66	6.09	--	7.62	--	--	--	--	--	641	.87	896	57	4.0	983	7.9
Sept. 2-20	3,290	23	1.95 | 1.39	1.91	.20	3.95	1.23	.17	.02	.01	.15	325	.44	1,450	35	1.5	511	7.9
Sept. 21-30	387	--	4.66	2.13	--	5.10	--	--	--	--	--	401	.55	213	31	1.4	633	7.8
Total or weighted average [e]....	18,480	--	4.20	2.91	--	5.15	--	--	--	--	--	427	0.58	10,710	41	2.0	665	--

a Includes 0.20 equivalent per million of carbonate (CO_3).
b Includes 0.17 equivalent per million of carbonate (CO_3).
c Includes 0.27 equivalent per million of carbonate (CO_3).
d Includes 0.33 equivalent per million of carbonate (CO_3).
e Represents 100 percent of runoff for water year October 1956 to September 1957.

RED RIVER OF THE NORTH BASIN--Continued

SOURIS RIVER NEAR WESTHOPE, N. DAK.

LOCATION.--At gaging station, 1,200 feet upstream from second crossing of international boundary, 1 mile downstream from Fish and Wildlife Service dam, 357, 7 miles northeast of Westhope, Bottineau County, and 11 miles downstream from Boundary Creek.
DRAINAGE AREA.--17,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1957.
Water temperatures: September 1954 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,320 micromhos on several days in January and February; minimum daily, 232 micromhos Apr. 18.
Percent sodium; Maximum, 44 Aug. 7 to Sept. 30; minimum, 29 Mar. 26 to Apr. 12.
EXTREMES, 1954-57.--Specific conductance: Maximum daily (1956-57), 1,320 micromhos on several days in January and February 1957; minimum daily (1954-55, 1956-57), 232 micromhos Apr. 18, 1957.
Percent sodium: Maximum, 48 Sept. 10-26, 1954; minimum, 29 Mar. 26 to Apr. 12, 1957.
REMARKS.--Values reported for dissolved solids are residue on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1508.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-24, 1956 .	4,670	--	1.95	2.67	3.22	--	5.05	2.69	0.37	--	0.04	0.16	484	0.66	3,080	40	2.1	749	8.2
Oct. 25-Nov. 14.	11,060	--	2.84	3.08	3.48	--	a 5.93	3.21	.48	--	.08	.18	576	.78	8,630	36	2.0	880	8.3
Nov. 15-30	2,360	--	8.89	4.11	4.31	--	b 6.51	4.50	.62	--	.08	.19	744	1.01	2,380	34	2.2	1,100	8.4
Dec. 1-11.....	1,220	--	4.14	4.46	4.26	--	c 8.14	4.87	.65	--	.04	.20	780	1.06	1,290	32	2.1	1,150	8.3
Dec. 12-31	2,160	12	4.84	4.26	4.61	0.33	d 8.76	4.79	.82	0.02	.06	.23	837	1.14	2,460	33	2.2	1,240	8.3
Jan. 1-22, 1957 .	2,090	--	4.54	4.02	4.39	--	7.90	4.64	.37	--	.08	.15	787	1.07	2,240	34	2.1	1,160	8.1
Jan. 9[e]	99	--	8.28		--	--	7.69	--	--	--	--	--	--	--	--	--	--	1,130	8.0
Jan. 23-Feb. 6..	1,010	--	3.99	5.93	5.13	--	9.06	5.21	.93	--	.12	.15	898	1.22	1,230	33	2.3	1,310	8.0
Feb. 7	56	16	5.29	4.49	4.83	.36	8.92	5.06	.96	.03	.15	.21	897	1.22	68	32	2.2	1,310	7.4
Feb. 8-28	1,070	--	4.84	4.36	5.48	--	8.39	5.16	1.02	--	.16	.12	857	1.17	1,250	37	2.6	1,280	7.9

Mar. 1-10, 1957.	744	--	3.94	3.62	4.18	---	6.70	4.02	0.82	--	.18	.10	705	.96	714	36	2.1	1,060	7.9
Mar. 11-18	853	11	3.79	3.31	3.39	0.28	6.23	3.71	.76	0.02	.18	.11	651	.89	759	31	1.8	985	8.0
Mar. 19-25	541	--	1.65	1.39	1.48	--	2.85	1.37	.34	--	.11	.07	285	.39	211	32	1.2	452	7.6
Mar. 26-Apr. 12 .	623	--	1.30	1.14	1.09	--	2.38	1.02	.23	--	.07	.06	226	.31	193	29	1.0	362	7.7
Apr. 13-18	154	--	.90	.80	.91	--	1.84	.69	.17	--	.01	.05	162	.22	34	34	1.0	266	7.3
Apr. 19-26	236	--	1.55	1.61	1.74	--	3.23	1.31	.31	--	.08	.08	302	.41	97	35	1.4	483	7.7
Apr. 27-May 1 ..	500	--	1.75	1.81	2.00	--	3.70	1.54	.37	--	.05	.10	324	.44	220	35	1.5	542	8.0
May 2-13	4,800	--	2.00	2.18	2.39	--	4.03	2.17	.48	--	.05	.13	404	.55	2,640	36	1.6	644	7.6
May 14-19	2,100	--	2.25	2.53	2.61	--	4.56	2.60	.45	--	.03	.14	450	.61	1,280	34	1.7	713	7.6
May 20-June 15 .	4,760	--	2.59	3.05	3.05	--	5.28	3.06	.48	--	.06	.17	525	.71	3,380	34	1.8	809	7.4
June 16-30	7,800	7.9	1.70	3.28	3.18	.28	4.75	3.04	.45	.02	.11	.18	512	.70	5,460	38	2.0	762	7.6
July 1-Aug. 6 ...	4,820	14	1.50	2.98	3.57	.28	4.85	2.85	.48	.02	.18	.20	502	.68	3,280	43	2.4	772	7.6
Aug. 7-Sept. 30 .	2,660	27	2.54	3.46	5.00	.36	7.01	3.29	.68	.02	.15	.30	668	.91	2,420	44	2.9	991	7.8
Total or weighted average [f]	56,290	--	2.59	3.19	3.48	--	5.69	3.21	0.51	--	0.09	0.17	566	0.77	43,320	37	2.0	859	--

a Includes 0.13 equivalent per million of carbonate (CO_3).
b Includes 0.53 equivalent per million of carbonate (CO_3).
c Includes 0.47 equivalent per million of carbonate (CO_3).
d Includes 0.53 equivalent per million of carbonate (CO_3).
e Not included in total or weighted average.
f Represents 100 percent of runoff for water year October 1956 to September 1957.

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PART 6. MISSOURI RIVER BASIN

MISSOURI RIVER MAIN STEM

MISSOURI RIVER NEAR WILLISTON, N. DAK.

LOCATION.--At gaging station at Lewis and Clark Highway Bridge, 5 miles southwest of Williston, Williams County, and 25 miles downstream from Yellowstone River.
DRAINAGE AREA.--164,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: May 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 890 micromhos Dec. 20; minimum daily, 317 micromhos June 17.
Percent sodium: Maximum, 43 Apr. 25-30; minimum, 28 June 4-13.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 919 micromhos Jan. 9, 1955; minimum daily, 317 micromhos June 17, 1957.
Percent sodium: Maximum, 43 Apr. 25-30, 1957; minimum, 24 May 27 to June 2, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-30, 1956 .	762,000	--	5.00		2.87	--	3.38	--	--	--	--	--	498	0.68	518,200	36	1.8	756	7.9
Oct. 31-Nov. 26 .	770,800	--	5.08		2.91	--	3.38	--	--	--	--	--	507	.69	531,900	36	1.8	765	7.7
Nov. 27-Dec. 5 .	255,300	--	5.48		2.91	--	3.65	--	--	--	--	--	540	.73	186,400	35	1.8	797	8.0
Dec. 18-24	212,200	--	5.96		3.13	--	3.92	--	--	--	--	--	590	.80	169,800	34	1.8	855	8.0
Dec. 25-Jan. 22, 1957	767,600	16	2.05	3.19	2.65	0.10	3.56	3.91	0.31	0.05	0.03	0.15	514	.70	537,300	33	1.6	759	8.0
Jan. 23-Feb. 9..	414,700	--	5.66		2.74	--	3.77	--	--	--	--	--	535	.73	302,800	33	1.6	799	7.8
Feb. 10-28.....	498,800	--	5.24		2.61	--	3.47	--	--	--	--	--	499	.68	339,200	33	1.6	743	7.8
Mar. 1-14	465,900	--	4.40		2.48	--	2.97	--	--	--	--	--	444	.60	279,500	36	1.7	678	7.8
Mar. 15-31	636,900	15	1.95	2.69	2.74	.10	2.93	4.16	.39	.03	.03	.10	476	.65	444,000	37	1.8	736	7.8
Apr. 1-13	481,000	--	4.98		2.91	--	3.26	--	--	--	--	--	508	.69	331,900	37	1.8	755	7.4
Apr. 14-23	280,300	--	5.18		3.05	--	3.46	--	--	--	--	--	526	.72	201,800	37	1.9	790	7.8
Apr. 24	30,550	--	5.04		2.61	--	3.21	--	--	--	--	--	494	.67	20,470	34	1.7	739	7.4
Apr. 25-30	198,300	--	4.86		3.61	--	3.28	--	--	--	--	--	556	.76	150,700	43	2.3	830	7.5

May 1-11, 1957..	332,800	--	5.04		3.22	--	3.33	--	--	--	--	--	545	.74	246,300	39	2.0	795	8.1
May 12-26	928,700	--	3.86		2.18	--	2.75	--	--	--	--	--	397	.54	501,500	36	1.6	591	8.1
May 27-June 3 ..	548,000	--	3.44		1.83	--	2.61	--	--	--	--	--	348	.47	257,600	35	1.4	518	7.5
June 4-13	1,285,000	19	2.15	1.01	1.26	0.07	2.33	1.85	0.12	0.02	0.04	0.08	281	.38	488,300	28	1.0	426	7.7
June 14-16	406,200	--	3.56		1.65	--	2.74	--	--	--	--	--	339	.46	186,900	32	1.2	510	7.5
June 17-20.....	525,800	--	2.48		1.44	--	2.00	--	--	--	--	--	252	.34	178,800	37	1.3	394	7.5
June 21-30	1,222,000	--	3.16		1.65	--	2.44	---	--	--	--	--	310	.42	513,200	34	1.3	474	7.6
July 1-25	2,132,000	--	3.00		1.52	--	2.36	--	--	--	--	--	286	.39	831,500	34	1.2	452	7.7
July 26-Aug. 27	1,020,000	--	3.98		2.31	--	2.92	--	--	--	--	--	396	.54	550,800	37	1.6	615	7.8
Aug. 28-Sept. 30	944,700	18	2.84	1.96	2.91	.12	3.33	4.21	.34	.04	.03	.16	487	.66	623,500	37	1.9	742	7.8
Total or weighted average [a]....	15,120,000	--	4.12		2.22	--	2.92	--	--	--	--	--	407	0.55	8,362,000	35	1.6	617	--
Total or weighted average [b]....	15,350,000	--	4.14		2.26	--	2.92	--	--	--	--	--	409	0.56	8,539,000	35	1.6	620	--

a Represents 98 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1956 to September 1957.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.

LOCATION.--At gaging station at Chicago and North Western Railway bridge at Pierre, Hughes County, 250 feet upstream from bridge on U. S. Highway 14-83, and 1.2 miles upstream from Bad River.
DRAINAGE AREA.--243,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,150 micromhos May 25-26; minimum daily, 496 micromhos Oct. 29.
Percent sodium: Maximum, 44 May 18-24; minimum, 34 Oct. 1 to Nov. 9.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 1,150 micromhos May 25-26, 1957; minimum daily, 394 micromhos July 3, 1951.
Percent sodium: Maximum, 45 May 1-3, 1953; minimum, 27 Jan. 24-27, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-Nov. 9, 1956	1,283,000	--	3.40		1.78	--	2.49	--	--	--	--	--	347	0.47	603,000	34	1.4	513	7.9
Nov. 10-Dec. 11.	814,300	--	3.76		2.04	--	2.75	--	--	--	--	--	367	.50	407,200	35	1.5	563	7.9
Dec. 12-28.....	339,200	9.1	2.50	1.46	2.22	0.08	2.98	3.12	0.23	0.02	0.00	0.15	394	.54	183,200	35	1.6	607	8.0
Dec. 29-Jan. 11, 1957.....	298,500	--	3.76		2.09	--	2.82	--	--	---	--	--		.50	149,300	36	1.5	577	8.0
Jan. 12-31.....	402,600	--	4.48		2.48	--	3.34	--	--	--	--	--	438	.60	241,600	36	1.7	671	
Feb. 1-28	733,900	--	4.52		2.70	--	3.26	--	--	--	--	--	463	.63	462,400	37	1.8	695	7.5
Mar. 1-31	902,900	11	2.84	1.80	2.91	.11	3.20	3.98	.31	.04	.00	.14	472	.64	577,900	38	1.9	715	8.0
Apr. 1-9	318,300	--	4.62		2.83	--	3.21	--	--	--	--	--	467	.64	203,700	38	1.9	713	7.9
Apr. 10-30.....	796,200	--	5.04		3.18	--	3.36	--	--	--	--	--	517	.70	557,300	39	2.0	792	7.8
May 1-17	579,000	--	4 98		3.05	--	3.47	--	--	--	--	--	508	.69	399,500	38	1.9	773	7.9
May 18-24	406,800	--	5.14		3.96	--	3.20	--	--	--	--	--	592	.81	329,500	44	2.5	874	8.0
May 25-26	171,000	--	7.08		5.39	--	a2.92	--	--	--	--	--	872	1.19	203,500	43	2.9	1,150	8.3

May 27-June 11, 1957	771,000	12	3.74	1.72	3.65	.18	3.03	5.98	.34	.03	.01	.15	601	.82	632,200	39	2.2	875	7.6
June 12-18	294,500	--	6.04		3.83	--	3.23	--	--	--	--	--	659	.90	265,100	39	2.2	942	7.9
June 19-July 5 ..	688,100	--	5.04		3.35	--	3.23	--	--	--	--	--	538	.73	502,300	40	2.1	807	7.5
July 6-31	901,300	--	4.64		2.96	--	3.20	--	--	--	--	--	492	.67	603,900	39	2.0	743	7.8
Aug. 1-Sept. 3 ..	1,429,000	--	4.64		2.83	--	3.15		--	--	--	--	476	.65	928,900	38	1.9	721	7.5
Sept. 4-30	927,700	8.8	2.74	1.58	2.48	.11	2.98	3.62	.28	.03	.00	.20	440	.60	556,600	36	1.7	667	7.5
Total or weighted average [b]	12,060,000	--	4.58		2.83	--	3.08	--	--	--	--	--	476	0.65	7,807,000	38	1.9	714	--

a Includes 0.13 equivalent per million of carbonate (CO_3).
b Represents 100 percent of runoff for water year October 1956 to September 1957.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT NEBRASKA CITY, NEBR.

LOCATION.--At gaging station at Waubonsie Highway bridge at Nebraska City, Otoe County.
DRAINAGE AREA.--414,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1957.
Water temperatures: May 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 839 micromhos Sept. 17; minimum daily, 387 micromhos June 18.
Percent sodium; Maximum, 41 July 31 to Aug. 27; minimum, 26 June 18-19.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 936 micromhos Jan. 6, 1953; minimum daily, 361 micromhos Mar. 29, 1951.
Percent sodium: Maximum, 48 May 29, 1956; minimum, 18 Mar. 27-29, 1951.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956 .	1,867,000	--	4.16		2.48	--	2.90	--	--	--	--	--	429	0.58	1,083,000	37	1.7	665	7.9
Nov. 1-25.....	852,700	--	3.90		2.09	--	2.87	--	--	--	--	--	386	.52	443,400	35	1.5	606	7.6
Nov. 26-Dec. 9..	308,900	--	4.08		2.09	--	3.10	--	--	--	--	--	396	.54	166,800	34	1.5	608	7.7
Dec. 10-15.....	95,960	--	4.66		2.44	--	3.39	--	--	--	--	--	446	.61	58,540	34	1.6	685	7.7
Dec. 16-26	228,000	19	2.89	1.27	2.26	0.11	3.10	2.75	0.71	0.02	0.03	0.08	404	.55	125,400	35	1.6	628	7.6
Dec. 27-Jan. 9, 1957	366,000	--	3.76		1.91	--	2.85	--	--	--	--	--	369	.50	183,000	34	1.4	572	7.8
Jan. 10-16.....	84,850	--	4.72		2.44	--	3.44	--	---	--	--	--	453	.62	52,610	34	1.6	695	8.0
Feb. 9-23	411,200	--	3.52		1.91	--	2.67	--	--	--	--	--	357	.49	201,500	35	1.4	556	7.9
Feb. 24	24,000	--	3.08		1.52	--	2.39	--	--	--	--	--	294	.40	9,600	33	1.2	465	7.8
Feb. 25-26	48,790	--	3.96		2.09	--	2.92	--	--	--	--	--	388	.53	25,860	35	1.5	603	8.0
Feb. 27-Mar. 1..	94,810	--	3.72		2.04	--	2.84	--	--	--	--	--	373	.51	48,350	35	1.5	574	7.9
Mar. 2-5.....	149,200	--	3.30		1.70	--	2.61	--	--	--	--	--	329	.45	67,140	34	1.3	499	8.0
Mar. 6-31	755,900	24	2.50	1.14	1.91	.23	2.84	2.12	.62	.03	.06	.09	355	.48	362,800	33	1.4	554	7.8
Apr. 1-30	1,300,000	--	3.74		1.74	--	2.87	--	---	--	--	--	355	.48	624,000	32	1.3	552	7.6
May 1-31	2,180,000	--	4.00		2.09	--	2.98	--	--	--	--	--	381	.52	1,134,000	34	1.5	600	7.9

June 1-16, 1957.	1,199,000	16	2.94 | 1.40	2.35	.17	3.06	3.14	.54	.03	.04	.11	427	.58	695,400	34	1.6	654	7.7
June 17.....	174,100	--	3.24	1.52	--	2.66	--	--	--	--	--	300	.41	71,380	32	1.2	474	8.2
June 18-19.....	358,200	--	2.84	1.00	--	2.39	--	--	--	--	--	252	.34	121,800	26	.8	392	8.2
June 20-28.....	845,900	--	3.44	1.31	--	2.61	--	--	--	--	--	317	.43	363,700	28	1.0	486	7.9
June 29-July 8..	853,100	--	3.96	1.48	--	2.87	--	--	--	---	--	350	.48	409,500	27	1.1	551	7.5
July 9-30.....	1,551,000	--	4.56	2.48	---	3.13	--	--	--	--	--	455	.62	961,600	35	1.6	698	7.5
July 31-Aug. 27.	1,859,000	--	4.76	3.35	--	2.98	--	--	--	--	--	537	.73	1,357,000	41	2.2	800	7.6
Aug. 28-Sept. 30	2,284,000	13	3.24 | 1.48	3.31	.17	2.98	4.54	.51	.03	.02	.20	518	.70	1,599,000	40	2.2	780	7.5
Total or weighted average [a]	17,890,000	--	4.14	2.35	--	2.93	--	--	--	--	--	418	0.57	10,170,000	36	1.6	643	--
Total or weighted average [b]	18,360,000	--	4.14	2.35	--	2.93	--	--	--	--	--	418	0.57	10,420,000	36	1.6	642	--

a Represents 97 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water October 1956 to September 1957.

YELLOWSTONE RIVER BASIN

YELLOWSTONE RIVER AT BILLINGS, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 87, 1 mile northeast of Billings, Yellowstone County, and 12 miles upstream from Pryor Creek.
DRAINAGE AREA.--11,870 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 723 micromhos Apr. 23; minimum daily, 153 micromhos June 10.
Percent sodium: Maximum, 31 Apr. 23-27; minimum, 18 May 31 to June 16.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 1,210 micromhos Feb. 2, 1951; minimum daily, 129 micromhos May 22, 1954.
Percent sodium: Maximum, 37 Dec. 1, 1950; minimum, 13 May 20-23, June 15, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956..	187,900	--	3.42		1.44	--	2.74	--	--	--	--	--	298	0.41	77,040	30	1.1	475	7.6
Nov. 1-Dec. 6...	241,200	--	3.44		1.30	--	2.69	--	--	--	--	--	293	.40	96,480	28	1.0	473	7.8
Dec. 7-10.....	17,810	--	4.76		1.78	--	3.46	--	--	--	--	--	418	.57	10,150	27	1.1	631	7.8
Dec. 11-31.....	122,900	17	2.25	1.21	1.22	0.07	2.67	1.94	0.21	0.02	0.02	0.21	293	.40	49,160	26	.9	464	7.6
Jan. 1-8, 1957...	33,620	--	3.68		1.35	--	2.80	--	--	--	--	--	323	.44	14,790	27	1.0	497	7.9
Jan. 9-14.....	14,350	--	4.66		1.78	--	3.52	--	--	--	--	--	403	.55	7,890	28	1.2	612	8.0
Jan. 15-25.....	33,620	--	3.92		1.39	--	2.98	--	--	--	--	--	332	.45	15,130	26	1.0	516	7.8
Jan. 26.....	2,480	--	2.04		.74	--	1.48	--	--	--	--	--	174	.24	595	27	.7	288	7.6
Jan. 27-Feb. 26..	142,200	--	3.46		1.22	--	2.66	--	--	--	--	--	304	.41	58,300	26	.9	470	7.6
Feb. 27-Mar. 13.	99,850	--	3.08		1.22	--	2.36	--	--	--	--	--	271	.37	36,940	28	1.0	422	7.5
Mar. 14-31.....	101,400	16	2.05	1.25	1.30	.08	2.52	1.77	.24	.03	.01	.23	286	.39	39,550	28	1.0	453	7.8
Apr. 1-22.....	128,300	--	3.32		1.35	--	2.56	--	--	--	--	--	293	.40	51,320	29	1.0	463	7.6
Apr. 23-27.....	40,360	--	4.26		1.87	--	2.90	--	--	--	--	--	389	.53	21,390	31	1.3	594	7.7
Apr. 28-May 6...	82,430	--	3.34		1.04	--	2.61	--	--	--	--	--	253	.34	28,030	24	.8	402	7.8
May 7-30.....	854,600	--	2.10		.56	--	1.95	--	--	--	--	--	167	.23	196,600	21	.6	262	7.7
May 31-June 16..	1,407,000	11	1.10	.32	.33	.03	1.38	.33	.02	.02	--	.05	112	.15	211,000	18	.4	180	7.3
June 17-25.....	603,800	--	2.00		.65	--	1.87	--	--	--	--	--	165	.22	132,800	25	.7	265	7.8

June 26-July 19, 1957	1,154,000	--	1.42		.42	--	1.38	--	--	--	--	--	116	.16	184,600	23	.5	192	7.3
July 20-Aug. 9	370,800	--	1.84		.74	--	1.70	--	--	--	--	--	151	.21	77,870	29	.8	256	7.3
Aug. 10-27	166,400	--	2.62		1.09	--	2.28	--	--	--	--	--	224	.30	49,920	29	1.0	367	7.4
Aug. 28-Sept. 30	323,800	18	1.95	1.23	1.30	.11	2.66	1.66	.17	.03	--	.17	275	.37	119,800	28	1.0	449	7.5
Total or weighted average [a]	6,129,000	--	2.14		0.70	--	1.88	--	--	--	--	--	177	0.24	1,471,000	25	0.7	285	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Highway 23, 2 miles south of Sidney, Richland County, 4½ miles downstream from gaging station, 2 miles downstream from Fox Creek, and 30 miles upstream from mouth.
DRAINAGE AREA.--69,450 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1957.
Water temperatures: January 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,090 micromhos Jan. 18-21; minimum daily, 355 micromhos July 2.
Percent sodium: Maximum, 43 Apr. 26 to May 1; minimum 25 June 8-14.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 257 micromhos June 15, 1956.
Percent sodium: Maximum, 48 May 1-30, 1953; minimum, 22 May 21 to June 4, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for gaging station near Sidney for water year October 1956 to September 1957 given in WSP 1509. No appreciable inflow between gaging station and sampling station.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-31, 1956	399,600	--	5.38		3.31	--	3.33	--	--	--	--	--	574	0.78	311,700	38	2.0	837	7.7
Nov. 1-17	293,000	--	5.40		3.18	--	3.26	--	--	--	--	--	551	.75	219,800	37	1.9	814	7.5
Nov. 18-19	34,120	--	3.54		1.87	--	2.15	--	--	--	--	--	356	.48	16,380	35	1.4	542	7.4
Nov. 20-30	171,800	--	5.44		2.91	--	3.31	--	--	--	--	--	538	.73	125,400	35	1.8	801	7.5
Dec. 1	14,500	--	5.48		2.96	--	3.34	--	--	--	--	--	536	.73	10,580	35	1.8	793	7.9
Dec. 2	14,680	--	4.36		2.35	--	2.66	--	--	--	--	--	436	.59	8,660	35	1.6	649	7.9
Dec. 3-6	52,900	--	6.08		3.31	--	3.69	--	--	--	--	--	602	.82	43,380	35	1.9	876	7.8
Dec. 7-23	183,100	14	4.24	2.60	3.92	0.11	4.28	6.20	0.34	0.03	0.02	0.26	687	.93	170,300	36	2.1	988	7.9
Dec. 24-Jan. 15, 1957	267,800	--	5.70		3.00	--	3.51	--	--	--	--	--	561	.76	203,500	34	1.8	823	8.0
Jan. 16-29	101,200	--	7.60		4.04	--	4.62	--	--	--	--	--	755	1.03	104,200	35	2.1	1,070	8.0
Jan. 30-Feb. 14	131,900	---	6.62		3.13	--	4.03	--	--	--	--	--	642	.87	114,800	32	1.7	921	7.9
Feb. 15-27	133,100	--	5.52		2.74	--	3.34	--	--	--	--	--	538	.73	97,160	33	1.7	799	7.7
Feb. 28-Mar. 12	170,000	--	4.46		2.61	--	2.77	--	--	--	--	--	463	.63	107,100	37	1.7	693	7.9
Mar. 13-19	103,100	--	5.46		3.22	--	2.95	--	--	--	--	--	563	.77	79,390	37	1.9	825	7.8
Mar. 20-Apr. 1	270,100	11	3.09	2.05	3.00	0.08	3.02	4.56	.37	.03	.02	.18	556	.76	205,300	36	1.9	788	7.9

Apr. 2-25, 1957.	312,300	--	5.88	3.87	--	3.47	--	--	--	--	--	622	.85	265,400	40	2.3	915	7.9
Apr. 26-May 1 ..	129,900	--	5.24	4.00	--	3.31	--	--	--	--	--	601	.82	106,500	43	2.5	880	7.7
May 2-8	92,790	--	6.28	4.09	--	3.72	--	--	--	--	--	664	.90	83,510	39	2.5	965	7.8
May 9-11	70,410	--	4.86	2.57	--	3.20	--	--	--	--	--	480	.65	45,770	35	1.6	708	7.7
May 12-31	964,200	--	3.88	1.96	--	2.88	--	--	--	--	--	365	.50	482,100	34	1.4	569	7.7
June 1-7.....	607,500	--	3.24	1.13	--	2.56	--	--	--	--	--	272	.37	224,800	26	.9	425	7.9
June 8-14.....	909,200	--	3.06	1.00	--	2.34	--	--	--	--	--	252	.34	309,100	25	.8	394	7.9
June 15-30	1,727,000	12	2.30 | .94	1.52	.08	2.59	2.12	.12	.02	.02	.08	302	.41	708,100	31	1.2	464	7.6
July 1-12.....	1,118,000	--	2.76	1.09	--	2.23	--	--	--	--	--	231	.31	346,600	28	.9	378	7.5
July 13-22.....	488,700	--	2.86	1.48	--	2.13	--	--	--	--	--	266	.36	175,900	34	1.2	431	7.5
July 23-Aug. 7 ..	436,600	--	3.30	1.83	--	2.36	--	--	--	--	--	327	.44	192,100	36	1.4	518	7.4
Aug. 8-20	174,100	--	4.08	2.83	--	2.82	--	--	--	--	--	431	.59	102,700	41	2.0	667	7.5
Aug. 21-Sept. 30	570,100	12	3.04 | 1.92	3.39	.11	3.24	4.75	.28	.03	.02	.16	512	.70	399,100	40	2.1	781	7.7
Total or weighted average [a] ...	9,942,000	--	4.04	2.09	--	2.80	--	--	--	--	--	389	0.53	5,269,000	34	1.5	591	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 10, three-quarters of a mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 4 miles east of Custer.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1957.
Water temperatures: April 1949 to September 1951, August 1952 to September 1957.
Sediment records: July 1947 to September 1954, October 1955 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,260 micromhos May 8; minimum daily 521 micromhos July 6.
Percent sodium: Maximum, 42 Apr. 28 to May 19; minimum, 28 Feb. 14.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 1,640 micromhos Nov. 18, 1955; minimum daily, 384 micromhos June 20, 1951.
Percent sodium: Maximum, 49 May 23-28, 1952; minimum, 27 June 20-21, 1955.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-28, 1956	180,900	--	6.48		4.35	--	3.39	--	--	--	--	--	719	0.98	177,300	40	2.4	1,030	7.7
Oct. 29-Dec. 4	296,400	--	6.34		3.61	--	3.44	--	--	--	--	--	670	.91	269,700	36	2.0	947	7.8
Dec. 5-14	53,750	13	4.99	2.81	4.65	0.11	4.26	7.76	0.42	0.03	0.00	0.14	799	1.09	58,590	37	2.4	1,130	7.8
Dec. 15-28	81,720	--	6.46		3.52	--	3.60	--	--	--	--	--	665	.90	73,550	35	2.0	944	7.8
Dec. 29-Jan. 8, 1957	68,230	--	6.36		3.61	--	3.59	--	--	--	--	--	649	.88	60,040	36	2.0	922	7.9
Jan. 9-31	91,640	--	7.56		3.92	--	4.20	--	--	--	--	--	760	1.03	94,390	34	2.0	1,050	8.0
Feb. 1-6	24,790	--	7.62		4.26	--	4.13	--	---	--	--	--	745	1.01	25,040	36	2.2	1,070	7.7
Feb. 7-13	35,310	--	6.48		8.65	--	3.62	--	--	--	--	--	627	.85	30,010	36	2.0	919	7.6
Feb. 14	5,450	--	4.40		1.74	--	2.92	--	--	--	--	--	390	.53	2,890	28	1.2	597	7.7
Feb. 15-27	73,290	--	6.42		3.74	--	3.46	--	--	--	--	--	647	.88	64,500	37	2.1	935	7.8
Feb. 28-Mar. 1	13,090	--	5.16		2.78	--	2.95	--	--	--	--	--	522	.71	9,290	35	1.7	752	8.0
Mar. 2-3	11,310	--	5.64		3.44	--	2.88	--	--	--	--	--	616	.84	9,500	38	2.1	875	7.9
Mar. 4-31	152,300	12	4.44	2.60	4.35	.09	3.60	6.64	.45	.03	.02	.13	742	1.01	153,800	38	2.3	1,050	7.9
Apr. 1-23	108,500	--	7.56		4.74	--	3.85	--	--	--	--	--	805	1.09	118,300	39	2.4	1,120	8.0
Apr. 24	18,050	--	7.56		3 52	--	3.38	--	--	--	--	--	728	.99	17,870	32	1.8	1,010	8.1
Apr. 25-27	31,620	--	6.08		4.09	--	3.28	--	--	--	--	--	678	.92	29,090	40	2.3	973	8.2

Apr. 28-May 19, 1957	180,900	--	6.96	5.05	--	3.87	--	--	--	--	--	818	1.11	199,900	42	2.7	1,110	7.9
May 20-28.....	120,600	--	5.86	3.78	--	3.42	--	--	--	--	--	674	.92	111,000	39	2.2	926	7.9
May 29-June 3 ..	94,270	--	5.38	3.04	--	3.36	--	--	--	--	--	557	.76	71,640	36	1.9	810	7.6
June 4-17.....	360,600	14	3.09 | 1.33	2.44	.08	3.05	3.62	.16	.02	.03	.07	437	.59	121,800	35	1.6	658	7.5
June 18-20	96,790	--	4.78	3.00	--	3.38	--	--	--	--	--	500	.68		39	1.9	750	7.7
June 21-July 14..	742,600	--	4.00	2.00	--	2.80	--	--	--	--	--	387	.53	393,600	33	1.4	575	7.7
July 15-29	237,200	--	4.28	2.52	--	2.62	--	--	--	--	--	441	.60	142,300	37	1.7	656	7.6
July 20-Aug. 7 ..	67,800	--	5.08	3.31	--	2.88	--	--	--	--	--	549	.75	50,850	39	2.1	803	7.6
Aug. 8-27.....	93,360	--	6.18	4.35	--	3.21	--	--	--	--	--	700	.95	88,690	41	2.5	1,000	7.5
Aug. 28-Sept. 30	195,200	18	644 | .58	4.35	.12	3.57	7.97	.39	.03	.03	.06	778	1.06	206,900	38	2.3	1,090	7.5
Total or weighted average a ...	3,435,000	--	5.58	3.31	--	3.28	--	--	--	--	--	586	0.80	2,748,000	37	2.0	840	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

TONGUE RIVER AT MILES CITY, MONT.

LOCATION.--At gaging station, 4 miles south of Miles City, Custer County, and 8 miles upstream from mouth.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1957.
Water temperatures: April 1949 to September 1957.
Sediment records: June 1946 to September 1951.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,300 micromhos Dec. 8; minimum daily, 327 micromhos June 21.
Percent sodium: Maximum, 57 Apr. 24-25; minimum, 17 June 7-16, June 30 to July 12.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 2,280 micromhos July 24, 1953; minimum daily, 288 micromhos June 21, 1953.
Percent sodium: Maximum, 69 May 4, 1955; minimum, 17 June 2-15, 1956, June 7-16, June 30 to July 12, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-17, 1956	2,120	--	6.98		3.65	--	5.16	--	--	--	--	--	650	0.88	1,860	34	2.0	960	8.1
Oct. 18-22	315	--	7.88		4.74	--	6.16	--	--	--	--	--	778	1.06	334	38	2.4	1,140	7.9
Oct. 23-31	2,310	--	6.36		2.78	--	4.20	--	--	--	--	--	550	.75	1,730	30	1.6	844	7.6
Nov. 1-19	11,900	--	6.64		2.22	--	4.46	--	--	--	--	--	529	.72	8,570	25	1.2	807	7.9
Nov. 20-Dec. 4	7,360	--	7.66		2.48	--	4.93	--	--	--	--	--	611	.83	6,110	24	1.3	905	7.9
Dec. 5-14	4,250	--	10.08		3.61	--	6.56	--	--	--	--	--	844	1.15	4,890	26	1.6	1,190	8.1
Dec. 15-31	7,740	7.6	4.14	4.58	2.83	0.11	5.56	6.04	0.13	0.02	0.01	0.12	691	.94	7,280	24	1.4	1,010	7.9
Jan. 1-7, 1957	2,460	--	8.42		2.87	--	5.47	--	--	--	--	--	700	.95	2,340	25	1.4	986	8.0
Jan. 8-31	5,650	--	10.32		3.44	--	6.77	--	--	--	--	--	859	1.17	6,610	25	1.5	1,180	8.0
Feb. 1-15	3,480	--	9.80		3.26	--	6.52	--	--	--	--	--	805	1.09	3,790	25	1.5	1,140	7.9
Feb. 16-21	1,470	--	5.84		2.74	--	4.21	--	--	--	--	--	547	.74	1,090	32	1.6	890	7.7
Feb. 22-26	1,270	--	8.36		3.04	--	5.70	--	--	--	--	--	709	.96	1,220	27	1.5	1,020	8.1
Feb. 27	595	--	3.48		1.87	--	2.85	--	--	--	--	--	342	.47	280	35	1.4	525	7.6
Feb. 28	992	--	1.92		1.44	--	2.16	--	--	--	--	--	244	.33	327	43	1.5	366	7.9
Mar. 1	1,980	--	5.28		1.70	--	3.90	--	--	--	--	--	414	.56	1,110	24	1.0	645	6.1
Mar. 2-6	3,170	--	3.38		1.30	--	2.64	--	--	--	--	--	309	.42	1,330	28	1.0	477	7.8
Mar. 7	179	--	5.92		4.31	--	5.08	--	--	--	--	--	638	.87	156	42	2.5	944	8.2

Mar. 8-13, 1957.	2,770	--	5.06	2.61	--	3.75	--	--	--	--	--	465	.63	1,740	34	1.6	715	7.7
Mar. 14-31	6,660	7.7	3.29 | 3.91	3.13	.14	4.97	5.04	.11	.03	.00	.15	616	.84	5,590	30	1.6	925	8.2
Apr. 1-23.....	9,790	--	7.40	2.91	--	4.77	--	--	--	--	--	626	.85	8,320	28	1.5	918	8.1
Apr. 24-25	8,900	--	2.56	3.39	--	3.70	--	--	--	--	--	376	.51	4,540	57	3.0	587	8.2
Apr. 26-May 20 .	14,060	--	6.98	3.78	--	4.36	--	--	--	--	--	596	.81	11,390	28	1.5	886	8.1
May 21-24	6,390	--	4.86	2.26	--	3.60	--	--	--	--	--	448	.61	3,900	32	1.4	683	8.2
May 25-27	5,720	--	5.04	1.30	--	3.47	--	--	--	--	--	403	.55	3,150	21	.8	594	7.9
May 28-June 6 ..	15,040	--	4.14	1.00	--	3.08	--	--	--	--	--	318	.43	6,470	19	.7	484	7.7
June 7-16	34,690	--	3.46	.70	--	2.72	--	--	--	--	--	244	.33	11,450	17	.5	389	7.3
June 17-29.....	73,450	9.2	1.90 | 1.04	.96	.06	2.57	1.25	.00	.02	.01	.05	233	.32	23,500	24	.8	376	7.4
June 30-July 12..	33,610	--	3.16	.65	--	2.59	--	--	--	--	--	227	.31	10,420	17	.5	368	7.6
July 13-26	5,540	--	4.44	1.87	--	3.54	--	--	--	--	--	385	.52	2,880	30	1.3	588	7.8
July 27-Aug. 27 .	6,100	--	5.44	2.91	--	4.41	--	--	--	--	--	494	.67	4,090	35	1.8	768	7.8
Aug. 28-Setp. 3 .	3,120	--	4.68	2.00	--	3.64	--	--	--	--	--	402	.55	1,720	30	1.3	622	7.6
Sept. 4-30	15,800	12	2.89 | 2.67	1.70	.11	3.84	3.58	.08	.02	.00	.10	447	.61	9,640	23	1.0	682	7.6
Total or weighted average [a]	298,900	--	4.74	1.65	--	3.52	--	--	--	--	--	388	0.53	158,400	26	1.1	591	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER NEAR LOCATE, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 12, at present site of Locate (5 miles west of former site of Locate), Custer County, 3 miles upstream from Locate Creek, and 25 miles east of Miles City.

RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1957.
Water temperatures: February 1951 to September 1957.
Sediment records: March 1950 to September 1953.

EXTREMES, 1956-57.--Specific conductance: Maximum daily, 3,080 micromhos Dec. 8; minimum daily, 712 micromhos Mar. 1.
Percent sodium: Maximum, 51 Oct. 1-29; minimum, 21 June 7-12.

EXTREMES, 1951-57.--Specific conductance: Maximum daily, 9,270 micromhos Dec. 16, 1955; minimum daily, 407 micromhos Feb. 14, 1952.
Percent sodium: Maximum, 83 Oct. 22-24, 1953; minimum, 17 Aug. 11-13, 1955.

REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-29, 1956	423	--	13.10		14.22	--	4.85	22.90	--	--	--	--	1,950	2.65	1,120	51	5.6	2,520	8.0
Oct. 30-Nov. 9	436	--	16.60		13.48	--	4.65	26.23	--	--	--	--	2,190	2.98	1,300	44	4.7	2,640	7.6
Nov. 10-17	1,500	--	13.64		8.26	--	4.51	17.18	--	--	--	--	1,520	2.07	3,100	38	3.2	1,890	7.6
Nov. 18-24	1,110	--	20.80		12.44	--	5.28	27.07	--	--	--	--	2,350	3.20	3,550	37	3.9	2,780	7.6
Nov. 25-29	684	--	16.56		11.35	--	5.05	21.86	--	--	--	--	1,950	2.65	1,810	41	3.9	2,400	7.6
Nov. 30-Dec. 5	1,260	--	15.52		7.70	--	4.97	18.11	--	--	--	--	1,630	2.22	2,800	38	2.8	2,010	7.8
Dec. 6-9	724	--	21.80		12.18	--	6.90	26.23	--	--	--	--	2,430	3.30	2,390	36	3.7	2,830	8.0
Dec. 10-24	3,720	12	10.98	7.46	9.96	0.19	6.36	21.65	1.55	0.03	0.08	0.17	1,990	2.71	10,080	35	3.3	2,390	7.8
Dec. 25-30	1,400	--	16.60		8.53	--	5.83	18.22	--	--	--	--	1,760	2.39	3,350	34	3.0	2,110	8.1
Dec. 31-Jan. 4, 1957	992	--	14.70		7.66	--	5.24	15.93	--	--	--	--	1,540	2.09	2,070	34	2.8	1,910	8.1
Jan. 5-9	1,170	--	16.52		8.26	--	5.83	17.18	--	--	--	--	1,710	2.33	2,730	33	2.9	2,080	8.0
Jan. 10-14	883	--	18.40		9.48	--	6.56	19.53	--	--	--	--	1,930	2.62	2,310	34	3.2	2,310	8.2
Jan. 15-22	1,530	--	19.60		10.35	--	7.05	21.65	--	--	--	--	2,110	2.87	4,390	35	3.3	2,490	8.1
Jan. 23-31	853	--	21.60		11.14	--	7.38	24.57	--	--	--	--	2,320	3.16	2,700	34	3.4	2,690	8.0
Feb. 1-13	1,250	--	19.36		10.40	--	6.82	21.03	--	--	--	--	2,100	2.86	3,580	35	3.3	2,510	7.8
Feb. 14-16	466	--	15.56		8.61	--	5.70	17.45	--	--	--	--	1,720	2.34	1,090	36	3.1	2,100	7.9
Feb. 17	169	--	11.44		7.74	--	4.78	14.84	--	--	--	--	1,320	1.80	304	39	3.2	1,750	7.8
Feb. 18-20	565	--	9.52		6.31	--	4.10	11.97	--	--	--	--	1,110	1.51	853	39	2.9	1,480	7.7
Feb. 21-26	1,340	--	15.12		8.66	--	5.93	17.45	--	--	--	--	1,680	2.28	3,060	36	3.2	2,080	7.9

Feb. 27, 1957..	397	--	7.36	4.78	--	3.34	8.64	--	--	--	--	646	1.15	456	39	2.5	1,170	7.7
Feb. 28	595	--	4.64	2.87	--	2.29	5.29	--	--	--	--	510	.69	410	38	1.9	753	7.4
Mar. 1-7	5,140	--	5.84	3.39	--	2.56	6.04	--	--	--	--	622	.85	4,370	37	2.0	894	7.7
Mar. 8-14	5,400	--	9.00	5.05	--	2.84	9.16	--	--	--	--	958	1.30	7,020	36	2.4	1,290	7.7
Mar. 15-22	8,700	7.9	6.54 | 3.86	6.22	.16	3.15	11.14	1.64	.03	.05	.12	1,110	1.51	13,140	37	2.7	1,480	7.8
Mar. 23-29	5,340	--	11.96	6.88	--	3.72	13.12	--	--	--	--	1,280	1.74	9,290	36	2.8	1,640	7.8
Mar. 30-Apr. 14	8,450	--	13.32	8.26	--	3.95	16.14	--	--	--	--	1,470	2.00	16,900	38	3.2	1,860	7.8
Apr. 15-23	5,160	--	14.24	9.92	--	3.90	18.53	--	--	--	--	1,630	2.22	11,460	41	3.7	2,080	7.7
Apr. 24-25	4,170	--	6.32	6.09	--	3.74	7.81	--	--	--	--	814	1.11	4,630	49	3.4	1,170	8.1
Apr. 26-28	2,730	--	13.12	8.61	--	3.51	15.62	--	--	--	--	1,310	1.78	4,860	40	3.4	1,830	8.3
Apr. 29-May 17 .	8,930	--	13.92	10.44	--	4.10	18.22	--	--	--	--	1,720	2.34	20,900	43	4.0	2,130	8.2
May 18-21	6,540	--	10.60	6.09	--	3.74	11.66	--	--	--	--	1,180	1.60	10,460	36	2.6	1,480	8.3
May 22-26	7,830	--	11.16	7.61	--	3.64	14.32	--	--	--	--	1,350	1.84	14,410	41	3.2	1,680	8.3
May 27-June 6 ..	19,530	--	11.80	6.52	--	3.84	13.28	--	---	--	--	1,240	1.69	33,000	36	2.7	1,590	7.6
June 7-12.....	31,040	--	12.28	3.26	--	3.41	11.87	--	---	--	--	1,060	1.44	44,700	21	1.3	1,330	7.6
June 13-19.....	38,580	12	6.14 | 2.42	4.26	.16	3.24	8.81	.39	.03	.10	.13	827	1.12	43,210	33	2.1	1,140	7.4
June 20-25.....	38,320	--	5.32	3.61	--	2.95	5.68	--	--	--	--	586	.80	30,660	40	2.2	850	7.4
June 26-28.....	12,810	--	7.36	3.78	--	3.05	7.66	--	--	--	--	736	1.00	12,810	34	2.0	1,030	7.8
June 29-July 4 ..	19,360	--	5.72	2.78	--	1.38	5.27	--	--	--	--	553	.75	14,520	33	1.6	796	7.3
July 5-18	20,330	--	7.72	3.22	--	2.87	7.60	--	--	--	--	733	1.00	20,330	29	1.6	997	7.3
July 19-24	2,270	--	9.88	6.13	--	3.28	11.62	--	--	--	--	1,070	1.46	3,310	38	2.8	1,400	7.5
July 25-31	2,300	--	11.36	7.13	--	3.41	14.99	--	--	--	--	1,310	1.78	4,450	39	3.0	1,670	7.6
Aug. 1-26.....	2,990	--	15.20	10.09	--	3.65	19.15	--	--	--	--	1,750	2.38	7,120	40	3.7	2,150	7.6
Aug. 27-31	1,810	--	12.36	7.57	--	4.39	15.09	--	--	--	--	1,380	1.86	3,400	38	3.0	1,770	7.6
Sept. 1-6	2,340	--	7.14	4.26	--	3.44	8.04	--	--	--	--	764	1.04	2,430	37	2.3	1,060	7.6
Sept. 7-30	3,350	14	10.78 5.94	8.70	.26	3.97	21.03	.87	.02	.06	.17	1,770	2.41	8,070	34	3.0	3,100	7.7
Total or weighted average [a]	285,100	--	9.88	5.31	--	b3.91	10.89	--	--	--	--	1,030	1.40	399,100	35	2.4	1,340	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

b Includes carbonate as bicarbonate.

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JAMES RIVER BASIN

JAMES RIVER AT HURON, S. DAK.

LOCATION.--At gaging station, 15 feet upstream from city dam at Huron, Beadle County, 135 feet downstream from Chicago and North Western Railway bridge, and 165 feet upstream from bridge on U.S. Highway 14.
DRAINAGE AREA.--16,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957.
Water temperatures: August 1956 to September 1957.
EXTREMES, August 1956 to September 1957.--Specific conductance: Maximum daily, 2,270 micromhos Mar. 9; minimum daily, 483 micromhos Mar. 30.
Percent sodium: Maximum, 55 May 1-10; minimum, 30 Mar. 29 to Apr. 4.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1509.

Chemical analyses, August 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons				
Aug. 13-24, 1956 a...	2,040	20	2.45	2.15	3.65	0.33	4.29	3.12	1.07	0.01	0.01	0.32	509	0.69	1,410	43	2.4	794	7.8
Aug. 25-Sept. 16 a...	649	17	2.15	1.89	2.70	.28	3.69	2.60	.79	.02	.01	.28	428	.58	376	38	1.9	677	7.9
Oct. 6, 8, 30-31, -Nov. 2, 4-15	354	9.1	2.94	2.36	3.61	.31	4.34	3.77	1.07	.01	.01	.28	545	.74	262	39	2.2	861	8.2
Nov. 28, Dec. 12-13, 16-17, 21-31.....	61	17	3.74	3.44	4.87	.33	5.65	5.41	1.58	.02	.03	.37	752	1.02	62	39	2.6	1,150	7.9
Jan. 1-17, 1957	91	18	4.29	3.95	5.48	.36	6.11	6.41	1.80	.01	.03	.72	884	1.20	109	39	2.7	1,300	7.9
Jan. 18, 20-26	16	23	4.99	4.73	6.35	.38	6.90	7.77	2.00	.02	.04	.67	1,050	1.43	23	39	2.9	1,500	7.8
Jan. 27-Feb. 1	12	25	5.39	5.33	7.57	.43	7.57	8.95	2.26	.02	.03	.54	1,160	1.58	19	40	3.3	1,650	7.8
Feb. 2-18	143	27	5.89	6.03	8.70	.46	8.00	10.31	2.54	.03	.04	.59	1,310	1.78	255	41	3.6	1,820	8.1
Feb. 19-Mar. 5	363	28	6.49	6.71	9.05	.51	8.88	11.56	2.85	.03	.04	.63	1,430	1.94	704	40	3.5	1,990	8.0
Mar. 6-15	401	26	7.63	7.65	10.44	.51	10.65	11.97	2.99	.04	.03	.71	1,580	2.15	862	40	3.8	2,170	8.1
Mar. 16-19	196	19	6.99	6.29	8.70	.46	9.19	10.31	2.51	.03	.05	.56	1,360	1.85	363	39	3.4	1,890	8.0

Mar. 20-22, 1957 ...	317	19	6.49	5.39	7.48	.49	8.18	9.16	2.23	.02	.03	.52	1,210	1.65	523	38	3.1	1,710	8.0
Mar. 23	278	15	5.24	3.76	5.87	.41	6.20	7.29	1.64	.02	.05	.41	922	1.25	348	38	2.8	1,350	8.0
Mar. 24	220	12	3.49	3.27	4.35	.33	4.43	5.52	1.07	.02	.02	.30	688	.94	207	38	2.4	1,030	7.7
Mar. 25-26	274	11	3.04	2.24	3.09	.33	3.28	4.43	.79	.02	.04	.25	534	.73	200	36	1.9	812	7.8
Mar. 27-28	171	10	2.40	1.56	1.96	.33	2.16	3.64	.37	.02	.03	.18	408	.55	94	31	1.4	625	7.8
Mar. 29-Apr. 4	472	12	2.10	1.34	1.57	.31	2.10	2.81	.34	.01	.03	.15	340	.46	217	30	1.2	520	7.4
Apr. 5-7.....	361	11	2.45	1.71	2.35	.28	2.82	3.44	.62	.02	.01	.20	429	.58	209	34	1.6	660	7.8
Apr. 8-16	928	9.1	2.50	2.46	3.13	.26	3.44	4.06	.87	.02	.01	.24	512	.70	650	37	2.0	795	7.6
Apr. 17-20	1,130	12	3.24	2.68	3.74	.26	4.20	4.64	1.13	.02	.01	.30	606	.82	930	38	2.2	927	8.0
Apr. 21-23	1,680	15	3.44	3.04	5.66	.31	5.18	5.10	1.97	.02	.01	.37	743	1.01	1,700	45	3.1	1,150	7.9
Apr. 24-25	2,080	13	2.84	2.12	4.35	.31	3.80	4.23	1.44	.02	.01	.29	592	.81	1,680	45	2.8	916	8.0
Apr. 26	1,000	9.8	2.74	2.46	6.00	.33	3.67	5.06	2.74	.02	.00	.36	710	.97	970	52	3.7	1,100	7.6
Apr. 27-30	2,640	13	2.05	2.55	4.05	.33	3.08	4.54	1.38	.02	.02	.33	572	.78	2,060	45	2.7	874	7.6
May 1-10	3,080	15	2.59	2.17	6.31	.36	3.87	4.62	2.71	.02	.03	.44	710	.97	2,990	55	4.1	1,130	7.7
May 11-23	4,810	13	2.69	2.17	3.92	.31	3.64	4.00	1.49	.02	.01	.28	569	.77	3,700	43	2.5	901	7.7
May 24-June 20	20,180	16	3.44	3.40	6.00	.43	4.38	6.95	1.69	.02	.01	.43	840	1.14	23,010	45	3.3	1,230	7.6
June 21-26.....	3,810	16	3.69	3.59	6.53	.43	5.02	6.85	1.95	.02	.01	.43	878	1.19	4,530	46	3.4	1,300	7.9
June 27-July 22	12,460	16	3.29	3.07	5.96	.41	4.90	5.50	1.95	.02	.00	.41	783	1.06	13,210	47	3.3	1,180	7.8
July 23-Aug. 19, 22-24 26-28.....	2,000	9.6	3.64	3.52	7.22	.46	6.00	5.98	2.51	.03	.01	.51	901	1.23	2,460	49	3.8	1,370	8.1
Aug. 29-Sept. 16, 18-27 30	384	11	3.24	3.56	8.31	.51	6.39	6.31	2.74	.02	.01	.58	940	1.28	492	53	4.5	1,440	7.8
Total or weighted average [b].....	59,920	15	3.29	3.07	5.66	0.38	4.51	5.87	1.80	0.02	0.01	0.40	772	1.05	62,840	46	3.2	1,160	--

a Not included in total or weighted average.
b Represents 100 percent of runoff for water year October 1956 to September 1957.

PLATTE RIVER BASIN

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.

LOCATION.--At bridge on U. S. Highway 26, at Guernsey, Platte County, 0.9 mile downstream from gaging station and 2 miles downstream from Guernsey Dam.
DRAINAGE AREA.--16,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: October 1951, April to September 1952, March to September 1953, May to August 1954, November 1954 to September 1957.
Sediment records: April 1947 to June 1953.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,430 micromhos Mar. 1; minimum daily, 404 micromhos May 29.
Percent sodium: Maximum, 43 Apr. 26 to May 14; minimum, 28 July 3-23, Sept. 1-30.
EXTREMES, 1951-57.--Specific conductance: Maximum daily (1954-57), 1,430 micromhos Mar. 1, 1957; minimum daily, 354 micromhos June 27, 1955.
Percent sodium: Maximum, 43 Apr. 26 to May 14, 1957; minimum 24 June 27, 1955, June 19 to July 11, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1956 to September 1957 given in WSP 1510. No appreciable inflow between gaging station and sampling station except during periods of heavy local precipitation.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-16, 1956	349	--	5.68		3.35	--	2.82	5.62	--	--	--	--	595	0.81	283	37	2.0	878	7.9
Oct. 17-Nov. 3	393	--	6.44		3.74	--	3.31	6.45	--	--	--	--	666	.91	358	37	2.1	961	8.0
Nov. 4-Dec. 7	789	--	6.68		3.83	--	3.44	6.45	--	--	--	--	678	.92	726	36	2.1	991	7.9
Dec. 8-31	601	12	3.79	4.15	4.70	0.13	4.00	8.02	0.99	0.02	0.05	0.17	832	1.13	679	37	2.4	1,170	8.2
Jan. 1-31, 1957	936	--	8.60		5.05	--	4.26	8.64	--	--	--	--	914	1.24	1,160	37	2.4	1,260	8.0
Feb. 1-28	1,180	--	8.96		5.70	--	4.36	8.95	--	--	--	--	949	1.29	1,520	39	2.7	1,300	7.8
Mar. 1-5	8,310	--	9.40		5.83	--	4.36	8.64	--	--	--	--	1,010	1.37	11,380	38	2.7	1,390	7.9
Mar. 6-10	9,810	--	8.68		5.61	--	3.98	--	--	--	--	--	930	1.26	12,360	39	2.7	1,300	8.0
Mar. 11-31	29,600	10	4.19	2.99	4.87	.14	3.24	7.70	1.02	.03	.02	.12	791	1.08	31,970	40	2.6	1,130	7.8
Apr. 1-25	567	--	7.02		4.65	--	3.28	7.43	--	--	--	--	780	1.06	601	40	2.5	1,100	7.9
Apr. 26-May 14	3,850	--	6.68		5.00	--	3.10	7.70	--	--	--	--	751	1.02	3,930	43	2.7	1,080	8.0
May 15-19	14,710	--	5.32		3.65	--	2.64	5.62	--	--	--	--	596	.81	11,920	41	2.2	868	7.8

May 20-23 ,1957	18,070	--	3.64	2.09	--	2.16	3.08	--	--	--	--	377	0.51	9,220	36	1.5	572	7.7
May 24-June 18..	71,230	16	2.05 | 0.85	1.30	0.08	1.85	2.08	0.21	0.02	0.01	0.06	277	.38	27,070	31	1.1	425	7.5
June 19-27.....	24,050	--	3.70	1.65	--	2.42	2.60	--	--	--	--	353	.48	11,540	31	1.2	526	7.9
June 28-July 2 ..	31,990	--	4.96	2.22	--	2.80	4.04	--	--	--	--	465	.63	20,150	31	1.4	693	7.5
July 3-23	206,100	--	3.88	1.52	--	2.54	2.62	--	--	--	--	338	.46	94,810	28	1.1	526	7.6
July 24-Aug. 31 .	331,400	--	4.58	2.00	--	2.69	3.56	--	---	--	--	418	.57	188,900	30	1.3	639	7.6
Sept. 1-30	135,400	18	2.64 | 1.28	1.57	.10	2.56	2.83	.31	.02	--	.18	357	.49	66,350	28	1.1	545	7.6
Total or weighted average [a].....	889,300	--	4.36	2.00	--	2.61	3.41	--	--	--	--	408	0.55	489,100	31	1.3	618	--

a Represents 100 percent of runoff for water year October 1956 to September 1957

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging stations at highway bridges, half a mile and 2½ miles respectively, south of Brady, Lincoln County, and 18 miles downstream from confluence of North Platte and South Platte Rivers.
DRAINAGE AREA.--56,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,130 micromhos May 21, 30(chan.1); minimum daily, 305 micromhos Jan.10 (chan.1).
Percent sodium: Maximum, 43 Aug. 9-26; minimum, 27 Jan. 9-10.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 1,130 micromhos May 21, 30, 1957 (chan.1); minimum daily, 305 micromhos Jan. 13, 1956, Jan. 9-10, 1957 (chan.1).
Percent sodium: Maximum, 46 Aug. 1-22, 1955; minimum, 22 Nov. 26, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis from each of two major channels composited by discharge. Composite periods normally identical to those of Supply Canal (Tri-County Diversion) near Maxwell, Nebr. Records of specific conductance of daily samples, taken at each of the two major channels, available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-24, 1956....	5,290	--	3.96		2.57	--	3.33	--	--	--	--	--	431	0.59	3,120	39	1.8	651	7.6
Oct. 25-Nov. 30 ...	9,580	--	4.00		2.35	--	3.67	--	--	--	--	--	422	.57	5,460	37	1.7	630	7.6
Dec. 1-31	8,730	40	2.25	1.71	1.87	0.21	3.61	2.12	0.37	0.03	0.03	0.10	384	.52	4,540	31	1.3	574	8.0
Jan. 1-8, 1957.....	2,170	--	3.86		1.83	--	3.51	--	--	--	--	--	385	.52	1,130	32	1.3	567	7.9
Jan. 9-10	296	--	3.60		1.31	--	3.34	--	--	--	--	--	338	.46	136	27	1.0	494	8.2
Jan. 11-13	536	--	4.40		2.22	--	3.97	--	--	--	--	--	444	.60	322	34	1.5	651	8.2
Jan. 14-17	603	--	4.10		2.00	--	3.72	--	--	--	--	--	407	.55	332	33	1.4	604	8.2
Jan. 18	177	--	4.28		2.22	--	3.90	--	--	--	--	--	428	.58	103	34	1.5	642	7.8
Jan. 19-Feb.6	3,930	--	4.14		2.00	--	3.70	--	--	--	--	--	412	.56	2,200	33	1.4	605	8.0
Feb. 7-18	4,410	--	3.46		1.52	--	3.16	--	--	--	--	--	343	.47	2,070	31	1.2	507	7.8
Feb. 19-24	1,970	--	4.04		1.74	--	3.62	--	--	--	--	--	385	.52	1,020	30	1.2	571	8.1
Feb. 25-Mar.22 ...	8,860	44	2.69	1.05	1.57	.22	3.36	1.69	.34	.04	.03	.08	361	.49	4,340	28	1.1	530	7.9
Mar. 23-31	4,020	--	4.02		1.74	--	3.47	--	--	--	--	--	383	.52	2,090	30	1.2	567	7.8

Mar. 30, 1957 (S. chan.) a	--	43	4.52	2.20	3.82	2.39	.42	.04	.05	--	--	--	--	33	1.5	623	7.8
Mar. 30 (N. bank of N. chan.) a	--	42	3.04	.65	3.16	.46	.03	.03	.01	--	--	--	--	18	.5	345	7.9
Mar. 30 (S. bank of N. chan.) a	--	37	3.80	1.63	3.31	1.79	.28	.04	.01	--	--	--	--	30	1.2	510	7.6
Apr. 1-30	13,280	--	4.02	1.74 --	3.59	--	--	--	--	--	375	.51	6,770	30	1.2	569	8.0
May 1-18	15,910	--	4.06	1.83 --	3.72	--	--	--	--	--	396	.54	8,590	31	1.3	584	8.1
May 19-28	79,600	--	6.88	3.35 --	3.57	--	--	--	--	--	688	.94	74,820	33	1.8	967	7.8
May 29-June 2	19,730	--	7.72	3.87 --	3.77	--	--	--	--	--	754	1.03	20,320	33	2.0	1,060	8.2
June 3-18	11,170	33	3.39 1.45	2.39 .26	3.49	3.41	.54	.03	.02	0.09	489	.67	7,480	32	1.5	708	7.7
June 19-26	16,390	--	6.68	3.48 --	3.57	--	--	--	--	--	677	.92	15,080	34	1.9	967	8.0
June 27-July 16	6,990	--	4.84	2.52 --	3.51	--	--	--	--	--	486	.66	4,610	34	1.6	715	7.9
July 17-Aug. 8	49,680	--	4.08	2.96 --	3.87	--	--	--	--	--	460	.63	31,300	42	2.1	691	8.0
Aug. 9-26	34,180	--	3.96	2.96 --	3.87	--	--	--	--	--	452	.61	20,850	43	2.1	675	8.0
Aug. 27-Sept. 30	15,650	28	2.94 1.30	2.26 .28	3.67	2.58	.51	.03	.01	.17	439	.60	9,390	33	1.6	647	7.8
Total or weighted average b	313,200	--	5.16	2.78 --	3.65	--	--	--	--	--	530	0.72	226,100	35	1.7	768	--

a Not included in total or weighted average.
b Represents 100 percent of runoff for water year October 1956 to September 1957

PLATTE RIVER BASIN--Continued

SUPPLY CANAL (TRI-COUNTY DIVERSION) NEAR MAXWELL, NEBR.

LOCATION.--At gaging station at Parshall Flume in sec. 28, T. 13 N., R. 29 W., near Maxwell, Lincoln County.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,210 micromhos May 30; minimum, daily, 403 micromhos Jan. 9.
Percent sodium: Maximum, 45 Oct. 1-24; minimum, 32 Feb. 25 to Mar. 22, May 19-28.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 1,210 micromhos Mar. 26, Apr. 6, 14, 15, 1952, May 30, 1957; minimum daily, 403 micromhos Jan. 9, 1957.
Percent sodium: Maximum, 48 Aug. 1 to Sept. 15, 1955; minimum, 32 Feb. 25 to Mar. 22, May 19-28, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Composite periods normally identical to those of Platte River at Brady, Nebr. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in reports of State Engineer.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-24, 1956	68,370	--	3.72		3.09	--	3.65	--	--	--	--	--	444	0.60	41,020	45	2.3	669	8.0
Oct. 25-Nov. 30	50,190	--	3.84		2.35	--	3.43	--	--	--	--	--	415	.56	28,110	38	1.7	619	7.7
Dec. 1-31	40,410	35	2.40	1.52	2.31	0.22	3.44	2.50	0.45	0.03	0.03	0.14	409	.56	22,630	36	1.7	609	7.9
Jan. 1-8, 1957	10,450	--	3.86		2.09	--	3.31	--	--	--	--	--	406	.55	5,750	35	1.5	592	7.8
Jan. 9-10	2,270	--	3.96		2.35	--	3.08	--	--	--	--	--	428	.58	1,320	37	1.7	631	7.9
Jan. 11-13	3,880	--	4.84		3.05	--	3.80	--	--	--	--	--	533	.72	2,790	39	2.0	772	8.1
Jan. 14-17	4,730	--	4.36		2.57	--	3.57	--	--	--	--	--	463	.63	2,980	37	1.7	688	7.8
Jan. 18	1,230	--	4.56		2.57	--	3.74	--	--	--	--	--	480	.65	800	36	1.7	708	7.9
Jan. 19-Feb. 6	25,190	--	4.56		2.61	--	3.59	--	--	--	--	--	483	.66	16,630	36	1.7	713	7.7
Feb. 7-18	16,470	--	3.90		2.00	--	3.20	--	--	--	--	--	398	.54	8,890	34	1.4	593	7.8
Feb. 19-24	7,500	--	4.40		2.39	--	3.44	--	--	--	--	--	464	.63	4,730	35	1.6	671	7.9
Feb. 25-Mar. 22	31,890	42	2.79	1.13	1.96	.22	3.23	2.39	.48	.03	.02	.09	407	.55	17,540	32	1.4	592	7.8
Mar. 23-31	12,320	--	3.92		2.09	--	3.25	--	--	--	--	--	396	.54	6,650	35	1.5	591	7.8
Apr. 1-30	42,120	--	3.92		1.96	--	3.31	--	--	--	--	--	394	.54	22,740	33	1.4	590	7.8
May 1-18	45,560	--	4.52		2.57	--	3.47	--	--	--	--	--	469	.64	29,160	36	1.7	701	7.7

May 19-28, 1957...	38,460	--	8.04	3.87	--	3.54	--	--	--	--	--	799	1.09	41,920	32	1.9	1,110	8.0
May 29-June 2.....	19,400	--	7.80	4.13	--	3.87	--	--	--	--	--	808	1.10	21,340	35	2.1	1,130	8.1
June 3-18	48,690	26	4.14 | 1.96	3.39	.26	3.43	5.48	.73	.03	.02	.13	633	.86	41,870	35	1.9	905	7.7
June 19-26	30,490	--	7.52	4.13	--	3.57	--	--	--	--	--	783	1.06	32,320	35	2.1	1,100	8.2
June 27-July 16....	53,450	--	6.24	3.70	--	3.41	--	--	--	--	--	668	.91	48,640	37	2.1	952	7.8
July 17-Aug. 8.....	91,660	--	6.44	4.09	--	3.38	--	--	--	--	--	697	.95	87,080	39	2.3	1,010	8.0
Aug. 8-26	71,270	--	4.88	3.61	--	3.54	--	--	--	--	--	562	.76	54,170	43	2.3	830	8.0
Aug. 27-Sept. 30 ..	89,790	29	2.94 | 1.42	3.18	.26	3.35	3.35	.56	.03	.01	.14	493	.67	60,160	41	2.1	737	7.7
Total or weighted average[a].....	805,800	--	5.10	3.13	--	3.47	--	--	--	--	--	547	0.74	599,200	38	2.0	798	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on State Highway 51, 0.5 mile southeast of Julesburg, Sedgwick County, 3 miles upstream from Colorado-Nebraska State line, and 8 miles downstream from Lodgepole Creek.
DRAINAGE AREA.--22,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1957.
Water temperatures: October 1945 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 2,250 micromhos Jan. 15; minimum daily, 882 micromhos May 15.
Percent sodium: Maximum, 40 May 10-13; minimum, 31 Oct. 1-23, Dec. 1-31.
EXTREMES, 1945-57.--Specific conductance: Maximum daily, 2,350 micromhos Apr. 13, 1955; minimum daily, 617 micromhos Aug. 19, 1953.
Percent sodium: Maximum, 82 Mar. 1-12, 1947; minimum, 29 Aug. 6-10, 1951, Aug. 19, 1953, Sept. 14-17, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-23, 1956	1,170	--	14.12		6.39	--	--	--	--	--	--	--	--	--	--	31	2.4	1,840	--
Oct. 24-Nov. 30	11,840	--	16.08		7.74	--	7.21	--	--	--	--	--	1,610	2.19	25,930	32	2.7	2,060	7.7
Dec. 1-31	6,610	36	11.73	4.67	7.70	0.43	6.42	16.45	2.09	0.02	0.09	0.23	1,650	2.24	14,810	31	2.7	2,070	7.8
Jan. 1-20, 1957	3,110	--	15.70		7.74	--	5.21	--	--	--	--	--	1,650	2.24	6,970	33	2.8	2,040	8.0
Jan. 21	401	--	11.90		5.66	--	3.77	--	--	--	--	--	1,220	1.66	666	32	2.3	1,580	7.9
Jan. 22-Feb. 28	9,360	--	15.20		7.74	--	5.02	--	--	--	--	--	1,610	2.19	20,500	34	2.8	1,990	7.9
Mar. 1-6	946	--	14.72		8.18	--	4.79	--	--	--	--	--	1,540	2.09	1,980	36	3.0	1,960	8.0
Mar. 7	200	--	12.24		6.53	--	4.20	--	--	--	--	--	1,250	1.70	340	35	2.6	1,650	7.9
Mar. 8-21	1,470	--	14.36		7.48	--	4.57	--	--	--	--	--	1,470	2.00	2,940	34	2.8	1,880	7.9
Mar. 22	87	--	12.76		6.61	--	4.26	--	--	--	--	--	1,270	1.73	151	34	2.6	1,680	7.9
Mar. 23-31	1,520	30	9.73	4.15	7.92	.36	4.54	15.30	1.83	.03	.05	.17	1,470	2.00	3,040	36	3.0	1,890	7.8
Apr. 1-30	11,920	--	13.80		8.53	--	4.36	--	--	--	--	--	1,520	2.07	24,670	38	3.2	1,930	7.7
May 1-9	1,460	--	13.52		8.05	--	4.38	--	--	--	--	--	1,450	1.97	2,880	37	3.1	1,860	7.8

May 10-13, 1957	1,400	--	13.84	9.05	--	4.59	--	--	--	--	--	1,580	2.15	3,010	40	3.4	2,020	7.9
May 14	1,070	--	10.56	5.74	--	4.20	--	--	--	--	--	1,090	1.48	1,580	35	2.5	1,460	7.7
May 15-27	144,400	--	8.08	4.05	--	3.18	--	--	--	--	--	824	1.12	161,700	33	2.0	1,140	7.6
May 28-June 4	19,130	--	11.20	6.05	--	4.26	--	--	--	--	--	1,160	1.58	30,230	35	2.6	1,530	8.0
June 5-21	96,830	16	4.69 | 2.43	3.70	.18	2.95	6.85	.85	.04	.04	.14	724	.98	94,890	34	2.0	1,020	7.7
June 22-27	24,380	--	10.28	5.87	--	3.87	--	--	--	--	--	1,060	1.44	35,110	36	2.6	1,410	8.0
June 28-July 14	14,360	--	11.36	6.13	--	4.06	--	--	--	--	--	1,180	1.60	22,980	35	2.6	1,550	7.5
July 15-18	492	--	12.52	7.13	--	4.26	--	--	--	--	--	1,320	1.80	886	36	2.9	1,320	7.7
July 19-27	7,720	--	10.60	5.92	--	3.80	--	--	--	--	--	1,110	1.51	11,660	36	2.6	1,470	7.6
July 28-Aug. 25	9,390	--	12.80	6.96	--	4.26	--	--	--	--	--	1,350	1.84	17,280	35	2.8	1,730	7.9
Aug. 26	165	--	9.20	4.96	--	3.67	--	--	--	--	--	944	1.28	211	35	2.3	1,270	7.7
Aug. 27-Sept. 18	4,200	--	12.76	7.31	--	4.16	--	--	--	--	--	1,390	1.89	7,940	36	2.9	1,780	7.7
Sept. 19-30	6,220	25	9.08 | 4.86	8.57	.36	4.47	15.76	1.78	.05	.03	.27	1,520	2.07	12,880	37	3.3	1,930	7.6
Total or weighted average [a]	379,900	--	9.54	5.00	--	3.64	--	--	--	--	--	984	1.34	509,100	34	2.3	1,320	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN

REPUBLICAN RIVER ABOVE MEDICINE CREEK AT CAMBRIDGE, NEBR.

LOCATION.--At bridge south of Cambridge, Furnas County, on State Highway 47, three-quarters of a mile (revised) upstream from gaging station at Cambridge, a quarter of a mile upstream from confluence with Medicine Creek, and about 2 miles (revised) upstream from Cambridge diversion dam.
DRAINAGE AREA.--13,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 703 micromhos Jan. 12; minimum daily, 284 micromhos May 17.
Percent sodium: Maximum, 31 Aug. 8-29; minimum, 10 May 14.
EXTREMES, 1950-57.--Specific conductance: Maximum daily (1951-57), 830 micromhos Aug. 21, 1952; minimum daily, 267 micromhos Aug. 17,1954.
Percent sodium: Maximum, 31 Sept. 7-8, 19-21, 1955, Aug. 8-29, 1957; minimum, 9 July 11-14, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Water discharge computed by subtracting the discharge of Medicine Creek at Cambridge from that of the Republican River at Cambridge from Oct. 1 to July 31, and the discharge of Medicine Creek below Harry Strunk Lake from that of the Republican River at Cambridge from Aug. 1 to Sept. 30. Records of discharge for the gaging stations for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-26, 1956.....	916	--	4.28		1.39	--	4.59	--	--	--	--	--	371	0.50	458	25	0.9	554	7.8
Oct. 27-Nov.30	9,090	--	4.32		1.04	--	4.54	--	--	--	--	--	351	.48	4,360	19	.7	532	7.6
Dec. 1-13	2,930	51	2.94	1.70	1.09	0.33	4.98	0.75	0.20	0.05	0.05	0.11	364	.50	1,470	18	.7	552	7.8
Dec. 14-Jan.8,1957..	8,390	--	4.32		1.00	--	4.56	--	--	--	--	--	335	.46	3,860	19	.7	511	7.8
Jan. 9-31	3,930	--	4.88		1.13	--	5.20	--	--	--	--	--	388	.53	2,080	19	.7	581	7.7
Feb.1-4	825	--	4.36		1.09	--	4.59	--	--	--	--	--	350	.48	396	20	.7	526	7.8
Feb. 5-19	5,120	--	3.84		.87	--	4.05	--	--	--	--	--	302	.41	2,100	18	.6	466	7.6
Feb. 20-24	1,450	--	4.34		.96	--	4.62	--	--	--	--	--	339	.46	667	18	.7	515	7.7
Feb. 25-Mar.31.....	12,710	54	2.89	1.35	1.00	.31	3.37	.60	.20	.08	.06	.08	329	.45	5,720	18	.7	506	7.8
Apr. 1-22	10,230	--	4.36		1.00	--	4.65	--	--	--	--	--	344	.47	4,810	19	.7	533	7.8
Apr. 23-24	3,550	--	3.28		.44	--	3.49	--	--	--	--	--	246	.33	1,170	12	.3	375	7.7
Apr. 25-30	2,910	--	4.10		.96	--	4.38	--	--	--	--	--	331	.45	1,310	19	.7	506	7.8
May 1-13.....	4,410	--	4.26		1.09	--	4.56	--	--	--	--	--	345	.47	2,070	20	.7	531	7.7

May 14, 1957	4,560	--	2.42		.28	--	2.67	--	--	--	--	--	186	.25	1,140	10	.3	288	7.7
May 15-16	4,940	--	2.98		.57	--	3.25	--	--	--	--	--	238	.32	1,580	16	.5	364	8.1
May 17-19	14,660	--	2.54		.40	--	2.82	--	--	--	--	--	199	.27	3,960	14	.4	310	8.0
May 20-31	53,370	--	3.28		1.17	--	3.41	--	--	--	--	--	293	.40	21,350	26	.9	466	7.7
June 1-15	41,340	20	2.40	1.18	1.26	.36	3.75	1.19	.20	.05	.01	.09	305	.41	16,950	24	.9	490	7.6
June 16-17	12,600	--	2.76		.48	--	2.93	--	--	--	--	--	232	.32	4,030	15	.4	336	8.0
June 18-27	9,660	--	3.78		1.09	--	3.97	--	--	--	--	--	314	.43	4,150	22	.8	485	7.9
June 28-July 11	13,340	--	3.32		.57	--	3.54	--	--	--	--	--	250	.34	4,540	15	.4	398	7.6
July 12-Aug. 7	18,490	--	3.86		1.00	--	3.67	--	--	--	--	--	286	.39	7,210	21	.7	457	7.7
Aug. 8-29	10,510	--	2.96		1.31	--	3.25	--	--	--	--	--	293	.40	4,200	31	1.1	468	7.4
Aug. 30-Sept. 30	8,440	30	2.50	1.02	1.09	.41	3.80	.90	.20	.04	.06	.14	304	.41	3,460	22	.8	474	7.8
Total or weighted average[a]	258,400	--	3.54		1.00	--	3.72	--	--	--	--	--	293	0.40	103,000	22	0.8	459	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER NEAR HARDY, NEBR.

LOCATION.--At gaging station at highway bridge, 1¼ miles southwest of Hardy, Nuckolls County.
DRAINAGE AREA.--22,400 square miles, approximately, of which a large area does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957.
Water temperatures: August 1956 to September 1957.
EXTREMES, August 1956 to September 1957.--Specific conductance: Maximum daily, 721 micromhos Jan. 17; minimum daily, 182 micromhos June 16.
Percent sodium: Maximum, 21 Aug. 28, 1956; minimum, 5 June 17-18.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1956 to September 1957 given in WSP 1510.

Chemical analyses, August 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 2-8, 1956 a....	1,670	19	2.54	1.08	1.00	0.38	3.64	1.02	0.34	0.03	0.06	0.12	294	0.40	668	20	0.7	486	7.6
Aug. 28 a	75	28	2.99	1.25	1.22	.41	4.36	1.25	.34	.03	.05	.15	344	.47	35	21	.8	559	7.9
Sept. 1-30 a	4,810	17	2.45	1.25	1.04	.41	3.67	1.12	.34	.03	.04	.10	298	.41	1,970	20	.8	492	7.8
Oct. 1-31	3,370	26	2.69	1.33	1.09	.33	3.87	1.12	.37	.03	.03	.12	316	.43	1,450	20	.8	511	7.7
Nov. 1-4	655	24	2.84	1.00	.91	.28	3.70	.96	.31	.02	.06	.09	307	.42	275	18	.7	481	8.2
Nov. 5-Dec. 6.....	3,870	35	3.24	1.24	.96	.23	4.23	.96	.31	.02	.04	.09	331	.45	1,740	17	.6	517	8.1
Dec. 7-19	1,510	31	3.64	1.04	1.00	.20	4.62	.98	.37	.01	.00	.10	351	.48	725	17	.7	554	7.9
Dec. 20-31	1,880	28	3.14	.96	.87	.18	4.03	.83	.27	.01	.00	.07	302	.41	771	17	.6	480	7.8
Jan. 1-9, 1957.....	1,260	30	3.19	1.31	1.00	.21	4.43	.96	.28	.03	.00	.05	331	.45	567	18	.7	527	7.3
Jan. 10-19	889	42	4.39	1.67	1.26	.28	5.87	1.25	.45	.03	.00	.09	447	.61	542	17	.7	698	7.3
Jan. 20-30	946	36	3.74	1.34	1.04	.24	4.95	1.02	.37	.03	.00	.06	374	.51	482	16	.7	592	7.4
Jan. 31-Feb. 6	774	32	1.45	2.83	.91	.20	4.20	.83	.31	.02	.00	.06	316	.43	333	17	.6	509	7.7
Feb. 7-17	2,760	25	2.00	1.40	.70	.18	3.28	.71	.23	.03	.03	.09	253	.34	938	16	.5	404	7.7
Feb. 18-28	2,300	31	1.45	2.95	.83	.21	4.26	.92	.28	.03	.04	.05	321	.44	1,010	15	.6	521	7.9
Mar. 1-27	5,560	28	3.04	1.08	.83	.25	3.97	.79	.28	.02	.01	.07	306	.42	2,340	16	.6	490	7.5
Mar. 28-Apr. 1.....	1,070	29	3.29	1.11	.96	.25	4.23	.83	.34	.02	.00	.07	330	.45	482	17	.6	520	8.1
Apr. 25-27	1,140	26	2.69	.75	.57	.31	3.25	.73	.14	.03	.06	.08	264	.36	410	13	.4	407	8.1
Apr. 28-May 8	3,410	27	3.19	.81	.61	.25	3.90	.73	.23	.03	.01	.05	294	.40	1,360	13	.4	462	7.3

May 9-25, 1957	18,100	20	2.10	.44	.33	.21	2.56	.44	.13	.02	.01	.04	194	.26	4,710	11	.3	299	7.2
May 26-June 10	4,330	29	3.29	1.09	.91	.28	4.11	1.04	.34	.02	.00	.10	332	.45	1,950	16	.6	517	7.3
June 11-15	2,280	20	1.90	.56	.41	.26	2.38	.56	.11	.03	.04	.07	195	.27	616	13	.4	304	7.5
June 16	8,210	19	1.15	.29	.14	.20	1.41	.21	.01	.02	.12	.03	116	.16	1,310	8	.2	182	7.4
June 17-18	90,050	--	1.75	.29	.12	.22	2.03	.19	.00	.02	.06	.07	140	.19	17,110	5	.1	230	8.0
June 19	12,300	20	2.54	.66	.48	.28	2.98	.75	.19	.02	.01	.05	240	.33	4,060	12	.4	376	7.8
June 20	3,330	19	2.15	.57	.36	.26	2.56	.58	.12	.02	.03	.04	208	.28	932	11	.3	319	7.7
June 21-26	8,050	26	3.34	1.02	.83	.31	3.95	1.17	.31	.02	.01	.09	321	.44	3,540	15	.6	511	7.8
June 27	6,410	17	2.30	.66	.52	.28	2.82	.67	.12	.03	.04	.06	240	.33	2,120	14	.4	356	7.6
June 28	11,070	14	1.80	.44	.44	.26	2.33	.54	.08	.03	.05	.05	184	.25	2,770	15	.4	286	7.5
June 29-July 27	154,300	15	2.35	.79	.65	.38	3.29	.71	.14	.03	.00	.07	244	.33	50,920	16	.5	396	7.4
July 28-Aug. 29	24,400	21	2.59	.93	.78	.36	3.51	.87	.19	.03	.02	.08	273	.37	9,030	17	.6	437	7.6
Aug. 30	4,070	15	2.05	.43	.26	.26	2.49	.42	.01	.03	.06	.04	180	.24	977	9	.2	292	7.4
Aug. 31-Sept. 30	16,700	23	2.94	.90	.74	.33	3.74	.96	.21	.02	.02	.07	290	.39	6,510	15	.5	463	7.4
Total or weighted average[b]	395,000	19	2.25	0.71	0.52	0.31	2.98	0.60	0.13	0.03	0.02	0.07	224	0.30	120,000	14	0.4	360	--
Total or weighted average[c]	400,400	19	2.30	0.68	0.52	0.31	3.00	0.60	0.13	0.03	0.02	0.07	225	0.30	122,200	14	0.4	361	--

a Not included in weighted average.
b Includes estimate where datum is missing. Represents 99 percent runoff for water year October 1956 to September 1957.
c Includes estimated data for missing period. Represents 100 percent runoff for water year October 1956 to September 1957.

PART 7. LOWER MISSISSIPPI RIVER BASIN

ARKANSAS RIVER BASIN

ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, COLO.

LOCATION.--At gaging station 1 mile upstream from Caddoa Creek, 1¾ miles downstream from John Martin Dam, Bent County, and 3 miles southeast of Hasty.
DRAINAGE AREA.--18,917 square miles, of which 785 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: August 1942 to August 1943, October 1945 to July 1949 (intermittent and weekly samples); January 1951 to September 1957 (daily samples).
Water temperatures: January 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 4,610 micromhos Dec. 9; minimum daily, 818 micromhos Aug. 17, 20.
Percent sodium: Maximum, 40 Mar. 1 to Apr. 12, May 17-26; minimum, 27 May 27 to June 2.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 5,180 micromhos Apr. 21, 1955; minimum daily, 818 micromhos Aug. 17, 20, 1957.
Percent sodium: Maximum, 42 Feb. 1-10, 1954, July 13, 1956; minimum, 23 July 1-10, 1955.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1511.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956...	1,150	18	19.81	14.47	20.79	0.21	5.20	45.80	3.75	0.04	0.06	0.86	3,770	5.13	5,900	38	5.0	4,090	7.7
Nov. 1-19.....	994	--	18.31	13.98	19.23	--	5.34	--	--	--	--	--	3,460	4.71	4,680	37	4.8	3,800	7.8
Nov. 20-24.....	246	--	20.21	14.89	20.71	--	5.82	--	--	--	--	--	3,770	5.13	1,260	37	4.9	4,080	7.7
Nov. 25-30.....	315	--	17.02	13.32	18.27	--	4.80	--	--	--	--	--	3,290	4.47	1,410	38	4.7	3,640	7.8
Dec. 1-7.....	260	--	19.11	14.56	19.92	--	5.44	--	--	--	--	--	3,630	4.94	1,280	37	4.9	4,000	7.9
Dec. 8-10.....	7.9	--	21.91	16.12	23.36	--	5.82	--	--	--	--	--	4,140	5.63	44	38	5.4	4,450	7.7
Dec. 11-31.....	93	--	18.71	15.54	20.88	--	6.10	--	--	--	--	--	3,730	5.07	472	38	5.0	4,070	7.9
Jan. 1-31, 1957...	103	18	19.11	15.71	21.23	.19	6.36	45.60	3.89	.04	.04	.79	3,890	5.29	545	38	5.1	4,190	7.7
Feb. 1-28.....	104	--	18.81	15.21	21.23	--	6.23	--	--	--	--	--	3,850	5.24	545	38	5.1	4,130	7.8
Mar. 1-31.....	94	--	17.12	14.56	20.71	--	6.00	--	--	--	--	--	3,650	4.96	466	40	5.2	3,960	7.9
Apr. 1-12.....	46	--	17.02	14.31	20.58	--	5.69	--	--	--	--	--	3,610	4.91	226	40	5.2	3,940	7.8
Apr. 13-22.....	13,650	--	11.68	7.57	11.14	--	2.64	--	--	--	--	--	2,090	2.84	38,770	37	3.6	2,460	7.7
Apr. 23-May 9....	13,540	17	9.23	5.43	6.31	.16	3.59	16.22	1.16	.04	.16	.21	1,440	1.96	26,540	30	2.3	1,770	7.7
May 10-16.....	7,830	--	7.29	3.54	4.22	--	3.43	--	--	--	--	--	991	1.35	10,570	28	1.8	1,300	7.8
May 17-26.....	55	--	14.87	11.27	17.40	--	4.62	--	--	--	--	--	3,080	4.19	230	40	4.8	3,460	7.9

May 27-June 2,1957	1,860	--	7.88	3.87	4.39	--	2.56	--	--	--	--	--	1,120	1.52	2,830	27	1.8	1,390	7.8
June 3-13	86	--	15.77	11.84	17.40	--	5.69	--	--	--	--	--	3,210	4.37	376	39	4.7	3,540	8.0
June 14-30	10,920	--	7.04	3.21	4.26	--	2.21	--	--	--	--	--	997	1.36	14,850	29	1.9	1,290	7.8
July 1-31	57,600	15	5.94	2.14	3.96	--	2.49	9.02	.51	.04	.03	.11	807	1.10	63,360	33	2.0	1,070	7.5
Aug. 1-31	68,670	--	4.64	2.06	3.70	--	2.08	--	--	--	--	--	617	.84	57,680	36	2.0	852	7.7
Sept. 1-30	25,590	--	5.35	2.38	3.13	--	2.47	--	--	--	--	--	732	1.00	25,590	29	1.6	997	8.1
Total or weighted average	203,200	--	6.39	3.04	4.70	--	2.51	--	--	--	--	--	931	1.27	258,100	33	2.2	1,200	--

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ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT ARKANSAS CITY, KANS.

LOCATION (revised).--At gaging station on bridge on U. S. Highway 166, 0.5 mile west of Arkansas City, Cowley County, and 5.4 miles upstream from Walnut River.
DRAINAGE AREA.--43,713 square miles of which 7,607 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1957.
Water temperatures: October 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 5,770 micromhos Jan. 16; minimum daily, 275 micromhos May 19.
Percent sodium: Maximum, 73 Oct. 1-10, Jan. 16, 24-27; minimum, 40 June 17-19, 1957.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 5,770 micromhos Jan. 16, 1957; minimum daily, 259 micromhos Oct. 4, 1955.
Percent sodium: Maximum, 79 Apr. 28, 1955; minimum, 36 May 27-29, 1955.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1956 to September 1957 given in WSP 1511.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	557	26	7.58	3.42	30.71	0.24	4.98	0.00	4.58	32.99	0.04	--	0.48	2,550	3.47	1,930	73	13	4,370	8.0
Oct. 11-13....	218	--	7.78	3.82	30.44		5.18	.00	4.43	32.43	--	--	--	2,460	3.35	731	72	13	4,330	7.7
Oct. 14, 16-20	1,170	--	4.39	2.11	14.17		3.64	.00	2.64	14.10	--	0.29	--	1,210	1.65	1,930	69	7.9	2,180	7.3
Oct. 15	177	--	5.79	3.21	19.56		4.29	.00	1.96	22.00	--	.31	--	1,780	2.42	428	68	9.2	3,100	7.8
Oct. 21-26 ...	1,080	--	5.04	2.16	17.57		4.00	.00	2.94	17.48	--	.35	--	1,500	2.04	2,210	71	9.3	2,630	8.0
Oct. 27-31 ...	785	--	5.49	2.31	20.49		4.20	.00	3.08	20.59	--	.42	--	1,700	2.31	1,820	72	10	2,970	7.8
Nov. 1-7.....	2,070	--	4.09	2.11	13.57		3.47	.00	2.50	13.54	--	.26	--	1,180	1.60	3,330	69	7.7	2,110	8.1
Nov. 8-10....	805	--	4.89	2.11	17.02		3.74	.00	2.87	17.06	--	.35	--	1,430	1.94	1,570	71	9.1	2,550	8.1
Nov. 11-20...	2,400	13	5.19	2.01	17.92	.25	4.03	.00	2.98	18.05	.03	.04	.12	1,500	2.04	4,910	71	9.4	2,680	7.5
Nov. 21-30...	2,370	--	5.39	2.01	17.26		4.26	.00	2.81	17.20	--	.39	--	1,470	2.00	4,750	70	9.0	2,610	8.2
Dec. 1-10....	2,390	--	5.49	1.91	18.99		4.10	.00	2.98	18.89	--	.42	--	1,570	2.14	5,110	72	9.9	2,800	7.7
Dec. 11-19...	2,440	--	5.39	1.91	17.76		4.03	.00	3.02	17.62	--	.39	--	1,520	2.07	5,050	71	9.3	2,690	8.2
Dec. 20.....	353	--	5.89	2.11	13.53		4.00	.47	3.56	13.11	--	.39	--	1,260	1.71	606	63	6.8	2,190	8.5
Dec. 21-31...	3,800	--	4.99	1.81	17.03		3.84	.00	2.98	16.64	--	.37	--	1,450	1.97	7,510	71	9.2	2,560	7.9
Jan. 1-10, 1957	3,140	--	5.14	1.76	16.85		4.06	.00	2.96	16.36	--	.37	--	1,450	1.97	6,200	71	9.1	2,560	7.7
Jan. 11-15, 17-20.....	2,130	--	6.64	2.46	22.43		4.82	.00	3.73	22.56	--	.42	--	1,910	2.60	5,540	71	11	3,300	7.5
Jan. 16	171	--	10.78	4.42	41.20		6.39	1.40	6.31	42.30	--	--	--	3,380	4.60	785	73	15	5,770	8.7

Jan.21-23, 1957	793	--	5.09	1.81	15.43	3.97	.00	2.75	15.09	--	.52	--	1,390	1.89	1,500	62	6.0	2,440	7.5
Jan. 24-27 ...	704	--	6.79	2.41	24.80	4.69	.00	4.02	24.82	--	.47	--	2,070	2.82	1,980	73	12	3,580	7.6
Jan. 28-31 ...	873	--	5.79	2.31	19.65	4.56	.00	3.29	19.74	--	.16	--	1,690	2.30	2,010	71	9.8	2,970	8.1
Feb. 1-4.....	1,510	--	5.59	2.11	16.85	4.10	.00	2.94	17.20	--	.31	--	1,520	2.07	3,130	69	8.6	2,600	8.2
Feb. 5-8.....	1,770	--	4.49	1.51	13.43	3.41	.00	2.37	13.25	--	.40	--	1,190	1.62	2,870	69	7.8	2,060	8.2
Feb. 9-12....	2,310	--	3.99	1.31	11.70	3.25	.00	2.10	11.42	--	.23	--	1,030	1.40	3,240	69	7.2	1,820	8.2
Feb. 13-20...	3,780	--	5.84	.76	14.67	3.61	.20	2.73	14.38	--	.35	--	1,290	1.75	6,640	69	8.1	2,270	8.4
Feb. 21-28...	3,450	20	5.39	1.51	15.09 | --	3.97	.00	3.14	15.23	.03	.29	.13	1,360	1.85	6,390	69	8.1	2,360	8.1
Mar. 1-10....	5,590	--	5.09	1.71	14.50	3.61	.20	2.98	14.24	--	.27	--	1,370	1.86	10,420	68	7.9	2,310	8.4
Mar. 11-14...	2,120	--	5.39	1.51	15.04	3.77	.20	3.19	14.52	--	.26	--	1,400	1.90	4,040	69	8.1	2,360	8.4
Mar. 15-20...	2,670	--	5.49	2.01	17.89	4.06	.00	3.54	17.48	--	.31	--	1,570	2.14	5,710	70	9.2	2,660	7.4
Mar. 21-27...	5,150	--	4.69	1.91	15.91	3.28	.20	3.33	15.51	--	.19	--	1,420	1.93	9,950	71	8.8	2,440	8.4
Mar. 28-31...	9,540	--	4.29	1.01	10.41	2.95	.07	2.46	10.15	--	.08	--	987	1.34	12,820	66	6.4	1,720	8.3
Apr. 1-2.....	4,100	--	4.09	1.61	13.49	2.85	.00	2.73	13.54	--	.07	--	1,180	1.60	6,590	70	8.0	2,120	8.2
Apr. 3.....	9,080	--	2.05	.63	4.82	1.57	.00	1.04	4.77	--	.12	--	440	.60	5,440	64	4.2	820	7.9
Apr. 4-10....	33,020	--	2.89	1.11	6.48	2.46	.00	1.62	6.34	--	.06	--	639	.87	28,730	62	4.6	1,150	8.2
Apr. 11-12...	5,000	--	3.69	1.31	8.23	2.82	.00	2.42	7.84	--	.15	--	819	1.11	5,570	62	5.2	1,420	8.2
Apr. 13-20...	14,360	--	4.89	2.51	12.67	3.47	.00	4.62	11.84	--	.14	--	1,260	1.71	24,620	63	6.6	2,110	8.2
Apr. 21-22...	9,340	--	3.44	1.56	9.14	2.52	.00	3.10	8.46	--	.06	--	898	1.22	11,420	65	5.8	1,560	8.1
Apr. 23-28...	49,370	--	2.59	1.41	3.56	2.33	.00	1.58	3.61	--	.04	--	456	.62	30,640	47	2.5	801	8.0
Apr. 29-30...	7,040	--	3.59	1.21	6.30	2.69	.00	2.12	6.20	--	.09	--	697	.95	6,680	57	4.1	1,200	8.0
May 1-10.....	30,310	18	4.09	1.39	9.83 | --	3.15	.00	2.89	9.02	.02	.11	.15	935	1.27	38,570	64	5.9	1,600	7.8
May 11-12....	6,700	--	4.29	1.75	12.29	2.95	.33	3.29	11.70	--	.10	--	1,110	1.51	10,130	67	7.0	1,970	8.5
May 13-14....	37,610	--	3.09	.91	5.99	2.43	.27	1.73	5.50	--	.06	--	590	.80	30,200	60	4.2	1,070	8.5
May 15-20....	398,100	--	1.55	.37	1.35	1.70	.07	.40	1.07	--	.03	--	192	.26	104,000	41	1.4	347	8.3
May 21-23....	82,350	--	2.15	.57	2.61	2.39	.00	.75	2.14	--	.05	--	297	.40	33,290	49	2.2	521	8.1
May 24-27....	50,660	--	3.04	1.16	4.65	2.56	.00	1.71	4.46	--	.12	--	507	.69	34,960	53	3.2	934	8.1
May 28-30....	24,930	--	3.79	1.33	6.48	2.75	.00	2.27	6.49	--	.09	--	678	.92	23,010	56	4.1	1,230	8.2

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT ARKANSAS CITY, KANS.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: 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) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
May 31, 1957	9,800	--	2.69	0.95	3.74		2.23	0.00	1.56	3.52	--	0.07	--	426	0.58	5,680	51	2.8	784	8.1
June 1-2	18,210	--	3.99	1.81	6.83		2.88	.20	2.94	6.54	--	.07	--	757	1.03	18,760	54	4.0	1,290	8.3
June 3-7	83,700	--	2.40	.72	3.19		2.10	.00	1.17	2.96	--	.08	--	379	.52	43,180	51	2.6	665	8.0
June 8-10	20,290	--	3.39	1.25	5.86		2.79	.00	2.00	5.64	--	.07	--	636	.86	17,570	56	3.9	1,110	8.2
June 11	7,740	--	3.34	1.54	5.58		2.56	.00	2.52	5.30	--	.08	--	645	.88	6,790	53	3.6	1,100	8.2
June 12-14	77,160	--	1.90	.74	1.93		1.84	.00	.92	1.75	--	.06	--	280	.38	29,410	42	1.7	478	8.0
June 15	14,600	--	2.54	1.10	3.09		2.39	.00	1.46	2.82	--	.06	--	381	.52	7,570	46	2.3	682	8.2
June 16	7,660	--	3.44	1.52	5.79		2.79	.00	2.35	5.50	--	.11	--	632	.86	6,590	54	3.7	1,120	8.2
June 17-19	23,310	--	4.19	1.81	3.97		3.08	.00	3.27	3.52	--	.10	--	821	1.12	26,050	40	2.3	1,380	8.2
June 20	15,190	--	2.40	.96	2.58		2.23	.00	1.27	2.37	--	.07	--	343	.47	7,090	43	2.0	606	8.1
June 21-23	35,820	--	2.89	.99	4.01		2.46	.00	1.85	3.50	--	.08	--	494	.67	24,090	51	2.9	821	8.2
June 24-27	108,500	--	2.25	.71	2.47		2.23	.00	1.10	2.03	--	.07	--	334	.45	49,330	45	2.0	553	8.1
June 28, 30	130,500	--	1.65	.47	1.46		1.70	.00	.48	1.33	--	.07	--	199	.27	35,350	41	1.4	338	8.1
June 29	80,730	--	3.49	1.43	7.45		2.56	.00	1.56	8.18	--	.07	--	745	1.01	81,870	60	4.8	1,330	8.2
July 1-4	196,600	--	2.10	.38	1.80		2.13	.00	.60	1.49	--	.06	--	253	.34	67,700	42	1.6	428	7.7
July 5-7	74,620	--	2.79	.65	2.98		2.62	.00	1.31	2.43	--	.06	--	387	.53	39,310	46	2.3	651	7.5
July 8-10	33,400	--	4.09	1.15	5.44		3.31	.00	2.50	4.79	--	.08	--	629	.86	28,600	51	3.4	1,090	7.8
July 11-13	21,580	--	4.79	1.61	7.79		3.51	.00	3.50	7.11	--	.07	--	851	1.16	25,000	55	4.4	1,450	7.8
July 14-17	20,750	--	5.69	1.71	10.11		3.84	.00	4.16	9.45	--	.06	--	1,050	1.43	29,650	58	5.3	1,790	7.6
July 18-19	8,010	--	5.79	1.91	11.13		3.93	.00	4.39	10.43	--	.08	--	1,140	1.55	12,440	59	5.7	1,930	7.9
July 20-31	58,650	22	4.44	2.04	9.61	--	3.47	.00	3.44	9.16	0.03	.10	0.30	975	1.33	77,840	60	5.3	1,680	8.2
Aug. 1-6	23,150	--	4.09	1.51	7.62		3.34	.00	2.42	7.33	--	.13	--	813	1.11	25,620	58	4.6	1,400	7.7
Aug. 7-10	9,860	--	5.49	2.41	11.80		3.97	.00	4.06	11.56	--	.11	--	1,190	1.62	15,970	60	5.9	2,030	7.8
Aug. 11-17	14,080	--	5.59	2.51	14.06		3.93	.00	4.43	13.68	--	.12	--	1,350	1.84	25,870	63	7.0	2,310	7.7
Aug. 18	3,470	--	4.64	2.16	10.45		3.67	.00	3.46	10.01	--	.11	--	997	1.36	4,710	61	5.7	1,780	7.9
Aug. 19	3,510	--	3.04	1.28	6.72		2.39	.00	2.19	6.34	--	.12	--	666	.91	3,180	61	4.6	1,180	7.6
Aug. 20	2,220	--	4.54	2.26	12.02		3.34	.00	3.77	11.56	--	.15	--	1,140	1.55	3,450	64	6.5	1,980	7.8
Aug. 21-31	18,580	--	5.19	2.61	15.61		3.57	.00	4.39	15.37	--	.08	--	1,430	1.94	36,160	67	7.9	2,460	7.6

Sept. 1-6, 1957	8,030	--	5.49	2.41	16.30	3.67	.00	4.50	15.93	--	.10	--	1,480	2.01	16,180	67	8.2	2,550	7.9
Sept. 7-10....	5,950	--	4.94	2.26	14.21	3.47	.00	4.04	13.82	--	.08	--	1,300	1.77	10,530	66	7.5	2,280	7.7
Sept. 11-12...	2,890	--	5.09	2.21	14.34	3.57	.00	4.00	13.96	--	.11	--	1,320	1.80	5,200	66	7.5	2,280	7.9
Sept. 13-14...	3,920	--	4.24	1.76	11.11	3.18	.00	3.10	10.72	--	.11	--	1,030	1.40	5,500	65	6.4	1,820	7.9
Sept. 15-17...	13,170	--	2.94	1.10	4.70	2.85	.00	1.50	4.29	--	.10	--	511	.69	9,160	54	3.3	910	7.7
Sept. 18-20...	34,710	--	2.40	.56	2.31	2.52	.00	.71	1.97	--	.07	--	307	.42	14,510	44	1.9	542	7.7
Sept. 21-25...	61,570	--	2.40	.60	3.02	2.72	.00	1.04	2.17	--	.09	--	339	.46	28,410	50	2.5	573	7.7
Sept. 26-30...	19,340	--	3.74	1.30	6.40	3.11	.00	2.44	5.78	--	.11	--	677	.92	17,820	56	4.0	1,200	7.8
Total or weighted average...	2,099,000	--	2.74	0.90	4.32	2.43	--	1.44	4.09	--	0.07	--	483	0.66	1,380,000	54	3.2	840	--

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT RALSTON, OKLA.

LOCATION.--At gaging station at bridge on State Highway 18 at Ralston, Pawnee County, 2 miles downstream from Salt Creek, and 2 miles upstream from Grayhorse Creek.
DRAINAGE AREA.--54,465 square miles, of which 7,615 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: January 1950 to September 1957.
Water temperatures: January 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 5,650 micromhos May 1; minimum daily, 286 micromhos June 25.
Percent sodium: Maximum, 87 May 1-2; minimum, 45 June 27-30.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 7,510 micromhos Sept. 14, 1955; minimum daily, 251 micromhos Oct. 5, 1955.
Percent sodium: Maximum, 87 May 1-2, 1957; minimum 36 July 18-20, 1950.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1956 to September 1957 given in WSP 1511.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	341	13	5.39	2.01	22.53	0.15	3.11	0.00	3.73	24.25	0.02	0.05	0.22	1,860	2.53	864	73	11	3,300	8.0
Oct. 11-18 ...	361	--	5.59	3.11	22.52		3.15	.00	3.79	24.25	--	.03	--	1,860	2.53	914	72	11	3,300	8.0
Oct. 19	113	--	4.09	2.31	14.31		2.95	.00	2.48	15.23	--	.05	--	1,250	1.70	192	69	8.0	2,220	8.0
Oct. 20	101	--	4.69	2.91	17.98		3.02	.00	3.04	19.46	--	.06	--	1,550	2.11	213	70	9.2	2,720	8.0
Oct. 21-29 ...	972	--	5.34	2.76	22.47		3.08	.00	3.77	23.69	--	.03	--	1,880	2.56	2,490	74	11	3,220	7.8
Oct. 30-31 ...	381	--	4.94	2.46	18.92		3.21	.00	3.33	19.74	--	.04	--	1,550	2.11	804	72	9.8	2,740	7.7
Nov. 1-4	657	--	5.39	2.81	20.62		3.54	.00	3.54	21.71	--	.03	--	1,740	2.37	1,560	72	10	3,090	8.0
Nov. 5-10	1,890	--	5.19	2.61	18.28		3.44	.00	3.37	19.18	--	.09	--	1,570	2.14	4,050	70	9.3	2,730	7.8
Nov. 11-20 ...	2,780	5.8	5.99	2.41	20.40	.16	3.74	.00	3.54	22.00	.02	.06	.17	1,730	2.35	6,550	70	10	3,040	7.8
Nov. 21-30 ...	1,990	--	5.59	2.71	20.90		4.00	.00	3.56	21.57	--	.07	--	1,750	2.38	4,740	72	10	3,090	7.9
Dec. 1-10	2,120	--	5.79	2.61	20.07		3.90	.20	3.39	20.87	--	.11	--	1,700	2.31	4,910	70	9.8	2,970	8.4
Dec. 11-20 ...	2,700	--	5.99	2.61	20.53		4.03	.00	3.48	21.43	--	.19	--	1,740	2.37	6,380	70	9.9	3,040	8.2
Dec. 21-31 ...	4,170	--	5.99	2.81	26.94		3.80	.00	3.89	27.92	--	.13	--	2,140	2.91	12,150	75	13	3,790	8.1
Jan. 1-10, 1957	3,800	12	5.19	2.01	20.79	--	3.25	.00	3.52	22.00	.03	.12	.28	1,760	2.39	9,110	74	11	3,090	7.8
Jan. 11-20 ...	3,020	--	5.99	2.61	21.39		3.67	.00	3.58	22.56	--	.18	--	1,830	2.49	7,530	71	10	3,160	7.9
Jan. 21-31 ...	2,770	--	6.09	2.81	24.04		3.70	.00	3.73	25.38	--	.13	--	1,980	2.69	7,460	73	11	3,390	7.7
Feb. 1-10	3,980	--	7.19	1.91	19.70		3.87	.00	3.27	21.43	--	.23	--	1,800	2.45	9,750	68	9.2	3,110	8.1

Feb. 11-20, 1957.....	4,920	--	6.99	1.21	17.58	3.80	.27	3.06	18.47	--	.18	--	1,610	2.19	10,770	68	8.7	2,760	8.4
Feb. 21-28...	4,060	--	7.19	1.41	18.21	3.80	.20	3.33	19.32	--	.16	--	1,670	2.27	9,230	68	8.8	2,870	8.3
Mar. 1-10....	6,050	--	5.79	2.21	19.49	3.93	.00	3.39	20.02	--	.15	--	1,670	2.27	13,750	71	9.7	2,900	8.0
Mar. 11-20...	6,250	--	5.79	2.41	21.53	3.84	.00	3.79	22.00	--	.10	--	1,810	2.46	15,410	72	11	3,120	8.0
Mar. 21-27...	5,330	--	5.09	2.11	18.97	3.28	.20	3.39	19.18	--	.12	--	1,620	2.20	11,740	72	10	2,760	8.4
Mar. 28-30...	2,910	--	5.19	2.81	23.06	3.25	.20	3.79	23.69	--	.13	--	1,940	2.64	7,690	74	12	3,320	8.4
Mar. 31.....	1,430	--	4.39	1.51	16.62	2.69	.33	2.87	16.50	--	.13	--	1,440	1.96	2,800	74	9.7	2,470	8.7
Apr. 1-4.....	13,730	--	3.89	1.61	10.87	2.82	.00	2.44	11.00	--	.11	--	1,030	1.40	19,240	66	6.6	1,800	8.1
Apr. 5-7.....	53,730	--	2.05	.83	4.04	1.84	.00	.92	4.12	--	.04	--	422	.57	30,870	58	3.4	758	7.9
Apr. 8.....	7,560	--	4.49	2.01	11.68	2.10	.00	2.50	13.40	--	.18	--	1,170	1.59	12,040	64	6.5	2,000	8.2
Apr. 9-10....	12,690	--	3.44	1.36	8.10	2.23	.00	1.85	8.69	--	.13	--	814	1.11	14,070	63	5.2	1,430	8.1
Apr. 11-15...	24,690	--	3.19	1.51	7.12	2.52	.00	1.85	7.33	--	.12	--	728	.99	24,470	60	4.7	1,290	8.0
Apr. 16-17...	6,330	--	4.24	1.96	10.11	2.95	.00	3.10	10.15	--	.11	--	1,020	1.39	8,790	62	5.7	1,760	8.2
Apr. 18-20...	22,200	--	1.85	.67	3.70	1.61	.00	.90	3.67	--	.04	--	378	.51	11,420	59	3.3	691	7.8
Apr. 21-23...	80,570	--	1.45	.71	2.13	1.61	.00	.50	2.14	--	.04	--	249	.34	27,310	50	2.0	450	8.0
Apr. 24-25...	110,500	--	2.00	.80	9.37	1.51	.00	.92	9.59	--	.05	--	757	1.03	113,800	77	7.8	1,410	7.8
Apr. 26.....	49,390	--	2.30	.90	14.10	1.48	.00	1.39	14.38	--	.05	--	1,140	1.55	76,640	82	11	2,150	8.0
Apr. 27-28...	46,180	--	3.39	1.61	24.18	1.80	.00	2.50	24.82	--	.06	--	1,770	2.41	111,300	83	15	3,200	8.0
Apr. 29-30...	29,200	--	4.79	1.81	38.27	2.10	.00	3.85	38.92	--	--	--	2,770	3.77	110,100	85	21	4,880	8.2
May 1-2.....	23,720	--	5.04	2.06	46.63	2.29	.00	4.35	47.09	--	--	--	3,260	4.43	105,300	87	25	5,690	8.0
May 3-7.....	72,440	--	3.29	1.39	21.56	2.10	.00	2.33	21.71	--	.10	--	1,590	2.16	156,800	82	14	2,880	8.1
May 8-10.....	25,790	--	5.09	2.11	37.25	2.66	.07	4.21	37.51	--	--	--	2,720	3.70	95,470	84	20	4,780	8.3
May 11.....	11,620	--	4.29	1.71	25.36	2.52	.13	2.89	25.66	--	.16	--	1,920	2.61	30,380	81	15	3,340	8.4
May 12-15....	57,560	--	4.09	1.71	18.95	2.49	.07	2.91	19.81	--	.10	--	1,560	2.12	122,200	77	11	2,770	8.3
May 16.....	92,230	--	2.00	.56	7.09	1.74	.00	.94	6.91	--	.06	--	588	.80	73,820	75	6.3	1,080	8.2
May 17-20....	692,200	--	1.60	.48	3.89	1.44	.00	.75	3.75	--	.03	--	369	.50	347,700	65	3.8	681	7.8
May 21.....	182,300	--	2.40	.72	6.02	1.90	.00	1.12	6.06	--	.06	--	535	.73	132,700	66	4.8	1,020	8.0

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT RALSTON, OKLA.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Car-bonate (CO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons				
May 22, 1957..	79,930	--	2.79	1.29	9.95		2.00	0.00	2.10	9.87	--	0.06	--	830	1.13	90,310	71	7.0	1,550	8.2
May 23.....	95,210	--	3.34	.54	6.61		2.10	.00	1.98	6.34	--	.07	--	613	.83	79,440	63	4.7	1,110	8.1
May 24-25....	175,300	--	2.50	.70	4.46		1.61	.00	1.62	4.37	--	.06	--	452	.61	107,900	58	3.5	838	8.0
May 26-28....	261,400	--	1.90	.66	3.37		1.44	.00	1.08	3.36	--	.05	--	341	.46	121,300	57	3.0	654	7.9
May 29-31....	105,300	--	3.34	1.06	6.76		2.07	.00	2.31	6.71	--	.07	--	663	.90	95,050	61	4.6	1,200	8.1
June 1-2	122,600	--	3.09	1.07	4.95		2.03	.00	1.87	5.13	--	.08	--	588	.80	98,110	54	3.4	986	8.2
June 3-10	302,500	--	3.29	1.27	6.45		1.97	.00	2.25	6.71	--	.08	--	700	.95	288,200	59	4.3	1,210	8.1
June 11-16 ...	580,200	--	1.95	.61	2.22		1.74	.00	.85	2.14	--	.05	--	283	.38	223,500	46	2.0	508	7.9
June 17	30,940	--	3.44	1.12	4.79		2.23	.00	2.27	4.79	--	.06	--	581	.79	24,470	51	3.2	986	8.1
June 18-20 ...	177,500	--	2.69	.75	3.56		1.77	.00	1.50	3.67	--	.06	--	435	.59	105,100	51	2.7	751	8.0
June 21-22 ...	77,160	--	2.50	.86	3.84		1.93	.00	1.37	3.84	--	.06	--	445	.61	46,740	53	3.0	764	8.0
June 23-26 ...	438,700	--	1.30	.62	1.77		1.31	.00	.69	1.64	--	.05	--	218	.30	130,200	48	1.8	368	6.9
June 27-30 ...	609,500	--	1.80	.64	2.03		1.57	.00	.90	1.95	--	.05	--	292	.40	242,300	45	1.8	485	7.9
July 1-6.....	721,600	--	2.69	.67	3.16		1.93	.00	1.48	3.07	--	.04	--	393	.53	386,000	48	2.4	696	7.1
July 7-10.....	139,200	--	4.54	1.26	6.07		2.75	.00	3.08	5.98	--	.06	--	731	.99	138,600	51	3.6	1,230	7.7
July 11-20....	157,100	20	5.04	2.36	9.87	--	3.34	.00	3.91	9.87	0.04	.05	0.27	1,080	1.47	230,900	57	5.1	1,780	8.1
July 21-31....	120,500	--	5.19	1.71	10.43		3.34	.00	3.27	10.66	--	.06	--	1,050	1.43	172,200	60	5.6	1,800	7.7
Aug. 1-10....	68,170	--	5.29	1.71	11.82		3.44	.00	3.04	12.27	--	.07	--	1,150	1.56	106,700	63	6.3	1,990	7.5
Aug. 11-20...	43,200	--	4.94	2.66	15.35		3.28	.00	3.83	15.79	--	.05	--	1,400	1.90	82,330	67	7.9	2,430	7.7
Aug. 21-23...	12,690	--	4.49	2.51	10.92		3.34	.00	3.08	11.42	--	.08	--	1,150	1.56	19,870	61	5.8	1,900	7.7
Aug. 24-31...	23,030	--	4.74	2.66	16.07		3.05	.00	3.73	16.64	--	.05	--	1,440	1.96	45,140	68	8.4	2,500	7.7
Sept. 1-10 ...	23,520	--	4.64	2.86	17.90		2.72	.00	3.89	18.75	--	.04	--	1,540	2.09	49,310	70	9.2	2,710	7.4
Sept. 11-16...	20,390	--	4.49	2.61	14.26		2.82	.00	3.25	15.23	--	.06	--	1,310	1.78	36,360	67	7.6	2,310	7.7
Sept. 17.....	11,860	--	4.09	1.91	11.11		2.62	.00	2.25	12.13	--	.11	--	1,010	1.37	16,310	65	6.4	1,840	7.8
Sept. 18-21...	50,420	--	2.79	1.21	7.02		2.00	.00	1.94	6.99	--	.09	--	669	.91	45,920	64	5.0	1,210	7.6
Sept. 22-25...	85,210	--	2.79	1.09	5.64		1.97	.00	1.54	5.92	--	.09	--	575	.78	66,700	59	4.0	1,040	7.5
Sept. 26-30...	48,650	--	3.69	1.43	9.05		2.39	.00	2.69	9.02	--	.07	--	868	1.18	57,490	64	5.7	1,550	7.6
Total or weighted average ...	6,259,000	--	2.59	0.90	5.87		1.90	--	1.54	5.87	--	0.05	--	573	0.78	4,882,000	63	4.4	1,010	--

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.

LOCATION.--At gaging station at bridge on State Highway 40, 1 mile south of Perkins, Payne County, 1½ miles upstream from Dugout Creek, and 4 miles downstream from Wildhorse Creek.
DRAINAGE AREA.--17,852 square miles, of which about 4,926 square miles does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1957.
Water temperatures: October 1952 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 32,400 micromhos Mar. 18; minimum daily, 497 micromhos May 17.
Percent sodium: Maximum, 94 Apr. 1-2; minimum, 53 May 21, June 24.
EXTREMES, 1952-57.--Specific conductance: Maximum daily, 32,400 micromhos Mar. 18, 1957; minimum daily, 497 micromhos May 17, 1957.
Percent sodium: Maximum, 94 Feb. 18-20, 1955, Apr. 1-2, 1957; minimum, 53 May 21, June 24, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1956 to September 1957 given in WSP 1511.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	61	17	12.23	7.31	96.57	0.25	3.72	0.00	9.29	102.65	0.01	--	0.45	6,930	9.42	574	83	31	11,500	7.9
Oct. 11-14....	47	--	12.92	7.48	96.70		3.92	.00	9.12	104.06	--	--	--	7,070	9.62	451	83	30	11,800	8.0
Oct. 15.....	968	--	1.85	.63	4.94		1.90	.00	.62	4.85	--	0.05	--	485	.66	639	67	4.4	793	7.4
Oct. 16.....	551	--	3.99	2.11	23.98		2.43	.00	3.29	24.25	--	.11	--	1,790	2.43	1,340	80	14	3,180	7.6
Oct. 17, 19-20	938	--	1.90	.86	6.38		1.93	.00	1.10	6.06	--	.05	--	537	.73	686	70	5.4	1,000	7.4
Oct. 18.....	452	--	5.99	2.51	31.07		2.46	.00	4.96	32.15	--	--	--	2,400	3.26	1,480	79	15	4,170	7.5
Oct. 21-23....	301	--	2.89	1.31	10.55		2.56	.00	1.71	10.43	--	.05	--	887	1.21	364	72	7.3	1,630	7.5
Oct. 24-25....	123	--	4.09	1.71	17.99		3.31	.00	2.37	18.05	--	.06	--	1,400	1.90	234	76	11	2,540	7.7
Oct. 26-28....	133	--	5.29	2.51	25.02		3.80	.00	3.02	25.94	--	.06	--	1,940	2.64	351	76	13	3,430	7.9
Oct. 29-31....	137	--	5.89	2.91	32.17		3.87	.00	3.54	33.56	--	--	--	2,460	3.35	458	79	15	4,330	7.9
Nov. 1-4.....	190	--	6.39	3.81	41.25		3.51	.00	4.23	43.71	--	--	--	3,090	4.20	801	80	18	5,470	8.0
Nov. 5, 9.....	357	--	3.29	1.91	17.55		2.07	.00	2.25	18.33	--	.10	--	1,340	1.82	651	77	11	2,500	7.8
Nov. 6-8, 10..	700	--	4.99	2.01	28.39		2.69	.00	3.37	29.33	--	--	--	2,110	2.87	2,010	80	15	3,830	8.2
Nov. 11-12....	179	--	5.19	2.41	26.66		3.05	.27	3.77	27.07	--	.10	--	2,040	2.77	496	78	14	3,650	8.5
Nov. 13-16....	218	--	4.79	2.11	22.00		3.77	.07	3.29	21.71	--	.10	--	1,680	2.28	499	76	12	3,030	8.3

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: 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) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Nov. 17-20, 1956	133	--	5.79	2.61	29.08		4.00	0.20	3.39	29.89	--	--	--	2,220	3.02	402	78	14	3,970	8.5
Nov. 21-24	99	--	6.89	3.51	38.79		4.23	.20	3.87	40.89	--	--	--	2,910	3.96	393	79	17	5,110	8.4
Nov. 25-30	120	--	8.28	4.02	48.51		4.72	.13	4.64	51.32	--	--	--	3,640	4.95	595	80	20	6,320	8.4
Dec. 1-10	201	--	9.48	4.72	58.28		5.05	.00	5.39	62.04	--	--	--	4,360	5.93	1,190	80	22	7,430	8.2
Dec. 11-20	305	14	8.98	4.42	58.29	0.11	4.85	.00	5.79	60.63	0.01	--	0.28	4,200	5.71	1,750	81	23	7,370	8.0
Dec. 21-31	520	--	8.28	4.12	51.55		4.52	.00	5.29	54.14	--	--	--	3,850	5.24	2,720	81	21	6,620	8.1
Jan. 1-10, 1957	371	--	7.98	4.02	45.05		4.20	.27	4.64	47.94	--	--	--	3,430	4.66	1,730	79	18	5,940	8.4
Jan. 11-20	315	--	8.78	5.02	50.79		4.85	.00	5.60	54.14	--	--	--	3,970	5.40	1,700	79	19	6,730	8.1
Jan. 21-31	315	--	9.18	4.82	50.21		5.11	.00	5.52	53.58	--	--	--	3,900	5.30	1,670	78	19	6,570	8.2
Feb. 1-10	442	8.0	7.58	4.22	49.16	--	4.10	.53	5.56	50.20	.02	--	.52	3,660	4.98	2,200	81	20	6,340	8.6
Feb. 11-20	589	--	9.58	2.22	44.02		4.33	.33	5.48	45.68	--	--	--	3,410	4.64	2,730	79	18	5,950	8.5
Feb. 21-25	248	--	7.58	4.42	57.76		3.70	.20	6.64	59.22	--	--	--	4,340	5.90	1,460	83	24	7,310	8.4
Feb. 26-28	182	--	8.88	5.52	80.61		3.70	.40	7.72	83.19	--	--	--	5,890	8.01	1,460	85	30	9,800	8.5
Mar. 1-8	686	--	9.38	4.72	82.88		4.20	.27	7.91	84.60	--	--	--	5,950	8.09	5,560	85	31	9,770	8.5
Mar. 9-10	311	--	13.17	4.41	96.13		3.31	.47	2.77	107.16	--	--	--	7,440	10.12	3,150	85	32	11,600	8.6
Mar. 11	182	--	10.13	6.39	123.76		3.39	.60	9.95	126.34	--	--	--	8,450	11.49	2,100	88	43	14,200	8.5
Mar. 12-16	835	--	12.28	6.38	176.84		3.49	.40	9.72	181.89	--	--	--	12,000	16.32	13,640	90	58	19,400	8.3
Mar. 17	137	--	13.82	8.58	273.67		3.18	.67	13.32	278.90	--	--	--	17,400	23.66	3,240	92	82	27,700	8.6
Mar. 18-20	361	--	14.57	7.83	302.24		3.34	.47	13.45	307.38	--	--	--	19,600	26,66	9,630	93	90	30,600	8.4
Mar. 21-24	649	--	10.53	7.35	194.59		3.06	.40	10.20	198.81	--	--	--	12,800	17.41	11,300	92	65	21,100	8.5
Mar. 25-28	1,480	--	9.83	5.11	126.70		3.36	.40	8.72	129.16	--	--	--	8,610	11.71	17,300	89	46	14,400	8.5
Mar. 29-31	2,660	--	13.47	6.35	232.45		2.74	.20	11.89	237.44	--	--	--	15,100	20.54	54,630	92	74	24,400	8.4
Apr. 1-2	1,360	--	12.62	6.56	288.74		2.79	.27	11.58	293.28	--	--	--	18,100	24.62	33,430	94	93	29,400	8.4
Apr. 3-4	2,470	--	8.33	4.39	160.65		2.80	.47	7.39	162.71	--	--	--	10,400	14.14	34,930	93	64	17,000	8.5
Apr. 5	4,440	--	6.59	2.99	99.99		2.87	.07	5.39	101.24	--	--	--	6,650	9.04	40,220	91	46	11,400	8.3
Apr. 6-7	5,280	--	5.19	1.81	55.16		2.52	.13	4.52	54.99	--	--	--	3,760	5.11	27,000	89	29	6,630	8.3

Apr. 8, 1957..	1,430	--	7.78	2.42	72.20	2.10	.13	7.41	72.76	--	--	--	5,080	6.91	9,880	88	32	8,530	8.3
Apr. 9-10.....	2,040	--	10.13	4.09	144.35	2.41	.07	8.89	147.20	--	--	--	9,540	12.97	26,450	91	54	15,900	8.3
Apr. 11-18....	4,220	--	9.13	4.61	143.83	3.33	.00	8.45	145.79	--	--	--	9,470	12.88	54,390	91	55	15,700	8.0
Apr. 19.....	2,660	--	7.39	2.97	93.48	2.59	.20	5.45	95.60	--	--	--	6,230	8.47	22,540	90	41	10,700	8.4
Apr. 20.....	5,610	--	3.04	1.12	25.64	2.13	.07	1.73	25.80	--	.07	--	1,860	2.53	14,210	86	18	3,350	8.3
Apr. 21.....	23,010	--	5.29	1.51	32.65	2.88	.13	4.29	32.15	--	--	--	2,510	3.41	78,610	83	18	4,350	8.3
Apr. 22-23....	61,290	--	3.44	.88	14.80	2.33	.00	2.66	14.10	--	.03	--	1,210	1.65	101,000	77	10	2,180	7.6
Apr. 24-25....	69,620	--	3.14	.70	7.70	2.16	.00	2.35	6.99	--	.04	--	739	1.01	70,040	67	5.6	1,270	7.9
Apr. 26.....	9,700	--	6.69	1.31	21.19	1.97	.00	6.14	21.01	--	.07	--	1,910	2.60	25,220	73	11	3,180	8.1
Apr. 27-28....	9,340	--	4.89	1.07	14.67	1.74	.00	4.60	14.24	--	.05	--	1,350	1.84	17,170	71	8.5	2,300	8.1
Apr. 29-30....	5,850	--	8.28	1.92	39.67	2.00	.00	6.70	41.17	--	--	--	3,080	4.19	24,530	80	18	5,240	7.8
May 1	2,620	--	7.98	1.22	51.31	2.16	.33	5.85	52.17	--	--	--	3,700	5.03	13,190	85	24	6,250	8.4
May 2	7,160	--	5.34	1.96	33.15	2.36	.40	4.41	33.28	--	--	--	2,470	3.36	24,080	82	17	4,250	8.5
May 3-5	95,400	--	4.14	1.06	14.26	1.97	.00	3.60	13.82	--	.07	--	1,230	1.67	159,700	73	8.8	2,140	7.7
May 6	13,980	--	5.19	1.11	20.79	1.74	.00	4.64	20.59	--	.12	--	1,700	2.31	32,360	77	12	2,890	8.2
May 7	8,690	--	7.09	2.71	37.50	1.90	.20	7.41	37.79	--	--	--	2,970	4.04	35,120	79	17	4,950	8.4
May 8-10	13,960	--	9.08	2.52	60.97	2.36	.13	8.60	61.48	--	--	--	4,410	6.00	83,830	84	25	7,460	8.3
May 11-13	17,080	--	9.78	3.22	62.14	2.56	.67	9.31	62.60	--	--	--	4,590	6.24	106,700	83	24	7,760	8.6
May 14-15	23,050	--	8.58	2.32	30.78	1.97	.67	8.87	30.17	--	--	--	2,520	3.43	79,060	74	13	4,340	8.6
May 16	35,900	--	10.58	2.72	43.86	2.03	.53	10.04	44.56	--	--	--	3,460	4.71	169,100	77	17	5,760	8.6
May 17	214,200	--	1.70	.40	2.85	1.84	.27	.52	2.26	--	.06	--	277	.38	80,770	58	2.8	497	8.5
May 18-20	280,900	--	1.90	.50	4.34	1.77	.20	.67	4.06	--	.04	--	412	.56	157,500	64	4.0	737	8.5
May 21	122,800	--	2.35	.61	3.37	2.33	.00	.62	3.33	--	.05	--	381	.52	63,680	53	2.8	706	7.7
May 22-23	63,070	--	3.09	1.15	8.85	2.29	.00	1.73	9.02	--	.05	--	761	1.03	65,340	68	6.1	1,440	8.0
May 24	15,670	--	4.54	1.76	17.68	2.62	.00	3.79	17.48	--	.09	--	1,480	2.01	31,570	74	10	2,680	7.8
May 25	17,430	--	3.84	1.76	10.98	2.72	.00	3.06	10.72	--	.08	--	1,080	1.47	25,630	66	6.6	1,940	7.8
May 26	47,400	--	5.09	2.31	21.89	2.69	.00	4.79	21.71	--	.10	--	1,730	2.35	111,600	75	11	3,040	8.1
May 27-29	53,730	--	4.69	2.51	15.99	2.13	.00	4.64	16.36	--	.06	--	1,440	1.96	105,300	69	8.4	2,500	7.5

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 30, 1957..	12,690	--	6.79	3.21	29.57		2.59	0.00	6.52	30.46	--	--	--	2,410	3.28	41,640	75	13	4,100	8.1
May 31	48,990	--	4.14	1.66	13.34		2.69	.00	2.83	13.54	--	0.08	--	1,150	1.56	76,690	70	7.8	2,050	7.7
June 1.....	45,820	--	4.89	2.51	22.69		2.36	.00	3.62	23.97	--	.14	--	1,830	2.49	114,100	75	12	3,170	8.2
June 2-3.....	46,470	--	5.89	3.11	36.53		1.67	.00	5.79	38.07	--	--	--	2,840	3.86	179,700	80	17	4,950	8.1
June 4.....	21,220	--	5.34	2.36	21.74		3.08	.00	5.08	21.15	--	.13	--	1,750	2.38	50,560	74	11	3,000	8.2
June 5-6.....	27,010	--	5.69	2.91	31.24		2.75	.00	4.66	32.43	--	--	--	2,410	3.28	88,630	78	15	4,240	8.2
June 7-8.....	16,200	--	5.44	2.46	25.10		2.85	.00	4.71	25.38	--	.06	--	2,010	2.73	44,340	76	13	3,520	8.2
June 9.....	6,430	--	6.74	4.16	37.97		2.75	.00	6.64	39.48	--	--	--	3,040	4.13	26,590	78	16	5,160	8.2
June 10.....	28,360	--	3.84	1.86	15.15		2.26	.00	2.71	15.79	--	.09	--	1,270	1.73	49,030	73	9.0	2,260	8.1
June 11.....	69,620	--	6.54	2.86	32.84		2.66	.00	5.18	34.40	--	--	--	2,590	3.52	245,500	78	15	4,430	8.2
June 12.....	41,650	--	4.74	1.66	9.33		1.90	.00	4.46	9.31	--	.06	--	990	1.35	56,130	59	5.2	1,670	7.4
June 13.....	21,820	--	3.84	1.16	6.43		1.87	.00	3.06	6.43	--	.07	--	707	.96	21,000	56	4.1	1,250	7.9
June 14.....	14,940	--	4.39	1.61	8.22		2.13	.00	3.69	8.32	--	.08	--	916	1.25	18,620	58	4.7	1,540	8.0
June 15.....	14,240	--	6.39	2.21	16.54		2.36	.00	5.52	17.20	--	.06	--	1,610	2.19	31,210	66	8.0	2,680	7.9
June 16-17....	16,010	--	8.63	3.77	37.30		2.75	.00	7.47	39.48	--	--	--	3,060	4.16	66,670	75	15	5,210	8.0
June 18.....	20,430	--	5.04	2.16	21.81		2.13	.00	4.23	22.56	--	.09	--	1,760	2.39	48,950	75	11	3,100	7.9
June 19-20	55,340	--	3.44	1.28	10.90		2.00	.00	2.56	11.00	--	.06	--	956	1.30	72,020	70	7.1	1,720	7.9
June 21.....	14,880	--	3.89	1.55	8.91		2.03	.00	2.96	9.31	--	.05	--	919	1.25	18,610	62	5.4	1,600	7.9
June 22.....	9,380	--	6.94	2.76	37.67		2.75	.00	5.14	39.48	--	--	--	2,830	3.85	36,140	80	17	4,920	8.0
June 23.....	31,930	--	3.69	1.59	16.68		2.49	.00	2.42	16.92	--	.13	--	1,310	1.78	56,950	76	10	2,380	7.9
June 24.....	84,500	--	2.30	1.26	4.05		2.03	.00	1.17	4.34	--	.07	--	458	.62	52,680	53	3.0	832	7.8
June 25-30....	258,000	--	3.74	1.46	8.85		1.97	.00	3.02	9.02	--	.04	--	878	1.19	308,300	63	5.5	1,540	7.8
July 1-2	37,170	--	4.34	1.86	12.52		2.75	.00	3.21	12.69	--	.07	--	1,160	1.58	58,690	67	7.1	2,020	7.9
July 3-7	93,720	--	5.84	2.16	23.45		2.43	.00	5.25	23.69	--	.08	--	1,880	2.56	239,300	75	12	3,270	7.2
July 8-10	11,880	--	8.13	3.77	31.24		3.93	.00	7.06	32.15	--	--	--	2,650	3.60	42,860	72	13	4,460	8.1
July 11-13.....	8,050	--	9.88	4.92	43.64		4.33	.00	8.99	45.12	--	--	--	3,570	4.86	39,130	75	16	5,930	8.0
July 14-20.....	12,160	--	9.98	6.42	56.07		3.67	.00	10.14	58.66	--	--	--	4,440	6.04	73,520	77	20	7,340	7.7

July 21-23, 1957	4,620	--	11.68	4.32	62.16	3.08	.00	10.22	64.86	--	--	--	4,760	6.47	29,950	80	22	8,010	8.0
July 24, 27-28.	8,280	--	6.69	6.11	40.22	3.97	.00	6.75	42.30	--	--	--	3,180	4.32	35,820	76	16	5,460	8.2
July 25-26	4,580	--	5.34	2.96	27.26	2.82	.00	5.02	27.64	--	.08	--	2,160	2.94	13,470	77	13	3,800	7.7
July 29-31	3,650	--	10.38	5.22	57.56	3.61	.00	10.33	59.22	--	--	--	4,400	5.98	21,880	79	21	7,360	7.4
Aug. 1.....	1,330	--	9.88	6.52	65.60	2.62	.00	11.14	68.24	--	--	--	4,940	6.72	8,980	80	23	8,340	7.8
Aug. 2-3.....	2,560	--	11.63	6.91	92.18	3.00	.00	12.12	95.60	--	--	--	6,670	9.07	23,250	83	30	11,000	7.8
Aug. 4.....	1,580	--	7.58	4.22	60.75	3.02	.00	6.93	62.60	--	--	--	4,340	5.90	9,320	84	25	7,500	7.8
Aug. 5-6.....	2,630	--	6.59	3.71	42.70	3.44	.00	5.85	43.71	--	--	--	3,140	4.27	11,250	81	19	5,460	7.8
Aug. 7.....	1,080	--	7.68	4.42	53.44	3.28	.00	7.27	54.99	--	--	--	3,920	5.33	5,780	82	22	6,740	7.9
Aug. 8-10.....	4,430	--	8.98	5.42	72.42	3.57	.00	8.52	74.73	--	--	--	5,190	7.06	31,290	83	27	8,740	7.9
Aug. 11	1,220	--	10.03	5.13	98.94	3.49	.00	9.37	101.24	--	--	--	6,830	9.29	11,340	87	36	11,400	8.2
Aug. 12-20....	7,520	--	8.28	5.12	59.79	4.03	.00	7.12	62.04	--	--	--	4,390	5.97	44,960	82	23	7,840	8.2
Aug. 21-26....	3,580	--	9.98	6.62	78.84	4.00	.00	9.10	82.34	--	--	--	5,850	7.96	28,490	83	27	9,890	8.0
Aug. 27-31....	2,330	--	11.03	7.09	102.25	3.88	.00	9.89	106.60	--	--	--	7,230	9.83	22,900	85	34	12,100	8.1
Sept. 1-10	4,220	26	10.73	7.21	86.13	--	4.05	.00	11.47	89.96	.01	--	.50	6,290	8.55	36,140	83	29	10,500	7.9
Sept. 11	585	--	10.33	4.81	112.49	2.90	.00	11.08	113.65	--	--	--	7,670	10.43	6,110	88	41	13,000	8.0
Sept. 12	690	--	6.29	4.91	48.26	3.41	.00	5.29	50.76	--	--	--	3,540	4.81	3,330	81	20	6,270	8.0
Sept. 13	649	--	5.99	8.31	63.72	3.93	.00	5.85	68.24	--	--	--	4,740	6.45	4,180	82	24	8,190	8.1
Sept. 14	4,360	--	7.09	3.71	44.21	4.16	.00	5.73	45.12	--	--	--	3,220	4.38	19,130	80	19	5,630	8.1
Sept. 15, 17...	40,030	--	3.44	1.28	10.16	2.26	.00	2.66	9.87	--	.09	--	927	1.26	50,510	68	6.6	1,660	7.7
Sept. 16, 18...	41,850	--	5.74	2.26	19.72	2.36	.00	5.23	20.02	--	.11	--	1,670	2.27	95,140	71	9.9	2,900	7.8
Sept. 19-20 ...	8,130	--	7.83	2.77	34.22	2.16	.00	7.41	35.25	--	--	--	2,750	3.74	30,440	76	15	4,710	7.7
Sept. 21-30 ...	21,000	--	6.14	2.96	42.71	2.92	.00	5.18	43.71	--	--	--	3,060	4.16	87,490	82	20	5,370	7.4
Total or weighted average [a]...	2,498,000	--	4.24	1.64	17.52	2.31	--	3.35	17.74	--	--	--	1,430	1.94	4,862,000	75	10	2,480	--

a Represents 100 percent of runoff for water year October 1956 to September 1957

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.

LOCATION.--At gaging station at bridge on U. S. Highways 64 and 71 at Van Buren, Crawford County, 1.3 miles downstream from Lee Creek, 8.6 miles downstream from Poteau River, and at mile 353.4.
DRAINAGE AREA.--150,483 square miles, of which 22,241 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1957.
Water temperatures: October 1945 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 6,110 micromhos Nov. 17; minimum daily, 156 micromhos Feb. 14.
Percent sodium: Maximum, 74 Nov. 17; minimum, 36 May 27-29, June 17-20.
EXTREMES, 1945-57.--Specific conductance: Maximum daily, 8,980 micromhos Apr. 1, 1954; minimum daily, 132 micromhos May 11, 1948.
Percent sodium: Maximum, 80 Oct. 21-24, 1946, Aug. 3-4, 1956; minimum, 32 July 18-27, 1951.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Fayetteville, Ark. Records of discharge for water year October 1956 to September 1957 given in WSP 1511.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-6, 1956.	5,270	5.8	4.44	1.56	11.48	0.33	3.11	1.62	12.69	0.01	0.08	0.00	1,180	1.60	8,430	64	6.6	1,940	7.4
Oct. 7-10.....	3,180	--	4.14	1.56	7.92	--	3.61	1.00	8.88	--	.05	.05	847	1.15	3,660	58	4.7	1,450	8.1
Oct. 11-19	7,600	--	3.34	1.56	7.00	--	3.11	1.02	7.47	--	.06	.00	730	.99	7,520	59	4.5	1,270	8.1
Oct. 20-22	3,560	--	3.94	1.73	10.00	--	2.95	1.37	11.00	--	.06	.05	962	1.31	4,660	64	5.9	1,670	8.2
Oct. 23-24	2,310	--	4.64	1.89	15.36	--	2.79	1.89	17.06	--	.05	--	1,370	1.86	4,300	70	8.5	2,390	8.0
Oct. 25-28.....	4,760	--	4.04	1.56	11.57	--	2.72	1.58	12.97	--	.07	.10	1,080	1.47	7,000	67	6.9	1,900	8.1
Oct. 29-31	3,570	--	3.54	1.56	8.70	--	2.64	1.29	9.59	--	.09	.00	857	1.17	4,180	63	5.4	1,500	8.0
Nov. 1, 4-6....	8,990	--	3.49	1.56	9.14	--	2.25	1.23	10.72	--	.07	.10	911	1.24	11,150	64	5.8	1,570	7.9
Nov. 2-3, 7 ...	4,920	--	4.24	1.64	13.57	--	2.51	1.60	15.23	--	.05	.10	1,200	1.63	8,020	70	7.9	2,110	8.0
Nov. 8, 10	4,660	--	5.24	2.22	19.53	--	2.07	1.67	22.84	--	.06	--	1,710	2.33	10,860	72	10	2,950	7.9
Nov. 9 a	2,460	--	--	--	--	--	1.92	2.37	29.33	--	.03	--	2,220	3.02	7,430	--	--	3,700	8.1
Nov. 11-14	10,290	--	3.94	1.48	12.70	--	2.23	1.39	14.38	--	.06	.10	1,150	1.56	16,050	70	7.7	2,000	8.0
Nov. 15 a	1,920	--	---	--	--	--	1.97	1.12	16.92	--	.03	--	1,480	2.01	3,860	--	--	2,460	8.2
Nov. 16, 18 ...	4,380	--	7.39	3.13	26.88	--	1.74	1.35	34.40	--	.06	--	2,310	3.14	13,750	72	12	4,130	7.8
Nov. 17.....	2,420	--	9.98	4.52	41.32	--	1.54	1.46	53.02	--	.07	--	3,970	5.40	13,070	74	15	6,060	7.8
Nov. 19, 22 ...	5,100	--	5.14	2.47	19.66	--	1.97	1.29	23.41	--	.06	.10	1,770	2.41	12,290	72	10	2.940	7.8
Nov. 20-21, 23.	8,730	--	4.49	1.81	15.27	--	1.97	1.23	18.05	--	.08	.10	1,350	1.84	16,060	71	8.6	2,390	7.7
Nov. 24-30	21,220	4.6	3.19	1.40	8.70	.28	1.97	1.02	10.38	.01	.08	.15	873	1.19	25,250	64	5.7	1,510	7.8

Dec. 1-9, 1956 .	23,540	4.6	3.34	1.23	7.70	.23	2.29	.90	8.97	.01	.06	.10	797	1.08	25,420	62	5.1	1,370	7.5
Dec. 10-13	15,790	--	2.89	.99	6.18	--	2.05	1.12	6.63	--	.04	.05	595	.81	12,790	61	4.4	1,080	7.7
Dec. 14-15	11,740	--	2.25	.90	5.13	--	1.59	.87	5.78	--	.04	--	513	.70	8,220	62	--	921	8.0
Dec. 16 a	5,000	--	--	--	--	--	1.88	1.12	7.47	--	.03	--	840	1.14	5,700	--	--	1,400	8.2
Dec. 17-19	10,930	--	4.50	1.32	13.18	--	1.90	.98	16.07	--	.06	.00	1,250	1.70	18,580	69	7.7	2,110	7.9
Dec. 20-21, 25-27	24,220	--	5.19	2.47	17.05	--	1.80	1.02	21.43	--	.07	.15	1,630	2.22	53,770	69	8.7	2,690	7.6
Dec. 22, 24	14,720	--	2.40	.82	5.66	--	1.41	.71	6.63	--	.05	--	623	.85	12,510	64	4.5	1,040	7.7
Dec. 23 a	7,580	--	--	--	--	--	1.08	.96	4.00	--	.02	--	386	.52	3,940	--	--	644	7.7
Dec. 28-31	17,300	--	4.44	1.64	13.88	--	1.80	1.08	16.64	--	.06	.15	1,280	1.74	30,100	70	7.9	2,200	7.6
Jan. 1-7, 1957..	24,020	5.1	3.64	1.32	9.05	.28	2.07	1.25	10.86	.01	.08	.15	950	1.29	30,990	63	5.7	1,590	8.0
Jan. 8-13	19,910	--	3.09	1.40	7.35	--	1.95	1.12	8.74	--	.06	.05	772	1.05	20,910	62	4.9	1,330	7.8
Jan. 14-19	15,270	--	3.54	1.82	9.00	--	2.25	1.25	10.72	--	.06	.00	921	1.25	19,090	63	5.5	1,570	8.0
Jan. 20-21	5,060	--	3.24	1.23	7.09	.25	2.24	1.10	8.52	--	.02	--	828	1.13	5,720	60	4.7	1,280	7.7
Jan. 22-23	12,750	--	2.89	.41	4.61	.19	1.77	.85	5.58		.08	--	474	.64	8,160	57	3.6	890	7.7
Jan. 24-28, 30..	85,590	--	1.00	.47	1.91	.11	.72	.52	2.26		.08	.15	228	.31	26,530	55	2.2	396	6.8
Jan. 29, 31, Feb. 3-6, 8-10	265,600	--	.85	.23	1.17	.10	.62	.42	1.32	--	.05	.10	184	.25	66,400	50	1.6	270	6.6
Feb. 1-2, 7 ...	88,480	--	1.20	.48	2.78	.12	.66	.38	3.55	--	.06	.05	341	.46	40,700	61	3.0	535	7.2
Feb. 11-18	182,900	--	.60	.32	.87	.08	.56	.44	.85	--	.08	.05	134	.18	32,920	47	1.3	197	6.6
Feb. 19-26	107,100	2.5	2.05	.63	2.83	.08	1.48	1.00	3.16	.01	.04	.10	359	.49	52,480	54	2.8	610	7.1
Feb. 27-28, Mar. 1, 2, 6-7	113,200	--	1.00	.54	1.26	.10	.85	.62	1.41	--	.05	--	192	.26	29,430	44	1.4	304	7.1
Mar. 3-5, 8-11..	150,200	2.0	1.50	.57	2.39	.08	1.02	.58	2.82	.00	.04	.05	299	.41	61,580	53	2.4	491	7.0
Mar. 12, 16-18,20	70,470	--	1.95	.72	3.35	.17	1.36	.77	3.92	--	.05	.10	432	.59	41,580	54	2.9	677	7.2
Mar. 13-15.....	39,630	--	2.15	.75	4.83	.20	1.25	.83	5.98	--	.05	.10	551	.75	29,720	61	4.0	886	7.2
Mar. 19 a	16,000	--	--	--	--	--	.84	.75	1.69	--	.02	--	217	.30	4,800	--	--	362	8.2
Mar. 21, 23-24, 26, 30-31	217,000	--	1.00	.51	1.83	.07	.84	.58	2.03	--	.04	.10	230	.31	67,270	54	2.1	362	7.7
Mar. 22 a	30,940	--	--	--	--	--	.70	.33	.62	--	.02	--	110	.15	4,640	--	--	183	8.0

a Not included in weighted average. Loads estimated from specific conductance.

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 25, 27-29, Apr. 1, 1957...	189,400	--	0.70	0.37	1.17	0.06	0.67	0.38	1.30	--	0.04	0.10	160	0.22	41,670	51	1.6	258	7.7
Apr. 2-6	967,500	--	1.65	.45	2.26	.11	1.48	.50	2.31	--	.07	.10	271	.37	358,000	51	2.2	462	8.0
Apr. 7a	194,000	--	--	--	--	--	b1.28	.25	1.52	--	.01	--	203	.28	54,320	--	--	338	8.3
Apr. 8a	177,300	--	--	--	--	--	c1.53	.37	1.55	--	.02	--	223	.30	53,190	--	--	371	8.3
Apr. 9-15, 17...	870,100	--	1.90	.64	3.26	.13	1.64	.77	3.50	--	.07	.10	374	.51	443,800	55	2.9	641	8.0
Apr. 16, 18-20, 24, 27-30	2,095,000	3.4	1.75	.44	2.13	.08	1.49	.62	2.26	0.02	.04	.05	282	.38	796,100	48	2.0	466	8.0
Apr. 21a	191,600	--	--	--	--	--	1.26	.35	1.66	--	.02	--	217	.30	57,480	--	--	362	8.2
Apr. 22-23, 25-26	1,285,000	--	2.00	.59	3.00	.12	1.77	.58	3.16	--	.06	.05	363	.49	629,600	53	2.6	461	7.9
May 1-4	1,081,000	--	1.65	.56	2.39	.11	1.48	.69	2.37	--	.05	.05	286	.39	421,600	51	2.3	490	8.0
May 5, 10-11	511,500	--	2.15	.59	2.91	.14	1.84	.98	2.99	--	.06	.00	372	.51	260,900	50	2.5	600	7.5
May 6-9	774,900	--	2.45	.79	5.61	.19	1.70	1.37	5.78	--	.10	.00	570	.78	604,400	62	4.4	977	7.8
May 12, 14, 16-20	1,787,000	3.7	2.30	.71	4.31	.12	1.75	1.12	4.60	.00	.07	.10	486	.66	1,179,000	58	3.5	816	8.3
May 13, 15.....	289,200	--	2.64	.82	7.31	.26	1.74	1.50	7.76	--	.07	--	697	.95	274,700	66	5.6	1,100	7.8
May 21-23	1,626,000	--	2.44	.61	4.35	.15	1.90	1.19	4.31	--	.05	.00	480	.65	1,057,000	58	3.5	774	7.8
May 24-26, 30-31	3,205,000	--	1.95	.41	2.09	.11	1.70	.69	2.06	--	.05	.05	288	.39	1,250,000	46	1.9	476	7.9
May 27-29	2,739,000	--	1.90	.26	1.26	.09	1.64	.56	1.18	--	.06	.00	238	.32	876,500	36	1.2	358	7.3
June 1-2, 4, 9-11	2,785,000	--	1.90	.56	1.96	.11	1.67	.77	1.97	--	.04	.02	293	.40	1,114,000	43	1.8	458	7.4
June 3, 5-8	2,541,000	--	2.05	.63	2.52	.11	1.80	.79	2.54	--	.05	.10	344	.47	1,194,000	47	2.2	548	7.5
June 12-16.....	2,210,000	--	2.20	.58	2.52	.12	1.67	.94	2.65	--	.05	.15	344	.47	1,039,000	46	2.1	541	7.5
June 17-20.....	1,771,000	--	1.80	.52	1.39	.11	1.67	.60	1.47	--	.03	.05	260	.35	619,800	36	1.3	393	7.4
June 21-23, 26-28	2,309,000	3.9	2.30	.71	2.91	.14	1.80	.92	3.16	.02	.05	.00	384	.52	1,201,000	48	2.4	627	7.4
June 24-25, 29-30	1,402,000	--	2.05	.62	2.04	.13	1.79	.90	1.97	--	.04	.02	307	.42	588,800	42	1.8	483	7.9

July 1-5, 1957 ..	1,577,000	--	2.05	.61	2.13	.15	1.80	.83	2.14	--	.04	.01	315	.43	678,100	43	1.8	505	7.6
July 6a	277,700	--	--	--	--	--	2.11	1.25	5.08	--	.04	--	544	.74	205,500	--	--	907	8.0
July 7a	279,700	--	--	--	--	--	1.66	1.04	3.10	--	.03	--	369	.50	139,800	--	--	615	7.8
July 8-16	1,927,000	7.4	1.95	.56	1.83	.12	1.66	.81	1.80	.02	.03	.00	283	.38	732,300	41	1.6	460	7.5
July 17-27	816,600	--	2.30	.72	3.39	.14	1.70	1.17	3.47	--	.03	.00	411	.56	457,300	52	2.8	673	7.7
July 28-30	146,800	--	2.84	1.07	5.83	.19	1.87	1.58	6.34	--	.04	.00	630	.86	126,200	59	4.2	1,050	7.7
July 31, Aug. 1 .	82,510	--	3.29	1.48	8.44	.23	2.02	2.17	9.02	--	.03	--	862	1.17	96,540	63	5.4	1,430	7.9
Aug. 2-4.....	98,980	--	2.59	.99	4.78	.17	1.92	1.37	5.13	--	.03	.05	545	.74	73,250	56	3.6	926	7.5
Aug. 5-7	73,390	--	3.24	1.40	6.48	.21	2.39	1.87	6.82	--	.03	.05	691	.94	68,990	57	4.3	1,170	8.0
Aug. 8-12, 15...	144,200	--	4.04	1.48	10.35	.28	2.43	2.35	11.00	--	.03	.05	971	1.32	190,300	64	6.2	1,670	8.0
Aug. 13-14, 20-27 30-31	339,000	3.7	2.84	1.32	7.13	.20	2.08	1.56	7.47	.02	.04	.10	721	.98	332,200	62	4.9	1,210	7.8
Aug. 16-19	151,500	--	2.40	.99	5.09	.18	1.82	1.52	5.08	--	.04	.05	538	.73	110,600	59	3.9	906	7.9
Aug. 28-29	44,030	--	4.14	1.64	9.66	.25	2.88	3.19	9.73	--	.04	--	988	1.34	59,000	62	5.8	1,620	7.5
Sept. 1-2.....	30,350	--	2.69	1.23	5.61	.20	2.08	1.54	5.92	--	.03	--	614	.84	25,490	58	4.0	1,020	7.8
Sept. 3-11, 15 ..	123,600	3.3	3.24	1.48	9.35	.25	2.18	1.92	10.01	.00	.02	.10	851	1.16	143,400	65	6.1	1,480	7.8
Sept. 12, 16-22 .	486,600	--	2.84	1.97	7.05	.20	1.85	1.56	7.56	--	.03	.15	674	.92	447,700	63	5.0	1,210	7.8
Sept. 13-14	26,440	--	3.59	1.89	13.22	.33	2.05	2.27	14.38	--	.03	--	1,160	1.58	41,780	69	8.0	2,020	7.7
Sept. 23-30	605,600	--	2.15	.61	3.83	.15	1.64	1.04	3.95	--	.02	.05	419	.57	345,200	57	3.3	774	7.6
Total or weighted average.....	39,910,000	--	2.05	0.59	2.83	--	1.69	0.85	2.90	--	0.05	--	356	0.48	19,160,000	52	2.5	583	--

a Not included in weighted average. Loads estimated from specific conductance.
b Includes 0.03 equivalent per million of carbonate (CO_3).
c Includes 0.10 equivalent per million of carbonate (CO_3).

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ARKANSAS RIVER BASIN

CANADIAN RIVER NEAR WHITEFIELD, OKLA.

LOCATION.--At gaging station at bridge on State Highway 2, three-quarters of a mile north of Whitefield, Haskell County, and 5½ miles upstream from Snake Creek.
DRAINAGE AREA.--47,576 square miles, of which 9,700 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: September 1944 to February 1945, September 1946 to September 1957.
Water temperatures: September 1944 to February 1945, September 1946 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 22,900 micromhos Nov. 11; minimum daily, 335 micromhos May 28.
Percent sodium: Maximum, 75 Nov. 11-15, Dec. 13-16; minimum, 36 Sept. 25-26.
EXTREMES, 1944-45, 1946-57.--Specific conductance: Maximum daily, 22,900 micromhos Nov. 11, 1956; minimum daily, 71.7 micromhos Jan. 2, 1948.
Percent sodium: Maximum, 80 Nov. 6-14, Dec. 21-23, 1947; minimum, 36 Sept. 25-26, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1956 to September 1957 given in WSP 1511.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10,1956	20	16	9.78	5.82	26.23	0.18	2.75	0.00	0.48	37.79	0.01	--	0.25	2,650	3.60	72	62	9.4	4,400	7.8
Oct. 11-20...	59	--	10.18	5.42	24.92		2.88	.00	.42	37.22	--	--	--	2,580	3.51	208	62	8.9	4,420	7.6
Oct. 21-31...	57	--	10.18	5.02	25.32		2.88	.00	.42	37.22	--	--	--	2,570	3.50	201	62	9.2	4,380	7.9
Nov. 1-3.....	48	--	10.18	5.22	25.36		2.85	.00	.40	37.51	--	--	--	2,750	3.74	178	62	9.1	4,370	8.0
Nov. 4-7.....	319	--	7.58	3.42	19.01		2.72	.00	.46	26.79	--	0.04	--	2,040	2.77	887	63	8.1	3,320	7.9
Nov. 8-9.....	841	--	11.28	5.42	42.52		1.90	.00	1.48	55.84	--	--	--	3,710	5.05	4,250	72	15	6,140	7.9
Nov. 10.....	536	--	41.57	20.03	175.25		2.02	.00	1.33	233.50	--	--	--	15,000	20.40	10,940	74	32	22,400	7.8
Nov. 11.....	516	--	40.22	18.58	180.25		1.29	.00	1.44	236.32	--	--	--	15,000	20.40	10,530	75	33	22,900	7.6
Nov. 12.....	454	--	24.25	10.35	106.00		1.61	.00	1.37	137.62	--	--	--	8,930	12.14	5,520	75	25	14,100	7.8
Nov. 13-15..	1,060	--	16.72	7.68	73.96		1.51	.00	1.25	95.60	--	--	--	6,290	8.55	9,070	75	21	10,200	7.6
Nov. 16-20..	964	--	10.18	4.62	42.30		1.84	.00	1.12	54.14	--	--	--	3,550	4.83	4,660	74	16	6,090	7.7
Nov. 21.....	797	--	9.08	4.32	35.03		2.29	.00	1.02	45.12	--	--	--	3,070	4.18	3,330	72	14	5,170	7.9
Nov. 22-23..	2,010	--	3.99	2.41	13.31		1.77	.00	.44	17.48	--	.02	--	1,250	1.70	3,420	68	7.4	2,200	7.8
Nov. 24-25..	1,030	--	5.39	2.41	19.52		1.64	.00	.54	25.10	--	.04	--	1,750	2.38	2,460	71	9.9	3,050	7.6
Nov. 26-30..	1,120	--	8.08	3.52	29.55		1.97	.00	.83	38.35	--	--	--	2,650	3.60	4,030	72	12	4,600	7.8

Dec. 1-10,1956	1,280	10	9.68	4.52	31.80	.25	2.79	.00	1.02	42.30	.01	--	.30	3,020	4.11	5,270	69	12	5,240	7.1
Dec. 11	480	--	9.38	4.82	35.42		2.56	.13	1.25	45.68	--	--	--	3,110	4.23	2.030	71	13	5,140	8.3
Dec. 12	615	--	13.97	4.83	52.08		2.10	.00	1.10	67.68	--	--	--	4,510	6.13	3,770	73	17	7,370	8.1
Dec. 13-14 ..	1,120	--	17.71	7.09	73.34		1.54	.00	1.00	95.60	--	--	--	6,290	8.55	9,630	75	21	10,300	7.9
Dec. 15-16 ..	680	--	21.91	9.49	93.64		1.67	.00	.98	122.39	--	--	--	8,050	10.95	7,460	75	24	12,900	7.9
Dec. 17-18 ..	454	--	16.17	7.43	66.74		2.00	.00	.92	87.42	--	--	--	5,810	7.90	3,590	74	19	9,570	8.1
Dec. 19-20 ..	428	--	14.77	6.03	58.52		2.26	.00	.92	76.14	--	--	--	5,080	6.91	2,960	74	18	8,460	8.1
Dec. 21	1,340	--	15.17	5.83	59.11		2.36	.13	.92	76.70	--	--	--	5,060	6.88	9,260	74	18	8,140	8.3
Dec. 22-23 ..	5,240	--	10.18	4.82	42.52		1.84	.00	.69	54.99	--	--	--	3,710	5.05	26,440	74	16	6,130	8.1
Dec. 24-31 ..	5,420	--	7.98	4.02	30.17		1.90	.00	.79	39.48	--	--	--	2,740	3.73	20,230	72	12	4,650	7.9
Jan. 1-10,1957	2,740	--	8.68	3.92	28.91		2.69	.00	1.31	37.51	--	--	--	2,830	3.85	10,540	70	12	4,440	7.9
Jan. 11-20...	2,030	--	9.78	4.82	32.68		2.75	.00	1.67	42.86	--	--	--	3,240	4.41	8,960	69	12	5,080	8.1
Jan. 21-22...	466	--	9.28	4.42	31.22		2.56	.27	1.48	40.61	--	--	--	3,100	4.22	1,970	70	12	4,820	8.5
Jan. 23.....	3,110	--	6.19	2.01	18.32		1.80	.07	.77	23.69	--	.19	--	1,680	2.28	7.120	69	9.0	2,870	8.3
Jan. 24.....	3,430	--	3.29	1.41	8.62		1.61	.00	.35	11.28	--	.08	--	897	1.22	4,190	65	5.6	1,550	8.2
Jan. 25-27...	7,460	--	5.29	1.91	17.50		1.25	.00	.52	22.84	--	.09	--	1,640	2.23	16,660	71	9.2	2,770	8.0
Jan. 28.....	1,290	--	15.17	5.43	56.69		.98	.00	.73	75.58	--	--	--	5,140	6.99	9,050	73	18	8,090	7.9
Jan. 29.....	1,100	--	27.84	11.36	113.13		1.08	.00	.94	150.31	--	--	--	10,100	13.74	15,160	74	26	15,200	8.0
Jan. 30.....	2,280	--	17.51	8.89	74.00		1.21	.00	.77	98.42	--	--	--	6,570	8.94	20,400	74	20	10,300	8.1
Jan. 31.....	4,980	--	3.99	1.71	12.10		1.34	.00	.44	15.93	--	.09	--	1,250	1.70	8,470	68	7.2	2,010	8.1
Feb. 1	5,630	--	2.99	1.31	8.24		1.05	.00	.40	11.00	--	.09	--	860	1.17	6,590	66	5.6	1,470	7.9
Feb. 2	4,920	--	3.99	1.61	12.59		.98	.00	.46	16.64	--	.11	--	1,240	1.69	8,300	69	7.5	2,070	7.8
Feb. 3	3,870	--	3.29	1.11	9.51		.82	.00	.44	12.55	--	.10	--	1,000	1.36	5,260	68	6.4	1,620	7.6
Feb. 4	2,980	--	4.69	2.31	15.15		.92	.00	.54	20.59	--	.10	--	1,540	2.09	6,240	68	8.1	2,580	7.8
Feb. 5-6	24,610	--	2.30	.74	4.22		1.61	.00	.21	5.36	--	.08	--	502	.68	16,820	58	3.4	819	8.1
Feb. 7-8	27,930	--	1.55	.53	2.79		.98	.00	.20	3.64	--	.05	--	364	.50	13,840	57	2.7	572	7.8
Feb. 9-11 ...	22,020	--	1.40	.36	2.32		.85	.00	.29	2.88	--	.06	--	307	.42	9,200	57	2.5	474	7.8
Feb. 12-13 ..	5,120	--	2.10	.94	5.06		.92	.00	.40	6.71	--	.07	--	615	.84	4,280	62	4.1	959	7.9

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 14-16, 1957	3,480	--	3.09	1.23	8.28		1.18	0.00	0.48	10.86	--	0.08	--	934	1.27	4,420	66	5.6	1,480	7.8
Feb. 17-20	3,060	--	4.09	.91	13.22		1.41	.00	.67	16.07	--	.07	--	1,350	1.84	5,620	73	8.4	2,120	7.9
Feb. 21-28	5,390	13	5.69	2.31	17.40	--	1.97	.00	.85	22.84	0.02	.09	0.66	1,760	2.39	12,910	69	8.7	2,880	7.9
Mar. 1-4	2,590	--	6.59	2.61	20.83		1.93	.00	.98	27.07	--	.05	--	2,160	2.94	7,630	69	9.7	3,310	8.0
Mar. 5, 9-10	11,310	--	3.99	1.93	13.45		1.31	.00	.52	17.48	--	.06	--	1,340	1.82	20,620	69	7.8	2,180	7.1
Mar. 6-8	40,620	--	2.35	1.01	5.78		1.25	.00	.46	7.39	--	.04	--	643	.87	35,560	63	4.5	1,090	7.9
Mar. 11-16	8,160	--	4.74	2.26	16.58		1.44	.00	.65	21.43	--	.06	--	1,520	2.07	16,890	70	8.9	2,690	7.9
Mar. 17	1,260	--	6.14	3.46	23.09		1.54	.07	1.19	29.89	--	--	--	2,110	2.87	3,610	71	11	3,570	8.3
Mar. 18	5,670	--	3.69	2.01	9.97		1.77	.13	1.29	12.41	--	.07	--	1,030	1.40	7,950	64	5.9	1,760	8.4
Mar. 19-20	17,830	--	1.45	.63	3.21		1.05	.00	.54	3.67	--	.03	--	328	.45	7,960	61	3.1	582	8.0
Mar. 21-23	38,020	--	2.54	.92	6.60		1.05	.00	.37	8.60	--	.04	--	749	1.02	38,770	66	5.0	1,200	7.8
Mar. 24-26	39,130	--	1.55	.81	3.96		.92	.00	.29	5.08	--	.03	--	456	.62	24,290	63	3.6	756	7.8
Mar. 27-29	16,440	--	2.50	.90	6.94		1.02	.00	.40	8.88	--	.04	--	727	.99	16,270	67	5.3	1,050	7.9
Mar. 30-31	13,650	--	1.70	.80	4.35		.95	.00	.29	5.58	--	.03	--	504	.69	9,360	64	3.9	821	7.9
Apr. 1-2	10,410	--	3.34	1.26	8.48		1.54	.00	.77	10.72	--	.05	--	922	1.25	13,070	65	5.6	1,540	8.0
Apr. 3-10	520,000	--	1.85	.63	2.55		1.64	.00	.33	3.02	--	.04	--	334	.45	236,400	51	2.3	576	8.0
Apr. 11-15	36,420	--	2.69	1.31	6.31		1.90	.00	.87	7.47	--	.07	--	671	.91	33,260	61	4.5	1,130	8.1
Apr. 16-17	35,010	--	1.55	.77	2.41		.84	.00	.40	3.44	--	.05	--	379	.52	18,060	51	2.2	566	8.0
Apr. 18-19	27,310	--	2.20	1.08	5.03		1.25	.00	.48	6.54	--	.04	--	609	.83	22,640	61	3.9	971	7.8
Apr. 20	34,910	--	1.45	.55	2.11		1.33	.00	.25	2.48	--	.05	--	302	.41	14,350	51	2.1	448	8.2
Apr. 21	82,510	--	2.94	1.46	7.92		1.54	.00	.27	10.43	--	.08	--	914	1.24	102,700	64	5.3	1,400	8.2
Apr. 22	117,200	--	2.30	.86	4.53		1.93	.13	.31	5.25	--	.07	--	537	.73	85,690	59	3.6	829	8.3
Apr. 23-30	911,600	--	1.60	.56	1.90		1.61	.00	.31	2.09	--	.05	--	286	.39	354,900	47	1.8	437	7.9
May 1-5	251,100	--	2.15	.93	3.27		1.77	.00	.73	3.81	--	.04	--	430	.58	147,000	51	2.6	723	7.7
May 6-7	55,140	--	3.09	1.39	5.78		2.20	.00	1.37	6.63	--	.06	--	673	.92	50,520	56	3.9	1,130	7.8
May 8-10	53,870	--	2.69	1.39	4.42		2.20	.00	1.50	4.74	--	.06	--	566	.77	41,510	52	3.1	940	8.0
May 11-12	19,460	--	2.99	1.49	5.95		2.23	.20	1.39	6.54	--	.07	--	685	.93	18,140	57	4.0	1,120	8.4

May 13, 1957..	13,410	--	5.34	2.76	13.45	2.36	.20	1.69	17.20	--	.10	--	1,520	2.07	27,740	62	6.7	2,330	8.3
May 14.....	77,950	--	2.94	1.18	5.82	2.10	.00	1.19	6.54	--	.11	--	667	.91	70,780	59	4.1	1,090	8.2
May 15-17....	124,200	--	2.10	.78	3.41	1.82	.00	.42	4.00	--	.05	--	432	.59	73,020	54	2.8	698	8.1
May 18-20....	590,900	--	1.80	.60	2.25	1.77	.00	.35	2.48	--	.05	--	299	.41	240,500	48	2.1	510	7.8
May 21-22....	154,300	--	2.30	.74	2.61	2.00	.13	.56	2.93	--	.03	--	351	.48	73,730	46	2.1	613	8.4
May 23.....	253,900	--	1.95	.55	1.95	1.80	.13	.33	2.12	--	.07	--	256	.35	88,470	44	1.7	474	8.5
May 24.....	168,200	--	1.95	.55	2.49	1.54	.27	.25	2.88	--	.05	--	299	.41	68,460	50	2.2	533	8.4
May 25-27....	628,200	--	1.70	.58	1.79	1.64	.27	.21	1.92	--	.03	--	261	.35	223,200	44	1.7	429	8.5
May 28.....	180,900	--	1.70	.30	1.37	1.67	.27	.12	1.27	--	.04	--	181	.25	44,570	41	1.4	335	8.5
May 29-31....	303,900	--	2.05	.85	2.57	1.90	.27	.79	2.48	--	.03	--	343	.47	141,880	47	2.1	573	8.4
June 1-4.....	547,000	--	2.00	.64	2.34	1.84	.00	.52	2.59	--	.03	--	299	.41	222,700	47	2.0	537	8.0
June 5-6.....	298,300	--	1.85	.71	1.90	1.85	.00	.44	2.14	--	.03	--	252	.34	102,300	43	1.7	467	7.8
June 7-8.....	154,300	--	1.90	.82	2.46	1.87	.00	.54	2.74	--	.03	--	304	.41	63,860	47	2.1	553	7.8
June 9-10.....	95,400	--	2.30	.90	3.20	1.98	.00	.77	3.61	--	.04	--	377	.51	48,960	50	2.5	702	7.9
June 11	85,880	--	3.14	1.66	6.06	1.88	.00	1.33	7.61	--	.04	--	618	.84	72,250	56	3.9	1,130	7.9
June 12-14....	150,300	--	2.05	.75	2.90	1.80	.00	.46	3.38	--	.06	--	356	.48	72,860	51	2.5	635	7.8
June 15-16....	331,600	--	1.95	.69	1.97	1.87	.00	.50	2.20	--	.04	--	262	.36	118,300	43	1.7	488	7.9
June 17-20....	306,400	--	2.00	.64	2.77	1.77	.00	.33	3.27	--	.04	--	331	.45	138,100	51	2.4	590	7.8
June 21-30....	534,300	14	1.85	.99	2.65	--	1.90	.00	.54	3.24	.03	.04	.32	372	.51	270,600	48	2.2	600	7.8
July 1-8.....	139,500	--	2.79	1.25	3.76	2.16	.00	.65	4.94	--	.05	--	509	.69	96,680	48	2.6	902	7.7
July 9-10.....	15,550	--	3.74	2.30	5.88	2.82	.00	1.10	7.90	--	.10	--	776	1.06	16,430	49	3.4	1,320	8.0
July 11-20....	50,220	--	4.24	2.12	7.95	2.82	.07	1.25	10.15	--	.02	--	943	1.28	64,470	56	4.4	1,570	8.3
July 21-25, 28, 30-31	37,690	--	3.99	2.09	6.87	2.69	.00	1.17	9.02	--	.07	--	871	1.18	44,680	53	3.9	1,490	7.5
July 26-27, 29.	29,360	--	4.69	2.71	11.03	2.36	.00	1.06	14.95	--	.06	--	1,120	1.52	44,760	60	5.7	2,070	7.9
Aug. 1-6	31,000	--	3.44	1.68	5.35	2.82	.00	1.25	6.34	--	.06	--	620	.84	26,160	51	3.4	1,120	7.6
Aug. 7-9	14,540	--	3.64	1.80	8.02	2.39	.00	.87	10.15	--	.05	--	818	1.11	16,190	60	4.9	1,470	7.5
Aug. 10-14 ...	41,220	--	4.39	2.81	9.12	3.38	.00	3.00	9.81	--	.13	--	972	1.32	54,540	56	4.8	1,690	7.3

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 15-19,1957	29,240	--	3.44	2.00	5.97		3.02	0.00	2.14	6.15	--	0.10	--	672	0.91	26,740	52	3.6	1,200	7.1
Aug. 20	5,160	--	3.89	2.03	7.26		2.88	.00	1.33	8.88	--	.09	--	795	1.08	5,580	55	4.2	1,410	7.4
Aug. 21-25	23,900	--	4.59	2.61	9.43		3.28	.00	1.87	11.42	--	.06	--	1,000	1.36	32,540	57	5.0	1,740	7.7
Aug. 26-31	21,930	--	4.14	2.36	8.02		3.54	.00	2.83	8.04	--	.11	--	859	1.17	25,640	55	4.4	1,500	7.6
Sept. 1-3.....	4,040	--	3.94	2.38	8.42		3.38	.00	2.00	9.31	--	.05	--	912	1.24	5,020	57	4.7	1,460	8.1
Sept. 4-7.....	3,890	--	4.94	3.16	10.54		3.95	.00	1.81	12.83	--	.05	--	1,160	1.58	6,150	57	5.2	1,970	8.2
Sept. 8-10.....	2,480	--	5.54	3.56	12.91		3.82	.00	1.64	16.50	--	.05	--	1,460	1.99	4,940	59	6.1	2,270	8.1
Sept. 11-14....	3,580	--	5.44	3.56	13.70		3.54	.00	1.31	17.77	--	.08	--	1,530	2.08	7,460	60	6.5	2,470	7.9
Sept. 15.....	10,200	--	3.79	2.01	8.31		2.43	.00	.77	10.86	--	.05	--	953	1.30	13,230	59	4.9	1,540	8.0
Sept. 16-21....	162,000	--	1.90	1.38	3.49		1.92	.00	.35	4.46	--	.04	--	434	.59	95,740	52	2.7	778	7.8
Sept. 22-24....	143,400	--	1.85	.27	3.21		1.87	.00	.48	2.93	--	.05	--	319	.43	62,270	60	3.1	579	7.5
Sept. 25-26....	58,510	--	2.10	.70	1.60		2.43	.00	.35	1.58	--	.04	--	236	.32	18,800	36	1.4	421	7.6
Sept. 27-30....	28,520	--	2.05	1.15	3.29		1.98	.00	.58	3.89	--	.04	--	386	.52	14,990	51	2.6	694	7.4
Total or weighted average[a] ...	8,370,000	--	2.10	0.82	3.21		1.85	--	0.50	3.78	--	--	--	397	0.54	4,523,000	52	2.7	672	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

RED RIVER BASIN

RED RIVER AT DENISON DAM NEAR DENISON, TEX.

LOCATION.--Immediately below dam on Red River, 1.7 miles upstream from Sand Creek, 3 miles upstream from gaging station near Colbert Bryan County, and 4 miles northwest of Denison, Grayson County.
DRAINAGE AREA.--39,719 square miles above dam, 39,777 square miles above gaging station, of which 5,936 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: May 1944 to September 1957.
Water temperatures: October 1945 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 2,430 micromhos Mar. 20; minimum daily, 1,040 micromhos June 19, July 5.
Percent sodium: Maximum, 60 Jan. 1-31; minimum, 53 June 1-30, July 1-31.
EXTREMES, 1944-57.--Specific conductance: Maximum daily, 3,520 micromhos Aug. 14, 1944; minimum daily, 656 micromhos Oct. 16, 1945.
Percent sodium: Maximum, 60 Aug. 1-31, 1956, Jan. 1-31, 1957; minimum, 31 Nov. 1-10, 1945.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Colbert for water year October 1956 to September 1957 given in WSP 1511. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956....	4,100	12	6.59	2.63	13.00		2.03	6.93	13.25		0.01		1,340	1.82	7,460	59	6.1	2,200	8.0
Nov. 1-30	4,740	10	6.54	2.63	13.32		2.00	7.08	13.40		.01		1,350	1.84	8,720	59	6.2	2,240	7.7
Dec. 1-31	41,610	12	6.67	2.63	13.53		2.02	7.12	13.68		.01		1,380	1.88	78,230	59	6.3	2,290	7.8
Jan. 1-31, 1957....	130,000	9.8	6.47	2.63	13.53		2.07	6.87	13.68		.01		1,360	1.85	240,500	60	6.3	2,280	7.9
Feb. 1-28	84,020	9.6	6.74	2.47	13.46		2.03	6.87	13.76		.01		1,360	1.85	155,400	59	6.3	2,320	8.2
Mar. 1-31	91,080	9.2	6.64	2.63	12.97		2.03	6.72	13.48		.01		1,330	1.81	164,900	58	6.0	2,260	7.8
Apr. 1-30	190,500	11	6.49	2.55	12.33		2.02	6.75	12.55		.05		1,290	1.75	333,400	58	5.8	2,170	8.0
May 1-31	2,142,000	11	4.84	1.81	8.68		1.85	4.54	8.88		.06		986	1.34	2,870,000	57	4.8	1,600	7.5
June 1-30	3,982,000	11	3.89	1.23	5.80		1.75	3.44	5.70		.03		696	.95	3,783,000	53	3.6	1,130	7.6
July 1-31	775,300	14	4.59	1.40	6.72		1.92	4.06	6.71		.02		822	1.12	868,300	53	3.9	1,310	7.7
Aug. 1-31	150,800	12	4.74	1.48	7.65		2.07	4.31	7.47		.02		882	1.20	181,000	55	4.3	1,420	7.7
Sept. 1-30	289,900	10	4.49	1.48	7.14		2.13	3.91	7.05		.02		849	1.15	333,400	54	4.1	1,350	8.0
Total or weighted average	7,886,000	11	4.44	1.48	7.26		1.84	4.06	7.28		0.04		840	1.14	8,990,000	55	4.2	1,370	--

PART 8. WESTERN GULF OF MEXICO BASINS

SABINE RIVER BASIN

SABINE RIVER NEAR RULIFF, TEX.

LOCATION.--At gaging station at bridge on State Highway 235, 2.4 miles north of Ruliff, Newton County, 4.2 miles upstream from Kansas City Southern Railway bridge, 4.5 miles downstream from Cypress Creek and at mile 40.
DRAINAGE AREA.--9,440 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1947 to September 1957.
Water temperatures: October 1947 to September 1957.
EXTREMES, 1956-57.-- Specific conductance: Maximum daily, 555 micromhos Dec. 5; minimum daily, 53.7 micromhos Dec. 23.
Percent sodium: Maximum, 83 Nov. 17-19, 25-30; minimum, 44 June 1-10.
EXTREMES, 1945-46, 1947-57.--Specific conductance: Maximum daily, 774 micromhos Dec. 26, 1948; minimum daily, 32.9 micromhos May 22, 1953.
Percent sodium: Maximum, 86 Dec. 26-27, 1948; minimum, 27 June 3-7, 10, 1946.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956.....	5,750	21	0.41	0.23	1.60		0.79	0.10	1.33		0.02		146	0.20	1,150	71	2.8	244	7.3
Oct. 11-20	5,500	21	.40	.20	1.56		.75	.10	1.30		.01		a151	.21	1,160	72	2.8	240	7.2
Oct. 21-31	6,260	22	.39	.21	1.74		.72	.12	1.49		.01		a162	.22	1,380	74	3.2	263	7.6
Nov. 1-10	9,180	20	.37	.19	1.65		.67	.12	1.41		.01		144	.20	1,840	75	3.1	251	7.4
Nov. 11-16, 20-24 ...	16,110	17	.31	.17	1.71		.52	.15	1.52		.00		142	.19	3,060	78	3.5	246	6.8
Nov. 17-19, 25-30 ...	17,690	15	.43	.25	3.30		.82	.20	2.96		.00		242	.33	5,840	83	5.7	450	7.1
Dec. 1-12	13,340	15	.51	.33	3.30		.92	.25	2.96		.01		250	.34	4,540	80	5.1	472	7.6
Dec. 13-20	43,080	12	.30	.14	1.38		.33	.18	1.30		.01		117	.16	6,890	76	2.9	207	6.6
Dec. 21, 27, 29-31 ...	45,640	12	.24	.12	.73		.23	.23	.62		.01		76	.10	4,560	67	1.7	125	6.3
Dec. 22-26, 28.....	125,200	7.8	.16	.08	.45		.18	.14	.37		.00		47	.06	7,510	65	1.3	71.6	6.3
Jan. 1-10, 1957.....	37,710	16	.21	.15	.98		.33	.18	.79		.04		94	.13	4,900	73	2.3	146	6.8
Jan. 11-20	26,940	18	.28	.18	1.03		.46	.20	.82		.01		103	.14	3,770	69	2.1	169	6.7
Jan. 21-31	36,020	18	.32	.20	1.43		.46	.21	1.27		.01		130	.18	6,480	73	2.8	219	6.8
Feb. 1-10	72,360	15	.39	.23	1.79		.33	.37	1.69		.02		156	.21	15,200	74	3.2	276	6.7
Feb. 11-20	75,530	14	.47	.25	1.79		.26	.42	1.80		.03		161	.22	16,620	71	3.0	285	6.6
Feb. 21-28	126,300	12	.38	.16	.63		.25	.25	.65		.02		79	.11	13,890	54	1.2	133	6.5

Mar. 1-13, 1957	141,400	11	.31	.18	.83	.23	.31	.76		.02		89	.12	16,970	63	1.7	163	6.3
Mar. 14-27	424,300	7.8	.19	.12	.56	.16	.18	.51		.02		59	.08	33,940	64	1.4	102	6.1
Mar. 28-31	111,900	11	.34	.18	.77	.23	.31	.73		.02		87	.12	13,430	60	1.5	154	6.5
Apr. 1-10	294,700	11	.32	.21	.76	.26	.31	.70		.02		86	.12	35,360	59	1.5	147	6.4
Apr. 11-20	340,600	12	.39	.21	.81	.28	.33	.76		.04		95	.13	44,280	57	1.5	172	5.7
Apr. 21-30	258,200	12	.43	.21	.92	.48	.33	.73		.02		102	.14	36,150	59	1.6	174	5.9
May 1-12	775,300	9.8	.23	.13	.37 | .08	.23	.17	.37	.02	.02		57	.08	62,020	46	.9	91.1	6.1
May 13-23	1,046,000	10	.28	.16	.54	.33	.18	.45		.02		65	.09	94,140	55	1.2	112	6.1
May 24-31	655,700	12	.53	.27	.84	.72	.17	.73		.02		102	.14	91,800	51	1.3	171	7.5
June 1-10	473,300	13	.65	.28	.74	.75	.20	.70		.02		106	.14	66,260	44	1.1	186	6.9
June 11-20	361,400	10	.50	.22	.66	.56	.20	.59		.03		87	.12	43,370	48	1.1	157	6.7
June 21-30	552,600	8.8	.50	.23	.64	.62	.17	.56		.02		85	.12	66,310	47	1.1	153	6.6
July 1-9	519,000	13	.55	.25	.70	.69	.17	.62		.02		95	.13	67,470	47	1.1	164	6.4
July 10-20	74,260	19	.65	.34	1.09	.79	.25	1.02		.02		134	.18	13,370	52	1.5	238	7.1
July 21-31	63,590	18	.60	.28	1.22	.64	.29	1.16		.01		136	.18	11,450	58	1.8	238	6.5
Aug. 1-10	40,240	20	.70	.35	1.75	.75	.31	1.72		.02		179	.24	9,660	62	2.4	317	7.3
Aug. 11-20	30,210	20	.60	.36	1.63	.79	.29	1.49		.02		a177	.24	7,250	63	2.4	291	7.1
Aug. 21-31	24,730	19	.60	.34	1.71	.75	.27	1.61		.02		a183	.25	6,180	65	2.5	299	7.1
Sept. 1-10	22,000	19	.55	.29	1.78	.72	.25	1.64		.01		a177	.24	5,280	68	2.7	287	7.3
Sept. 11-25	39,050	16	.46	.25	1.79	.62	.21	1.66		.01		a166	.23	8,980	72	3.0	276	7.1
Sept. 26, 30	19,040	11	.28	.12	1.03	.36	.16	.90		.01		93	.13	2.480	72	2.3	156	7.1
Sept. 27-29	52,110	6.4	.13	.07	.60	.16	.12	.51		.01		53	.07	3,650	75	1.9	81.1	6.5
Total or weighted average	6,983,000	11	0.40	0.21	0.74	0.44	0.21	0.68		0.02		88	0.12	838,000	55	1.3	151	--

a Residue on evaporation at 180°C.

NECHES RIVER BASIN

NECHES RIVER AT EVADALE, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 96, 200 feet upstream from Gulf, Colorado and Santa Fe Railway bridge at Evadale, Jasper County, 600 feet downstream from Mill Creek, 15 miles upstream from Village Creek and at mile 55.
DRAINAGE AREA.--7,908 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1957.
Water temperatures: October 1947 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 422 micromhos Jan. 25; minimum daily, 62.1 micromhos Mar. 19.
Percent sodium: Maximum, 76 Jan. 21-31; minimum, 42 June 1-10, July 11-22, 30-31, 23-29.
EXTREMES, 1947-57.--Specific conductance: Maximum daily, 422 micromhos Jan. 25, 1957; minimum daily, 49.3 micromhos May 9, 1953.
Percent sodium: Maximum, 76 Jan. 21-31, 1957; minimum, 14 June 4-18, 1950.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956.....	3,380	22	0.57	0.35	2.20		1.24	0.29	1.55	0.02	0.02		196	0.27	913	71	3.2	327	7.2
Oct. 11-20	3,850	22	.64	.32	2.19		1.38	.25	1.47	.03	.02		196	.27	1,040	70	3.2	325	7.3
Oct. 21-31	3,690	22	.66	.30	2.65		1.62	.21	1.72	.03	.03		222	.30	1,110	73	3.8	369	7.2
Nov. 1-10	2,610	24	.67	.29	2.18		1.54	.20	1.35	.02	.03		196	.27	705	69	3.1	326	7.9
Nov. 11-20	2,480	24	.64	.26	1.63		1.29	.18	1.02	.02	.02		162	.22	546	64	2.4	258	7.9
Nov. 21-30	1,430	24	.63	.25	1.27		1.10	.19	.82	.02	.02		141	.19	272	59	1.9	224	7.7
Dec. 1-10	1,800	22	.63	.25	1.07		.92	.21	.79	.01	.02		130	.18	324	55	1.6	206	7.5
Dec. 11-20	1,820	21	.63	.25	1.05		.95	.23	.73	.01	.01		128	.17	309	54	1.6	201	7.2
Dec. 21-31	5,200	18	.44	.20	1.06		.54	.35	.79	.01	.01		115	.16	832	62	1.9	181	6.7
Jan. 1-12, 1957.....	2,740	20	.56	.22	.92		.61	.29	.76	.03	.01		115	.16	438	54	1.5	180	7.0
Jan. 13-20	2,070	21	.61	.27	2.04		1.02	.31	1.55	.03	.01		185	.25	518	70	3.1	317	7.2
Jan. 21-31	4,970	19	.58	.24	2.64		1.02	.37	2.03	.03	.01		216	.29	1,440	76	4.1	374	7.3
Feb. 1-11	4,120	18	.59	.21	2.22		.74	.35	1.89	.03	.01		191	.26	1,070	74	3.5	332	7.2
Feb.12-22	3,040	22	.63	.21	1.76		.72	.29	1.55	.03	.01		170	.23	699	68	2.7	280	6.9
Feb. 23-28	14,720	15	.51	.21	2.03		.72	.52	1.47	.03	.01		175	.24	3,530	74	3.4	294	7.2

Mar. 1-9, 1957	32,730	38	.43	.21	1.68	.51	.54	1.21	.04	.02	174	.24	7,860	72	3.0	258	6.8
Mar. 10-17	45,300	14	.37	.20	1.31	.31	.48	1.02	.04	.03	124	.17	7,700	70	2.5	207	6.9
Mar. 18-21	38,440	8.2	.20	.12	.62	.20	.27	.42	.04	.01	63	.09	3,460	66	1.6	98.8	6.4
Mar. 22-31	117,900	12	.37	.20	1.15	.31	.40	.96	.04	.01	111	.15	17,690	67	2.2	183	6.5
Apr. 1-10	140,200	13	.38	.18	.80	.25	.40	.68	.02	.01	92	.13	18,230	59	1.5	157	5.9
Apr. 11-20	87,870	13	.36	.20	.80	.25	.40	.68	.02	.01	92	.13	11,420	59	1.5	157	5.9
Apr. 21-30	110,000	14	.43	.23	1.05	.26	.50	.90	.03	.02	115	.16	17,600	61	1.8	198	5.7
May 1-2, 16-20	428,600	12	.24	.20	.70	.26	.27	.51	.04	.06	79	.11	47,150	61	1.5	124	6.2
May 3-15	1,120,000	10	.15	.13	.29 / .08	.16	.19	.25	.04	.02	50	.07	78,400	45	.8	75.9	6.1
May 21-31	334,800	14	.43	.27	.57	.56	.21	.45	.03	.02	84	.11	36,830	45	1.0	140	6.9
June 1-10	123,300	14	.55	.33	.65	.69	.23	.56	.03	.02	98	.13	16,030	42	1.0	168	6.7
June 11-22	193,600	14	.45	.28	.64	.51	.27	.54	.03	.02	90	.12	23,230	47	1.1	151	6.5
June 23-30	230,900	9.6	.33	.21	.45	.36	.20	.39	.03	.01	65	.09	20,780	45	.9	113	6.5
July 1-10	122,600	16	.46	.27	.55	.62	.17	.45	.03	.01	86	.12	14,710	43	.9	136	6.6
July 11-22, 30-31	30,300	18	.60	.32	.68	.79	.23	.54	.03	.01	105	.14	4,240	42	1.0	167	7.0
July 23-29	14,720	14	.44	.25	.51	.54	.23	.39	.03	.01	80	.11	1,620	42	.9	132	6.7
Aug. 1-10	25,680	19	.60	.37	.87	.89	.23	.68	.02	.02	119	.16	4,110	47	1.2	183	7.4
Aug. 11-20	14,760	18	.60	.36	.88	.89	.27	.65	.02	.01	118	.16	2,360	48	1.3	194	7.3
Aug. 21-31	22,530	14	.50	.39	1.07	.85	.29	.79	.02	.01	123	.17	3,830	55	1.6	206	7.2
Sept. 1-10	13,140	16	.55	.33	1.08	.87	.27	.79	.02	.01	124	.17	2,230	55	1.6	204	7.5
Sept. 11-25	16,070	17	.55	.32	1.08	.89	.25	.79	.02	.00	124	.17	2,730	55	1.6	203	7.4
Sept. 26-30	14,520	11	.34	.22	.81	.49	.23	.62	.02	.01	88	.12	1,740	59	1.5	138	6.9
Total or weighted average	3,336,000	12	0.31	0.21	0.65	0.34	0.25	0.48	0.03	0.02	78	0.11	367,000	56	1.3	127	--

TRINITY RIVER BASIN

TRINITY RIVER AT ROMAYOR, TEX.

LOCATION.--At gaging station at bridge on State Highway 105, 1.9 miles south of Romayor, Liberty County, 2.0 miles downstream from Gulf, Colorado and Santa Fe Railway bridge, 4.1 miles downstream from Big Creek, and at mile 94.
DRAINAGE AREA.--17,192 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to November 1949, February 1950 to September 1951, April 1953 to September 1957. Water temperatures: February 1950 to September 1951, April 1953 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 3,800 micromhos Oct. 30; minimum daily, 125 micromhos Apr. 27. Percent sodium: Maximum, 83 Nov. 1-8, Jan. 3-5, 7, 11; minimum 26 May 11-20.
EXTREMES, 1945-50, 1953-57.--Specific conductance: Maximum daily, 3,800 micromhos Oct. 30, 1956; minimum daily, 103 micromhos Nov. 9, 1946. Percent sodium: Maximum, 86 Nov. 7, 1953; minimum, 23 June 11-20, 1946.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	3,130	17	3.24	0.80	16.24		3.20	2.17	14.89		0.02		1,190	1.62	5,070	80	11	2,080	8.1
Oct. 11-20	3,080	18	4.14	.99	21.44		4.03	3.48	19.04		.02		1,570	2.14	6,590	81	13	2,680	8.1
Oct. 21-31	4,890	18	4.09	1.07	24.07		4.06	3.44	21.71		.02		1,730	2.35	11,490	82	15	2,930	8.0
Nov. 1-8	5,890	13	3.49	1.07	22.57		3.38	4.00	19.74		.01		1,610	2.19	12,900	83	15	2,850	8.2
Nov. 9-19	63,510	8.8	1.82	.28	3.83		1.93	.96	2.99		.05		356	.48	30,480	65	3.7	641	7.8
Nov. 20-30	8,120	12	1.99	.29	3.72		1.85	1.04	3.07		.04		360	.49	3,980	62	3.5	645	7.6
Dec. 1-13	6,970	12	1.80	.34	4.06		1.51	1.04	3.64		.01		390	.53	3,690	65	3.9	671	7.5
Dec. 14-17, 22-28 ..	13,220	12	2.69	.49	8.37		2.38	1.31	7.84		.02		733	1.00	13,220	72	6.6	1,250	7.8
Dec. 18-21, 29-31 ..	9,050	13	3.92	.90	19.71	--	3.10	4.04	17.20		.19		1,460	2.00	18,100	37	13	2,590	8.2
Jan. 1, 1957	1,340	24	--	--	5.82		.82	1.06	5.70		.00		--	--	--	77	6.2	864	7.5
Jan. 2, 6, 8-10, 12-17	8,370	22	3.09	.63	13.98		2.77	3.08	11.62		.23		1,070	1.46	12,220	79	10	1,900	7.9
Jan. 3-5, 7, 11.....	4,210	18	3.69	.99	23.39		3.61	3.58	20.59		.29		1,670	2.27	9,560	83	15	2,960	8.1
Jan. 18-31	16,710	18	3.10	.82	10.96		2.84	3.04	8.69		.31		941	1.28	21,390	74	7.8	1,600	7.8
Feb. 1-2, 6-7.....	25,130	20	3.36	.82	13.98		2.47	2.48	12.92		.29		1,090	1.48	37,190	77	9.6	1,940	7.7
Feb. 3-5, 8-9.....	33,760	15	2.02	.34	5.00		2.15	1.21	3.84		.16		484	.66	22,280	68	4.6	781	7.8
Feb. 10-19	37,710	15	1.83	.31	2.87		1.74	.87	2.31		.09		a303	.41	15,460	57	2.8	529	7.8
Feb. 20-28	24,060	14	1.88	.36	3.61		1.59	1.04	3.13		.09		a354	.48	11,550	62	3.4	622	7.6

Mar. 1-12, 1957	30,960	17	1.98	.40	5.35	1.54	1.31	4.77		.11		496	.67	20,740	69	4.9	834	7.7
Mar. 13-19, 22-23, 27-28	91,420	16	1.37	.21	2.55	1.29	.73	2.03		.08		a255	.35	32,000	62	2.9	438	7.7
Mar. 20-21, 24-26	56,130	16	1.56	.30	4.95	1.33	1.06	4.31		.11		a415	.56	31,430	73	5.1	739	7.3
Mar. 29-31	63,950	13	1.32	.16	1.46	1.43	.60	.87		.04		a180	.24	15,350	50	1.7	294	7.6
Apr. 1-6	88,800	15	1.51	.21	1.68	1.34	.52	1.47		.07		a208	.28	24,860	49	1.8	353	7.4
Apr. 7-17	177,300	22	2.04	.30	1.84	1.93	.79	1.38		.08		260	.35	62,060	44	1.7	432	7.6
Apr. 18-19, 26-27, 29-30	399,600	11	.85	.13	.71	.89	.27	.51		.02		a105	.14	55,940	42	1.0	164	7.3
Apr. 20-23, 25-28	162,300	14	1.58	.18	1.24	1.29	.50	1.18		.03		a184	.25	40,580	41	1.3	312	7.4
Apr. 24	16,540	14	2.52	.40	3.40	1.74	1.02	3.50		.06		a377	.51	8,440	54	2.8	671	8.0
May 1-10	146,600	15	1.47	.21	.74	1.61	.37	.42		.02		a146	.20	29,320	31	.8	247	7.3
May 11-20	1,467,000	15	2.04	.26	.81	2.07	.50	.51		.03		a184	.25	366,800	26	.8	312	7.5
May 21-31	879,900	16	2.34	.30	1.07	2.36	.56	.76		.03		234	.32	281,600	29	.9	371	7.4
June 1-9	731,300	29	1.30	.14	.82	1.26	.44	.54		.02		164	.22	160,900	36	1.0	240	7.4
June 10-20	1,199,000	20	1.65	.21	.86	1.57	.48	.65		.02		178	.24	287,800	32	.9	279	7.4
June 21-30	753,900	19	1.45	.19	1.16	1.43	.48	.87		.02		180	.24	180,900	41	1.3	284	7.6
July 1-10	258,800	45	1.35	.06	1.57	b1.49	.46	1.02		.01		234	.32	82,820	53	1.9	304	8.9
July 11-20	186,000	30	1.70	.14	1.53	c1.73	.52	1.10		.02		237	.32	59,520	45	1.6	345	8.7
July 21-31	155,100	33	1.35	.04	1.73	b1.40	.52	1.18		.02		233	.32	49,630	55	2.1	330	9.1
Aug. 1-10	143,000	43	1.45	.12	1.82	d1.59	.48	1.30		.02		234	.32	45,760	54	2.1	353	8.9
Aug. 11-20	369,900	26	1.25	.12	1.18	1.35	.31	.87		.02		180	.24	88,780	46	1.4	267	8.2
Aug. 21-31	110,400	16	2.10	.35	1.70	2.26	.56	1.30		.03		a244	.33	36,430	41	1.3	424	7.9
Sept. 1-10	49,840	15	1.95	.34	1.88	2.20	.54	1.41		.02		250	.34	16,950	45	1.8	417	8.0
Sept. 11-18, 21-22	25,510	13	1.80	.32	2.56	1.98	.56	2.14		.00		282	.38	9,690	55	2.5	484	7.8
Sept. 19-20, 23-30	34,530	5.4	2.35	.42	3.95	2.46	.85	3.41		.00		390	.53	18,300	59	3.4	693	7.8
Total or weighted average	9,186,000	19	1.65	0.21	1.30	1.69	0.50	0.93		0.03		201	0.27	2,480,000	41	1.3	325	--

a Calculated from determined constituents.
b Includes 0.60 equivalent per million carbonate (CO_3).
c Includes 0.30 equivalent per million carbonate (CO_3).
d Includes 0.33 equivalent per million carbonate (CO_3).

BRAZOS RIVER BASIN

BRAZOS RIVER AT RICHMOND, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 59 in Richmond, Fort Bend County, 925 feet downstream from Texas and New Orleans Railroad bridge and at mile 93.
DRAINAGE AREA.--44,020 square miles, approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1957.
Water temperatures: November 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 2,230 micromhos Mar. 1; minimum daily, 224 micromhos Apr. 29.
Percent sodium: Maximum, 60 Oct. 11-20, Feb. 21-28, Mar. 1-10; minimum, 20 May 1-5, 9.
EXTREMES, 1945-57.--Specific conductance: Maximum daily, 2,540 micromhos Sept. 4, 1951; minimum daily, 187 micromhos Aug. 31, 1947.
Percent sodium: Maximum, 76 Dec. 3-4, 1945; minimum, 18 Aug. 27-31, 1947.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956....	11,760	12	6.49	1.81	11.96		2.23	6.39	11.62	--	0.02		1,230	1.67	19,640	59	5.9	2,020	7.9
Oct. 11-20	11,590	12	6.04	1.97	11.80		2.39	6.27	11.14	--	.01		1,200	1,63	18,890	60	5.9	1,970	8.1
Oct. 21-31	16,190	8.8	6.39	1.89	11.93		2.23	6.64	11.34	--	.00		1,220	1.66	26,880	59	5.9	2,010	8.1
Nov.1-11	27,000	9.0	5.88	1.64	10.20		2.16	5.68	9.87	--	.01		1,070	1.46	39,420	58	5.3	1,780	7.7
Nov. 12-20	29,590	8.4	2.69	.67	2.79		2.21	1.39	2.51	--	.04		367	.50	14,800	45	2.2	634	8.0
Nov. 21-30	19,800	6.4	2.74	.66	2.57		2.80	.87	2.28	--	.02		347	.47	9,310	43	2.0	608	7.7
Dec. 1-10	19,620	8.8	2.74	.74	2.22		2.88	.77	2.03	--	.02		328	.45	8,830	39	1.7	587	8.1
Dec. 11-20	18,780	9.0	2.97	.81	2.33		3.11	.90	2.09	--	.01		344	.47	8,830	38	1.7	619	8.1
Dec. 21-31	24,380	8.6	2.79	.73	2.49		2.90	.90	2.20	--	.01		346	.47	11,460	41	1.9	613	8.0
Jan. 1-9, 1957	8,730	11	3.09	.81	2.89		3.26	1.31	2.20	--	.02		398	.54	4,710	43	2.1	674	7.8
Jan. 10-23	18,890	8.8	4.49	1.32	5.56		3.82	2.60	4.94	--	.01		672	.91	17,190	49	3.3	1,130	8.0
Jan. 24-31	14,380	6.2	6.29	1.73	10.47		2.41	5.93	10.15	--	.00		1,110	1.51	21,710	57	5.2	1,900	8.1
Feb. 1-10	16,460	15	6.31	1.73	9.96		2.69	5.20	10.10	--	.01		1,080	1.47	24,200	55	5.0	1,850	7.7
Feb. 11-20	17,730	6.6	4.76	1.40	8.93		2.20	4.08	8.80	--	.01		a898	1.22	21,630	59	5.1	1,550	7.5
Feb. 21-28	16,600	11	5.40	1.48	10.35		2.39	4.35	10.49	--	.00		1,030	1.40	23,240	60	5.6	1,780	7.5
Mar. 1-10	24,240	10	4.99	1.40	9.77		2.21	4.02	9.87	--	.06		a964	1.31	31,750	60	5.5	1,700	7.6
Mar. 11-17	15,070	7.8	5.39	1.48	9.39		2.36	4.58	9.31	--	.01		a971	1.32	19,890	58	5.1	1,680	7.8
Mar. 18-31	183,900	8.6	2.30	.49	2.38		1.77	1.19	2.17	--	.04		325	.44	80,920	46	2.0	548	7.5

Apr. 1-11, 1957	141,600	12	2.30	.41	1.91	.12	2.03	.81	1.89	.03	.05	305	.41	58,060	40	1.6	499	7.7
Apr. 12-23	82,850	9.4	2.79	.60	3.64		1.93	1.69	3.36	.03	.02	440	.60	49,710	52	2.8	729	7.6
Apr. 24-30	850,900	8.2	1.75	.34	.61	.08	1.80	.48	.45	.03	.05	a161	.22	187,200	22	.6	280	7.9
May 1-5, 9	1,188,000	14	2.00	.36	.61	.10	2.05	.44	.56	--	.02	190	.26	308,900	20	.6	303	7.3
May 6-8, 10-15	1,402,000	14	2.80	.58	2.51		1.97	1.46	2.40	--	.06	386	.52	729,000	43	1.9	612	7.3
May 16-20	808,700	14	2.14	.44	1.04	.09	2.02	.69	.96	--	.05	244	.33	266,900	28	.9	379	7.3
May 21-31	1,348,000	13	2.69	.63	2.64		1.90	1.42	2.59	--	.05	390	.53	714,400	44	2.0	624	7.4
June 1-10	1,339,000	13	2.40	.58	1.78	.09	1.90	1.17	1.78	--	.05	300	.41	549,000	37	1.5	507	7.7
June 11-20	1,088,000	12	2.40	.55	1.57	.10	1.92	1.08	1.55	--	.04	287	.39	424,300	34	1.3	477	7.7
June 21-30	1,045,000	12	2.54	.63	1.83	.10	1.98	1.25	1.83	--	.04	324	.44	459,800	36	1.5	532	7.6
July 1-10	638,100	14	2.89	.68	2.04	.11	2.29	1.27	2.06	--	.03	361	.49	312,700	36	1.5	594	7.7
July 11-20	188,800	14	2.94	.65	1.44	.10	2.61	.96	1.58	--	.04	322	.44	83,070	28	1.1	530	7.8
July 21-31	152,100	12	2.69	.61	1.22	.12	2.67	.67	1.21	--	.03	286	.39	59,320	26	.9	480	7.7
Aug. 1-10	132,500	22	2.69	.67	1.70	.13	2.75	.87	1.61	--	.02	318	.43	56,980	33	1.3	527	8.1
Aug. 11-20	39,650	18	3.09	.73	1.91	.12	3.18	.98	1.78	--	.02	356	.48	19,030	33	1.4	593	8.2
Aug. 21-31	29,690	16	3.59	1.23	3.46		3.28	1.89	3.10	--	.01	518	.70	20,780	42	2.2	839	7.8
Sept. 1-10	20,510	12	3.74	1.32	3.46		3.13	2.06	3.33	--	.00	538	.73	14,970	41	2.2	866	8.0
Sept. 11-20	19,070	12	3.69	1.40	3.80		3.18	2.10	3.61	--	.00	568	.77	14,680	43	2.4	896	7.9
Sept. 21-30	58,950	11	3.24	1.15	3.03		2.75	1.77	2.90	--	.00	475	.65	38,320	41	2.0	758	7.8
Total or weighted average	11,070,000	13	2.50	0.57	2.00		2.03	1.12	1.83	--	0.04	317	0.43	4,760,000	39	1.6	519	--

a Calculated from determined constituents.

COLORADO RIVER BASIN

COLORADO RIVER AT AUSTIN, TEX.

LOCATION.--At raw-water intake at Austin City Water Plant, just downstream from bridge on U.S. Highway 290 in Austin, Travis County, half a mile downstream from Barton Creek and 4.5 miles upstream from gaging station at Montopolis bridge on U.S. Highway 183.
DRAINAGE AREA.--38,400 square miles, approximately, above gaging station, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1957.
Water temperatures: October 1947 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 552 micromhos Dec. 1; minimum daily, 288 micromhos Sept. 23.
Percent sodium: Maximum, 32 Mar. 1-31; minimum, 18 July 1-31.
EXTREMES, 1947-57.--Specific conductance: Maximum daily, 591 micromhos July 1, 1948; minimum daily, 243 micromhos Dec. 2, 1953.
Percent sodium: Maximum, 46 Nov. 1-30, 1951; minimum, 15 Nov. 1-30, 1953, Jan. 1-31, 1954.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956	19,090	8.0	2.05	0.90	1.27		2.65	0.46	1.10	1.01	0.01		237	0.32	6,110	30	1.0	412	7.7
Nov. 1-30	10,830	9.2	2.24	.90	1.33		2.74	.52	1.18	.02	.01		a246	.33	3,570	30	1.1	440	8.0
Dec. 1-31	10,750	9.2	2.09	.99	1.36		2.75	.42	1.24	.02	.01		a242	.33	3,550	31	1.1	432	8.0
Jan. 1-31, 1957	10,590	6.4	2.43	.99	.99		2.74	.48	1.16	.02	.01		245	.33	3,490	22	.8	437	8.1
Feb. 1-28	10,500	7.8	2.10	.90	1.36		2.69	.46	1.18	.02	.01		242	.33	3,470	31	1.1	428	8.0
Mar. 1-31	14,110	8.2	2.00	.90	1.38		2.59	.48	1.16	.03	.02		237	.32	4,520	32	1.1	423	8.2
Apr. 1-30	128,900	8.0	1.86	.90	1.22		2.44	.44	1.04	.02	.04		226	.31	39,960	31	1.0	397	7.5
May 1-31	1,677,000	8.4	1.88	.64	1.11		2.25	.37	.96	.02	.03		207	.28	469,600	31	1.0	363	7.4
June 1,4-30	1,010,000	9.6	1.89	.55	.90		2.16	.33	.76	.03	.06		188	.26	262,600	27	.8	329	7.5
June 2-3	49,030	14	2.46	.76	1.33		2.75	.60	1.10	.03	.07		a259	.35	17,160	29	1.0	433	8.1
July 1-31	301,200	11	1.95	.53	.56		2.15	.27	.54	.03	.05		184	.25	75,300	18	.5	304	7.7
Aug. 1-31	163,900	9.6	2.00	.54	.72		2.34	.29	.56	.02	.05		197	.27	44,250	22	.6	337	8.0
Sept. 1-30	142,100	9.6	2.00	.54	.78		2.38	.25	.65	.02	.02		190	.26	36,950	23	.7	321	7.8
Total or weighted average	3,548,000	9.1	1.90	0.58	1.00		2.25	0.35	0.85	0.02	0.04		201	0.27	957,960	28	0.9	349	--

a Calculated from determined constituents.

COLORADO RIVER AT WHARTON, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 59 in Wharton, Wharton County, 1,000 feet downstream from Texas and New Orleans Railroad bridge, 12 miles upstream from Jones Creek and at mile 67.
DRAINAGE AREA.--41,380 square miles, approximately, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: April 1944 to September 1957.
Water temperatures: October 1945 to September 1948, March 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 765 micromhos Feb. 5; minimum daily, 146 micromhos Sept. 27.
Percent sodium: Maximum, 32 Feb. 1-28; minimum, 14 Apr. 29-30, May 1-3.
EXTREMES, 1944-57.--Specific conductance: Maximum daily, 765 micromhos Feb. 5, 1957; minimum daily, 146 micromhos Sept. 27, 1957.
Percent sodium: Maximum, 43 Nov. 1-30, 1951; minimum, 7 Jan. 19-24, 1945.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956	18,230	14	2.49	0.99	1.39	0.13	3.28	0.50	1.21	0.02	0.01		a279	0.38	6,930	28	1.1	478	7.9
Nov. 1-30	13,070	10	2.77	1.07	1.48	.13	3.67	.54	1.33	--	.01		304	.41	5,360	27	1.1	529	8.2
Dec. 1-25	13,830	8.8	2.83	1.15	1.48	.13	3.75	.54	1.33	.02	.01		312	.42	5,810	26	1.0	544	8.2
Dec. 26-31	5,580	8.6	1.94	.44	.78	.11	2.11	.46	.68	.03	.03		194	.26	1,450	24	.7	331	7.9
Jan. 1-31, 1957	15,460	6.2	2.83	.99	1.35	.12	3.54	.60	1.21	--	.01		292	.40	6,180	26	1.0	519	8.2
Feb. 1-28	20,090	5.8	2.45	1.07	1.70	.12	3.26	.56	1.55	.02	.02		296	.40	8,040	32	1.3	534	7.9
Mar. 1-10	8,390	11	2.15	.66	1.09	.11	2.52	.52	.96	--	.04		246	.33	2,770	27	.9	406	8.2
Mar. 11-17	6,890	8.2	2.42	.82	1.30	.12	3.00	.54	1.16	--	.02		272	.37	2,550	28	1.0	466	8.2
Mar. 18-31	90,150	9.2	1.70	.31	.48	.10	1.88	.29	.39	--	.06		168	.23	20,730	19	.5	260	8.0
Apr. 1-23	56,780	11	2.15	.52	.78	.12	2.41	.42	.73	.03	.04		222	.30	17,030	22	.7	359	7.8
Apr. 24-28	94,490	9.0	1.80	.37	.48	.11	1.97	.35	.39	.03	.05		a158	.21	19,840	17	.5	279	7.7
Apr. 29-30, May 1-3	349,500	12	1.68	.28	.33	.10	1.72	.35	.27	--	.07		153	.21	73,400	14	.3	237	7.2
May 4-31	1,512,000	9.6	2.01	.61	1.00	.13	2.29	.42	.96	--	.04		219	.30	453,600	27	.9	374	7.6
June 1-10	688,900	11	1.90	.49	.70	.11	2.02	.37	.70	--	.06		195	.27	186,000	22	.6	325	7.6
June 11-20	567,300	12	1.90	.46	.57	.11	2.05	.33	.59	--	.07		186	.25	141,800	19	.5	307	7.5
June 21-30	139,900	13	2.15	.59	.65	.11	2.39	.35	.65	--	.08		214	.29	40,570	19	.6	349	7.6

a Calculated from determined constituents.

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COLORADO RIVER BASIN--Continued

COLORADO RIVER AT WHARTON, TEX.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 1-31, 1957.....	263,000	13	2.15	0.57	0.57	0.10	2.36	0.31	0.65	--	0.05		a192	0.26	68,380	17	0.5	342	7.8
Aug. 1-31	132,300	12	1.90	.64	.65	.11	2.29	.35	.56	0.02	.03		200	.27	35,720	20	.6	331	7.8
Sept. 1-26, 30	157,200	11	1.90	.62	.74	.12	2.33	.31	.68	.01	.02		194	.26	40,870	22	.7	323	7.9
Sept. 27-29	145,000	10	1.22	.10	.30	.13	1.26	.23	.27	.07	.02		a108	.15	21,750	17	.4	169	7.7
Total or weighted average	4,298,000	11	1.95	0.52	0.74	0.12	2.15	0.37	0.70	--	0.05		198	0.27	1,160,000	22	0.7	331	--

a Calculated from determined constituents.

GUADALUPE RIVER BASIN

GUADALUPE RIVER AT VICTORIA, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59 in Victoria, Victoria County, 1,300 feet upstream from Texas and New Orleans Railroad bridge, 10 miles upstream from Coleto Creek, and at mile 51.
DRAINAGE AREA.--5,161 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1948 to September 1957.
Water temperatures: November 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 770 micromhos Feb. 20; minimum daily, 184 micromhos Oct. 24.
Percent sodium: Maximum, 50 Oct. 1-18; minimum, 14 May 1-6.
EXTREMES, 1945-46, 1948-57.--Specific conductance: Maximum daily, 1,950 micromhos Jan. 11-17, 1946; minimum daily, 184 micromhos Oct. 24, 1956.
Percent sodium: Maximum, 67 July 23-24, 1950; minimum, 14 May 1-6, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-18, 1956	1,150	21	2.15	1.07	3.21		3.51	0.54	2.37	--	0.01		366	0.50	575	50	2.5	631	8.3
Oct. 19-22	6,970	12	1.49	.49	1.22	0.11	2.13	.27	.90	--	.04		a192	.26	1,810	37	1.2	336	7.8
Oct. 23-31	1,940	12	1.47	.25	.57	.13	1.80	.19	.39	--	.00		142	.19	369	24	.6	233	8.0
Nov. 1-10	1,680	17	2.04	.42	.96	.13	2.49	.33	.73	--	.04		219	.30	504	27	.9	351	8.1
Nov. 11-20	1,020	15	2.04	.46	1.13	.12	2.52	.33	.93	--	.03		229	.31	316	30	1.0	375	7.9
Nov. 21-30	847	15	2.51	.63	1.74	.11	3.16	.46	1.44	--	.01		289	.39	330	35	1.4	494	7.7
Dec. 1-10	998	17	2.84	.90	2.39	.12	3.87	.56	1.86	0.03	.01		368	.50	499	38	1.7	622	7.8
Dec. 11-21	12,460	16	2.91	1.07	2.78	.13	4.13	.60	2.23	.03	.00		400	.54	6,730	40	2.0	684	8.2
Dec. 22-31	16,430	9.0	1.75	.37	.96	.12	2.03	.40	.79	.03	.03		199	.27	4,440	30	.9	326	7.8
Jan. 1-10, 1957	2,400	11	2.02	.46	1.13	.12	2.33	.44	.82	--	.07		223	.30	720	30	1.0	373	7.4
Jan. 11-20	2,220	14	2.42	.64	1.26	.12	2.93	.50	.99	--	.05		262	.36	799	28	1.0	442	7.6
Jan. 21-31	2,650	13	2.76	.82	1.52	.12	3.41	.58	1.24	--	.04		304	.41	1,090	29	1.1	515	8.1
Feb. 1-12	3,300	14	3.01	1.23	2.71		4.08	.79	2.03	.02	.03		395	.54	1,780	39	1.9	670	8.0
Feb. 13-24	6,060	14	3.12	1.32	2.72		4.26	.71	2.17	--	.02		402	.55	3,330	38	1.8	697	8.1
Feb. 25-28	13,420	11	2.30	.82	1.78	.11	2.90	.60	1.52	--	.04		301	.41	5,500	36	1.4	499	7.9
Mar. 1-10	8,690	13	2.20	.69	1.39	.11	2.46	.60	1.24	--	.06		276	.38	3,300	32	1.2	444	8.1

a Calculated from determined constituents.

GUADALUPE RIVER BASIN--Continued

GUADALUPE RIVER AT VICTORIA, TEX.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 11-20, 1957	17,040	12	2.20	0.62	1.26	0.10	2.62	0.56	0.96	--	0.04		257	0.35	5,960	30	1.1	413	8.2
Mar. 21-31	45,940	10	1.95	.53	.91	.10	2.29	.42	.76	--	.05		218	.30	13,780	26	.8	351	8.1
Apr. 1-10	32,900	11	1.95	.49	.96	.11	2.18	.44	.85	0.03	.05		217	.30	9,870	27	.9	350	7.9
Apr. 11-20	19,310	14	2.59	.72	1.30	.11	2.92	.56	1.24	.03	.05		288	.39	7,530	28	1.0	467	7.9
Apr. 21-30	194,600	10	1.70	.38	.52	.12	1.93	.31	.45	.02	.05		a157	.21	40,870	19	.5	272	7.9
May 1-6	239,500	15	2.09	.39	.44	.13	2.29	.33	.39	--	.07		194	.26	62,270	14	.4	305	7.6
May 7-18	81,360	17	2.99	.81	1.00	.10	3.23	.58	.96	--	.13		313	.43	34,980	20	.7	478	7.8
May 19-20, 30-31	59,800	13	1.78	.50	.65	.12	2.00	.35	.62	--	.07		195	.27	16,150	21	.6	305	7.6
May 21-29	46,890	17	3.35	1.15	1.09	.09	3.77	.67	1.07	--	.14		351	.48	22,510	19	.7	542	8.1
June 1-9	232,400	12	2.35	.46	.57	.12	2.46	.37	.59	--	.06		210	.29	67,400	16	.5	345	7.4
June 10-15	36,000	14	3.09	.90	.91	.10	3.31	.54	.99	--	.10		304	.41	14,760	18	.6	491	7.6
June 16-30	47,700	16	3.94	1.40	1.30	.08	4.36	.77	1.44	--	.12		393	.53	25,280	19	.8	652	7.8
July 1-10	17,600	21	3.24	1.48	1.74	.08	3.75	.85	1.78	--	.13		404	.55	9,680	27	1.1	636	8.0
July 11-20	13,100	23	3.09	1.56	1.83	.08	3.62	.87	1.86	--	.11		396	.54	7,070	28	1.2	638	8.0
July 21-31	10,890	19	2.89	1.48	1.87	.08	3.59	.85	1.89	--	.04		382	.52	5,660	30	1.3	631	8.0
Aug. 1-10	7,780	20	2.30	1.56	1.91	.08	3.13	.85	1.95	--	.03		370	.50	3,890	33	1.4	596	7.9
Aug. 11-20	7,080	20	2.69	1.56	1.96	.08	3.56	.83	1.95	--	.03		386	.52	3,680	31	1.4	625	7.9
Aug. 21-31	7,000	20	2.69	1.23	1.78	.10	3.47	.73	1.66	--	.02		346	.47	3,290	31	1.3	570	7.9
Sept. 1-10	4,880	21	2.64	1.48	2.31		3.46	.83	2.12	--	.02		a365	.50	2,440	36	1.6	637	8.2
Sept. 11-23	9,280	18	2.54	1.48	2.25		3.54	.77	1.95	--	.01		386	.52	4,830	36	1.6	621	8.2
Sept. 24-30	215,500	11	1.60	.40	.57	.13	1.87	.33	.51	--	.04		a158	.21	45,260	21	.6	274	8.0
Total or weighted average	1,429,000	13	2.25	0.60	0.78	0.12	2.51	0.44	0.73	--	0.06		227	0.31	443,000	21	0.7	370	--

a Calculated from determined constituents.

NUECES RIVER BASIN

NUECES RIVER NEAR MATHIS, TEX.

LOCATION.--At intake tower at Lake Corpus Christi, 0.8 mile upstream from gaging station at bridge on State Highway 359, 200 feet downstream from Texas and New Orleans Railroad bridge and 4 miles southwest of Mathis, San Patricio County.
DRAINAGE AREA.--16,660 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1957.
Water temperatures: October 1947 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 677 micromhos Apr. 9; minimum daily, 246 micromhos May 31.
Percent sodium: Maximum, 59 Apr. 1-23; minimum, 22 June 1-30.
EXTREMES, 1947-57.--Specific conductance: Maximum daily, 1,040 micromhos July 1, 1948; minimum daily, 233 micromhos July 30, 1949.
Percent sodium: Maximum, 63 May 1-20, 1953; minimum, 22 June 1-30, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956	39,030	18	1.84	0.26	1.65	0.17	2.31	0.69	0.87	--	0.06		240	0.33	12,880	42	1.6	385	7.8
Nov. 1-30	6,440	17	1.81	.21	1.70	.16	2.25	.81	.82	--	.05		246	.33	2,130	44	1.7	391	7.6
Dec. 1-31	5,740	17	2.00	.26	.96	.14	2.56	.81	.85	0.04	.04		269	.37	2,120	45	1.8	417	7.5
Jan. 1-31, 1957	3,710	15	2.00	.28	1.70	.17	2.59	.62	.87	--	.03		257	.35	1,300	41	1.6	415	7.7
Feb. 1-28	3,530	17	2.08	.28	1.91	.17	2.77	.62	1.02	--	.04		282	.38	1,340	43	1.8	431	7.9
Mar. 1-31	19,710	19	2.05	.25	2.35	.16	2.92	.67	1.18	--	.04		309	.42	8,280	49	2.2	480	8.2
Apr. 1-23	29,560	14	1.80	.23	2.92		2.61	.77	1.49	.03	.05		316	.43	12,710	59	2.9	491	8.0
Apr. 24-30	128,900	12	1.60	.21	1.04	.19	1.95	.42	.62	.03	.08		a184	.25	32,220	34	1.1	309	7.5
May 1-31	583,000	14	1.02	.82	.78	.17	1.92	.42	.42	--	.05		177	.24	139,900	28	.8	283	7.2
June 1-30	484,500	14	2.15	.30	.74	.19	2.52	.31	.45	--	.06		208	.28	135,700	22	.7	334	7.4
July 1-31	6,720	17	3.04	.44	1.17	.21	3.54	.48	.70	.02	.06		290	.39	2,620	24	.9	458	8.0
Aug. 1-31	6,500	17	2.84	.55	1.57	.23	3.57	.58	.99	.02	.05		312	.42	2,730	30	1.2	499	8.0
Sept. 1-30	103,300	17	2.64	.50	2.09		3.28	.65	1.24	.02	.04		322	.44	45,450	40	1.7	509	8.0
Total or weighted average	1,421,000	14	1.65	0.52	0.96	0.18	2.29	0.42	0.56	--	0.05		208	0.28	397,900	29	0.9	333	--

a Calculated from determined constituents.

RIO GRANDE BASIN

RIO GRANDE ABOVE CULEBRA CREEK NEAR LOBATOS, COLO.

LOCATION.--Half a mile southeast of La Sauces, 7 miles upstream from Culebra Creek, and 15 miles upstream from gaging station near Lobatos, Conejos County.
DRAINAGE AREA.--7,700 square miles, approximately, above gaging station (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 873 micromhos Oct. 15; minimum daily, 196 micromhos June 23. Percent sodium: Maximum, 72 May 11-14; minimum, 30 May 29-31.
EXTREMES, 1946-57.--Specific conductance: Maximum daily, 1,070 micromhos July 26, 1948; minimum daily, 122 micromhos June 1, 1949. Percent sodium: Maximum, 72 May 11-14, 1957; minimum, 16 Dec. 1, 3-10, 1946.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for gaging station near Lobatos for water year October 1956 to September 1957 given in WSP 1512. Culebra Creek which enters the Rio Grande between the sampling point and the gaging station is usually dry at its mouth. Inflow from this and other sources between sampling point and gaging station occurs only after heavy rainfall.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956 ..	151	41	1.95	0.82	2.91	0.21	3.23	2.04	0.62	0.06	0.01	0.32	387	0.53	80	49	2.5	568	7.8
Oct. 11-19.....	218	--	2.89	1.23	3.52	--	3.49	--	--	--	--	--	518	.70	153	46	2.5	749	7.9
Oct. 20-31.....	420	--	2.30	.90	2.18	--	3.80	--	--	--	--	--	361	.49	206	41	1.7	524	7.6
Nov. 1-19	2,070	--	2.30	.80	1.91	--	3.06	--	--	--	--	--	338	.46	952	38	1.5	490	7.5
Nov. 20-30	1,660	--	2.10	.74	1.48	--	2.77	--	--	--	--	--	299	.41	681	34	1.2	426	7.4
Dec. 1-31	3,870	--	2.00	.64	1.35	--	2.75	--	--	--	--	--	276	.38	1,470	34	1.2	392	7.7
Jan. 1-18, 1957...	2,820	33	1.75	.43	1.13	.14	2.26	.83	.23	.03	.00	.08	235	.32	902	33	1.1	327	7.0
Jan. 19-31.....	1,840	--	1.75	.63	1.30	--	2.75	--	--	--	--	--	250	.34	626	35	1.2	362	7.6
Feb. 1-28.....	5,670	--	1.70	.61	1.22	--	2.34	--	--	--	--	--	242	.33	1,870	35	1.1	354	7.7
Mar. 1-31	4,060	--	2.05	.76	1.57	--	2.74	--	--	--	--	--	296	.40	1,620	36	1.3	436	7.9
Apr. 1-13	1,570	--	2.40	.90	2.48	--	2.82	--	--	--	--	--	396	.54	848	43	1.9	573	7.7
Apr. 14-18	371	--	2.20	.82	2.09	--	2.92	--	--	--	--	--	342	.47	174	41	1.7	504	7.7
Apr. 19-29	1,860	33	1.50	.63	1.30	.16	2.57	.75	.17	.04	.01	.19	237	.32	595	36	1.3	338	7.5
Apr. 30	119	--	2.05	.72	1.96	--	2.34	--	--	--	--	--	318	.43	51	41	1.7	465	7.3
May 1-2	184	--	2.35	.99	2.52	--	2.66	--	--	--	--	--	402	.55	101	43	1.9	568	8.0
May 3	77	--	1.75	.64	1.57	--	2.41	--	--	--	--	--	298	.41	32	40	1.4	390	7.4

May 4-10, 1957...	7,160	--	1.05	.41	.87	--	1.77	--	--	--	--	--	182	.25	1,790	37	1.0	230	7.6
May 11-14	7,110	--	1.15	.47	4.22	--	3.34	--	--	--	--	--	404	.55	3,910	72	4.7	570	7.9
May 15-20	8,850	--	1.25	.57	2.96	--	2.66	--	--	--	--	--	336	.46	4,070	62	3.1	471	7.8
May 21-28	11,900	--	1.75	.71	1.44	--	1.77	--	--	--	--	--	272	.37	4,400	37	1.3	386	7.5
May 29-31	6,100	--	1.25	.58	.78	--	1.28	--	--	--	--	--	198	.27	1,650	30	.8	270	7.7
June 1-30.....	119,000	--	1.00	.49	.83	--	1.31	--	--	--	--	--	172	.23	27,370	36	1.0	234	7.7
July 1-16	65,560	--	1.10	.43	.83	--	1.44	--	--	--	--	--	178	.24	15,730	35	.9	241	7.5
July 17-27	33,160	--	1.50	.82	1.17	--	1.62	--	--	--	--	--	236	.32	10,610	34	1.1	335	7.4
July 28-31	24,050	--	1.10	.51	.91	--	1.20	--	--	--	--	--	192	.26	6,250	36	1.0	265	7.2
Aug. 1-3	16,280	--	1.45	.39	1.30	--	1.51	--	--	--	--	--	210	.29	4,720	41	1.4	312	8.1
Aug. 4-8.....	13,580	--	1.85	.54	1.44	--	a2.14	--	--	--	--	--	232	.32	4,350	38	1.3	379	9.0
Aug. 9-13.....	7,840	--	2.25	.70	1.57	--	2.29	--	--	--	--	--	315	.43	3,370	35	1.3	462	7.8
Aug. 14	1,240	--	2.59	.82	2.04	--	b2.64	--	--	--	--	--	342	.47	583	37	1.6	520	8.5
Aug. 15-22.....	6,610	--	2.79	.78	2.48	--	3.02	--	--	--	--	--	395	.54	3,570	41	1.9	599	8.1
Aug. 23	639	--	2.89	.82	2.91	--	c2.92	--	--	--	--	--	430	.58	371	44	2.1	657	8.6
Aug. 24-25.....	1,140	--	2.79	.90	2.48	--	3.15	--	--	--	--	--	407	.55	627	40	1.8	602	8.0
Aug. 26-30.....	3,630	--	2.15	.82	1.83	--	b2.72	--	--	--	--	--	302	.41	1,490	38	1.5	456	8.5
Aug. 31	805	--	1.75	.63	1.52	--	d2.19	--	--	--	--	--	236	.32	258	39	1.4	360	8.8
Sept. 1	1,160	--	1.60	.16	.87	--	1.39	--	--	--	--	--	164	.22	255	33	.9	245	8.2
Sept. 2	2,020	--	1.05	.82	1.13	--	e1.76	--	--	--	--	--	198	.27	545	38	1.2	295	8.4
Sept. 3	2,520	--	1.15	.20	.87	--	1.28	--	--	--	--	--	136	.18	454	39	1.1	218	7.9

a Includes 0.53 equivalent per million of carbonate (CO_3).
b Includes 0.20 equivalent per million of carbonate (CO_3).
c Includes 0.30 equivalent per million of carbonate (CO_3).
d Includes 0.37 equivalent per million of carbonate (CO_3).
e Includes 0.10 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE ABOVE CULEBRA CREEK NEAR LOBATOS, COLO.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Sept. 4-6, 1957...	5,250	--	1.40	0.35	1.13	--	f 1.65	--	--	--	--	--	189	0.26	1,360	39	1.2	287	9.1
Sept. 7-11	4,680	--	2.00	.63	1.65	--	2.33	--	--	--	--	--	268	.36	1,680	39	1.4	413	6.7
Sept. 12-14	1,490	--	2.54	.82	2.00	--	2.62	--	--	--	--	--	367	.50	745	37	1.5	536	7.5
Sept. 15-20	1,820	--	3.14	.90	2.31	--	2.88	--	--	--	--	--	426	.58	1,060	36	1.6	622	7.9
Sept. 21	232	--	2.94	.82	2.04	--	g 2.76	--	--	--	--	--	392	.53	123	35	1.5	567	8.8
Sept. 22	220	--	2.30	.71	1.57	--	2.43	--	--	--	--	--	290	.39	86	34	1.3	452	7.2
Sept. 23-25	678	--	1.95	.67	1.39	--	b 2.40	--	--	--	--	--	289	.39	264	35	1.2	396	8.5
Sept. 26-28	672	--	2.00	.82	1.65	--	2.33	--	--	--	--	--	280	.38	255	37	1.4	447	8.0
Sept. 29-30	416	--	2.59	.90	1.96	--	h 2.54	--	--	--	--	--	369	.50	208	36	1.5	544	8.8
Total or weighted average	382,800	--	1.35	0.54	1.17	--	1.69	--	--	--	--	--	217	0.30	114,800	38	1.2	307	--

f Includes 0.40 equivalent per million of carbonate (CO_3).
g Includes 0.43 equivalent per million of carbonate (CO_3).
h Includes 0.47 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE AT OTOWI BRIDGE NEAR SAN ILDEFONSO, N. MEX.

LOCATION.--At gaging station on downstream side of pier of former railway bridge, 400 feet downstream from bridge on State Highway 4, 1¾ miles southwest of San Ildefonso Pueblo, 2½ miles downstream from Pojoaque River, and 7 miles west of Pojoaque, Santa Fe County.
DRAINAGE AREA.--14,300 square miles, approximately (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses October 1946 to September 1957.
Water temperatures: October 1948 to September 1957.
Sediment records: October 1947 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 636 micromhos Feb. 14, 15; minimum daily, 205 micromhos June 12.
Percent sodium: Maximum, 33 Nov. 1-30; minimum, 17 May 4 to June 3.
EXTREMES, 1946-57.--Specific conductance: Maximum daily, 1,230 micromhos Aug. 26, 1951; minimum daily, 165 micromhos June 13, 1952.
Percent sodium: Maximum, 34 Jan. 21 to Feb. 10, 1954; minimum, 14 June 11-20, 1949, May 11-20, 1952.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956...	10,300	36	1.85	0.74	1.22		2.80	0.81	0.24		0.01		242	0.33	3,400	32	1.1	369	7.8
Nov. 1-30.....	16,720	33	2.25	.90	1.57		2.85	1.60	.34		.01		300	.41	6,860	33	1.3	463	7.8
Dec. 1-31.....	22,170	32	2.20	.82	1.44		2.84	1.42	.34		.01		285	.39	8,650	32	1.2	440	7.7
Jan. 1-31, 1957...	24,710	31	2.25	.90	1.35		2.72	1.42	.34		.01		281	.38	9,390	30	1.1	433	7.9
Feb. 1-12.....	9,900	28	2.20	.90	1.30		2.67	1.42	.31		.01		273	.37	3,660	30	1.0	425	7.7
Feb. 13-16.....	5,260	23	3.34	1.32	1.65		2.61	3.41	.25		.03		397	.54	2,840	26	1.1	599	7.9
Feb. 17-28.....	15,420	23	2.59	.99	1.35		2.51	2.14	.26		.02		306	.42	6,480	27	1.0	476	7.8
Mar. 1-31.....	30,160	29	2.59	.90	1.48		2.67	1.94	.28		.01		310	.42	12,670	30	1.1	483	7.7
Apr. 1-15.....	19,420	26	2.64	.90	1.26		2.61	1.87	.25		.03		298	.41	7,960	26	.9	454	7.9
Apr. 16-May 3....	59,790	20	2.30	.57	.61		2.39	.83	.15		.05		207	.28	16,740	18	.5	332	7.9
May 4-31	207,700	23	2.10	.41	.52		2.10	.73	.12		.03		186	.25	51,920	17	.5	292	7.9
June 1-3	27,560	20	1.85	.37	.44		1.87	.65	.12		.02		164	.22	6,060	17	.4	261	7.9
June 4-9	66,190	18	1.90	.35	.48		1.92	.65	.12		.03		166	.23	15,220	18	.5	270	7.7
June 10-12	33,830	20	1.50	.33	.48		1.59	.60	.11		.02		147	.20	6,770	21	.5	228	7.9
June 13-24	115,200	17	1.80	.31	.52		1.75	.69	.11		.01		160	.22	25,340	20	.5	257	7.7

RIO GRANDE BASIN--Continued

RIO GRANDE AT OTOWI BRIDGE NEAR SAN ILDEFONSO, N. MEX.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 25-30, 1957	57,820	18	1.60	0.31	0.48		1.59	0.69	0.11		0.01		150	0.20	11,560	20	0.5	238	7.7
July 1-2	20,460	12	1.55	.54	.87		1.87	.90	.14		.02		175	.24	4,910	29	.8	265	8.2
July 3-8	58,420	9.7	1.50	.35	.87		1.67	.87	.11		.02		161	.22	12,850	32	.9	239	8.2
July 9-16	72,620	12	1.55	.47	.78		a 1.54	.98	.18		.00		166	.23	16,700	28	.8	251	9.2
July 17-23	50,330	12	1.65	.47	.87		b 1.87	.90	.16		.02		176	.24	12,080	29	.8	304	9.2
July 24-26	21,200	12	1.70	.53	1.04		c 2.14	1.02	.17		.04		198	.27	5,720	32	.9	337	8.7
July 27-29	23,160	17	1.80	.51	1.09		2.00	1.12	.23		.02		207	.28	6,480	32	1.0	427	7.9
July 30-Aug. 3	51,950	12	1.55	.39	.87		c 1.75	.85	.17		.02		168	.23	11,950	31	.9	297	8.8
Aug. 4-14	71,290	15	2.20	.82	1.04		2.56	1.39	.18		.02		245	.33	23,530	26	.8	446	8.0
Aug. 15-18	23,720	11	1.90	.54	1.00		2.03	1.04	.25		.02		200	.27	6,400	29	.9	366	7.9
Aug. 19	5,280	--	--	--	.96		--	1.50	.18		--		--	--	--	--	--	420	--
Aug. 20-23	20,290	12	1.80	.51	.96		2.10	1.06	.25		.02		200	.27	5,480	29	1.0	378	7.9
Aug. 24	6,190	--	--	--	1.22		--	2.56	.23		--		--	--	--	--	--	505	--
Aug. 25	6,050	--	--	--	.78		--	1.64	.14		--		--	--	--	--	--	382	--
Aug. 26	6,090	--	--	--	.87		--	1.64	.16		--		--	--	--	--	--	497	--
Aug. 27-31	32,640	12	1.70	.47	.87		c 1.78	1.08	.25		.02		187	.25	8,160	29	.8	334	8.8
Sept. 1	6,940	10	--	--	1.30		d 1.84	2.04	.17		.00		--	--	--	--	--	395	9.2
Sept. 2-6	32,200	17	2.30	.41	.65		e 2.45	.87	.17		.00		204	.28	9,020	19	.6	328	8.3
Sept. 7-11	23,660	17	2.20	.37	.57		2.21	.87	.17		.00		193	.26	6,150	18	.5	312	7.6
Sept. 12-20	30,380	20	2.10	.39	.61		2.11	.96	.16		.00		195	.27	8,200	20	.5	307	7.9
Sept. 21-30	12,200	21	2.40	.54	1.09		2.51	1.39	.28		.00		253	.34	4,150	27	.9	396	8.2
Total or weighted average	1,297,000	18	1.95	0.49	0.78		a 2.05	0.98	0.17		0.02		196	0.27	350,200	24	0.7	321	--

a Includes 0.20 equivalent per million of carbonate (CO_3).
b Includes 0.33 equivalent per million of carbonate (CO_3).
c Includes 0.27 equivalent per million of carbonate (CO_3).
d Includes 0.50 equivalent per million of carbonate (CO_3).
e Includes 0.07 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE CONVEYANCE CHANNEL AT SAN MARCIAL, N. MEX.

LOCATION.--At gaging station 440 feet downstream from grade control at outlet of San Marcial Lake, 150 feet downstream from mouth of drain entering from left side, 1,800 feet west of San Marcial gage on railway bridge, about 18½ miles southwest of San Antonio, and about 1 mile south of site of the former village of San Marcial, Socorro County.

RECORDS AVAILABLE.--Chemical analyses: March 1954 to September 1957.
Water temperatures: March 1954 to September 1957.
Sediment records: March 1954 to September 1957.

EXTREMES, 1956-57.--Specific conductance: Maximum daily, 2,860 micromhos Oct. 25; minimum daily, 527 micromhos June 24, July 2.
Percent sodium: Maximum, 66 Oct. 1-20, Nov. 1-21; minimum, 34 July 1-5.

EXTREMES, 1954-57.--Specific conductance: Maximum daily, 2,860 micromhos Oct. 25, 1956; minimum daily, 527 micromhos June 24, July 2, 1957.
Percent sodium: Maximum, 66 Oct. 1-20, Nov. 1-21, 1956; minimum, 34 July 1-5, 1957.

REMARKS.--Values reported for dissolved solids are residues on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 furnished by Santa Fe district office of Surface Water Branch; records of composite discharge for Rio Grande conveyance channel at San Marcial and Rio Grande floodway at San Marcial given under Rio Grande at San Marcial in WSP 1512. Chemical analyses for Rio Grande floodway given on page 101.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-20, 1956...	203	44	5.09	2.30	14.62	0.31	5.20	8.58	8.40	0.04	0.04	0.45	1,380	1.88	382	66	7.6	2,140	7.9
Oct. 21-31	77	--	6.49	3.29	17.84	--	6.10	--	--	--	--	--	1,810	2.46	189	65	8.1	2,660	7.9
Nov. 1-21.....	265	--	6.19	2.63	17.05	--	5.52	--	--	--	--	--	1,660	2.26	599	66	8.1	2,520	7.9
Nov. 22-30.....	121	--	5.79	2.38	14.88	--	5.05	--	--	--	--	--	1,460	1.99	241	65	7.3	2,250	7.9
Dec. 1-13.....	226	--	6.19	2.30	14.44	--	5.51	--	--	--	--	--	1,430	1.94	438	63	7.0	2,220	7.9
Dec. 14-31.....	2,150	--	4.89	1.48	5.57	--	4.13	--	--	--	--	--	769	1.05	2,260	47	3.1	1,150	7.8
Jan. 1-31, 1957...	13,770	30	4.34	1.15	4.35	.17	3.79	4.25	2.06	.04	.04	.19	641	.87	11,980	43	2.6	965	7.8
Feb. 1-28.....	20,850	--	4.34	1.23	3.92	--	3.84	--	--	--	--	--	610	.83	17,300	41	2.3	919	7.9
Mar. 1-31.....	15,640	--	4.54	1.48	5.31	--	3.80	--	--	--	--	--	722	.98	15,330	47	3.1	1,100	7.7
Apr. 1-21.....	4,240	--	5.14	1.89	7.26	--	4.05	--	--	--	--	--	922	1.25	5,300	51	3.9	1,400	7.8
Apr. 22-26.....	7,420	--	3.39	1.23	2.87	--	3.20	--	--	--	--	--	480	.65	4,820	38	1.9	726	7.9
Apr. 27-30.....	6,480	26	3.34	1.15	2.78	.15	3.21	2.81	1.24	--	.07	.25	462	.63	4,080	37	1.9	704	7.7
May 1-7.....	7,960	--	3.69	1.23	3.57	--	3.29	--	--	--	--	--	550	.75	5,970	42	2.3	831	7.9
May 8-14.....	17,310	--	3.09	.90	2.39	--	2.97	--	--	--	--	--	408	.55	9,520	37	1.7	624	7.7

RIO GRANDE BASIN--Continued

RIO GRANDE CONVEYANCE CHANNEL AT SAN MARCIAL, N. MEX.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 15-31, 1957..	43,610	--	2.89	0.90	2.52	--	2.64	--	--	--	--	--	409	0.56	24,420	40	1.8	628	7.7
June 1-30.....	83,800	--	3.09	.78	2.35	--	3.05	--	--	--	--	--	408	.55	46,090	38	1.7	616	8.0
July 1-5.....	12,790	24	2.79	.99	2.04	0.12	2.69	2.23	1.07	0.03	0.03	0.10	390	.53	6,780	34	1.5	567	7.9
July 6-8.....	7,220	--	3.84	.99	2.70	--	2.92	--	--	--	--	--	500	.68	4,910	36	1.7	740	8.0
July 9-17.....	20,740	--	3.24	.78	2.22	--	3.10	--	--	--	--	--	406	.55	11,410	36	1.6	602	7.8
July 18-27.....	17,420	--	3.84	.99	2.83	--	3.41	--	--	--	--	--	500	.68	11,850	37	1.8	749	7.8
July 28-Aug. 1....	9,510	--	5.44	1.23	4.26	--	3.87	--	--	--	--	--	720	.98	9,320	39	2.3	1,030	7.9
Aug. 2-29.....	14,600	--	3.99	1.15	5.05	--	a3.21	--	--	--	--	--	690	.94	13,720	50	3.2	1,060	8.5
Aug. 30-Sept. 4...	6,500	--	3.74	1.32	4.35	--	b2.12	--	--	--	--	--	632	.86	5,590	46	2.7	1,050	8.4
Sept. 5-13.....	12,820	--	3.54	.90	2.87	--	c3.17	--	--	--	--	--	481	.65	8,330	39	1.9	737	8.6
Sept. 14-30.....	8,570	--	4.49	1.15	4.78	--	3.62	--	--	--	--	--	696	.95	8,140	46	2.9	1,030	7.9
Total or weighted average	334,400	--	3.54	0.99	3.18	--	a3.18	--	--	--	--	--	505	0.69	230,700	41	2.1	763	--

a Includes 0.33 equivalent per million of carbonate (CO_3).
b Includes 0.17 equivalent per million of carbonate (CO_3).
c Includes 0.40 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE FLOODWAY AT SAN MARCIAL, N. MEX.

LOCATION.--At gaging station at Atchison, Topeka and Santa Fe Railway bridge, 1.1 miles downstream from former site of San Marcial, Socorro County, and 18½ miles southwest of San Antonio.
DRAINAGE AREA.--27,700 square miles, approximately (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: July 1946 to September 1957.
Water temperatures: January 1949 to September 1957.
Sediment records: July 1946 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,350 micromhos Aug. 18; minimum daily, 378 micromhos June 20.
Percent sodium: Maximum, 41 Aug. 14-16; minimum, 27 July 8-13, 15-17, Aug. 17, 25.
EXTREMES, 1946-57.--Specific conductance: Maximum daily, 2,730 micromhos Apr. 8, 1953; minimum daily, 311 micromhos June 14, 1952.
Percent sodium: Maximum, 65 May 1-10, 1951; minimum, 22 Nov. 21-22, 28-30, 1947, June 21-30, 1949.
REMARKS.--Values reported for dissolved solids are residue on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of chemical analyses and sediment loads for years prior to 1946 have been published in Water Bulletins of International Boundary and Water Commission. Records of discharge for water year October 1956 to September 1957 furnished by Santa Fe district office of Surface Water Branch; records of composite discharge for Rio Grande conveyance channel at San Marcial and Rio Grande floodway at San Marcial given under Rio Grande at San Marcial in WSP 1512. Chemical analyses for Rio Grande conveyance channel given on page 99.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 11-31, 1957[a]	57,300		3.14	0.67	1.61		3.21						350	0.48	27,500	30	1.2	527	8.0
June 1-5	16,060		2.40	.99	1.48		2.80						321	.44	7,070	30	1.1	477	7.9
June 6	4,620		3.19	.67	2.18		b2.85						402	.55	2,540	36	1.6	580	8.9
June 7-19	63,480		2.89	.51	1.44		2.95						318	.43	27,300	30	1.1	471	7.7
June 20	3,850		2.10	.54	1.35		2.11						279	.38	1,460	34	1.2	378	7.4
June 21-30	35,040		2.40	.51	1.44		2.44						292	.40	14,020	33	1.2	434	7.9
July 1-5	20,940	37	2.40	.78	1.35	0.10	2.49	1.67	0.34	0.03	0.03	0.02	330	.45	9,420	29	1.1	408	8.0
July 6-7	12,180		3.49	.90	2.22		2.67						462	.63	7,670	34	1.5	656	7.6
July 8-13	32,460		2.94	.53	1.30		2.90						313	.43	13,960	27	1.0	465	7.7
July 14	5,390		2.35	.39	1.17		2.29						263	.36	1,940	30	1.0	380	8.2
July 15-17	15,980		2.89	.51	1.26		2.97						300	.41	6,550	27	1.0	464	7.7

a No flow Oct. 1, 1956 to May 10, 1957.
b Includes 0.57 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE FLOODWAY AT SAN MARCIAL, N. MEX.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons				
July 18, 1957....	4,320		3.74	0.90	2.52		c 2.73						499	0.68	2,940	35	1.7	692	8.5
July 19.....	4,050		2.89	.67	1.61		d 2.82						330	.45	1,820	31	1.2	486	8.5
July 20-26.....	31,030		3.44	.72	1.70		3.26						384	.52	16,140	29	1.2	571	7.7
July 27.....	6,760		4.69	1.56	2.74		4.05						557	.76	5,140	30	1.6	822	7.5
July 28-29.....	22,670		6.04	1.23	4.70		3.79						835	1.14	25,840	39	2.5	1,160	8.1
July 30-31.....	11,900		4.19	1.07	3.00		3.31						554	.75	8,920	36	1.8	795	7.8
Aug. 1-5.....	41,150		3.64	.82	2.09		3.16						432	.59	24,280	32	1.4	635	7.6
Aug. 6-7.....	20,440		5.09	1.32	2.83		3.57						616	.84	17,170	31	1.6	865	7.3
Aug. 8-11.....	41,960		6.69	1.64	4.39		3.85						855	1.16	48,670	35	2.2	1,170	8.1
Aug. 12-13.....	11,300		4.44	1.15	2.96		3.64						567	.77	8,700	35	1.8	821	7.2
Aug. 14-16.....	14,460		2.45	.51	2.09		e 2.32						347	.47	6,800	41	1.7	605	8.9
Aug. 17.....	5,930		5.29	1.15	2.44		4.43						563	.77	4,570	27	1.4	799	7.3
Aug. 18.....	6,050		7.98	1.89	4.52		2.93						990	1.35	8,170	31	2.0	1,350	8.2
Aug. 19.....	8,350		5.34	1.15	2.87		f 3.53						632	.86	7,180	31	1.6	904	8.3
Aug. 20.....	8,090		6.94	1.81	4.78		g 2.62						949	1.29	10,440	35	2.3	1,260	8.3
Aug. 21-23.....	10,150		4.34	1.07	2.96		3.05						567	.77	7,820	35	1.8	814	8.0
Aug. 24.....	3,330		5.29	1.32	3.26		2.43						685	.93	3,100	33	1.8	948	8.2
Aug. 25.....	6,230		4.59	.99	2.09		3.93						473	.64	3,990	27	1.2	704	8.1
Aug. 26-27.....	16,880		6.84	1.56	3.87		4.21						812	1.10	18,570	32	1.9	1,120	7.4
Aug. 28-31.....	20,460		4.79	1.15	2.91		3.51						591	.80	16,370	33	1.7	856	7.9
Sept. 1-3.....	34,150		5.84	1.40	3.35		3.51						713	.97	33,130	32	1.8	997	7.7
Sept. 4.....	4,360		3.84	.82	2.74		h 3.06						498	.68	2,960	37	1.8	790	8.7
Sept. 5-7.....	10,490		3.49	.70	1.91		3.36						391	.53	5,560	31	1.3	578	8.1
Sept. 8-17.....	19,460		2.99	.63	1.78		2.95						356	.48	9,340	33	1.3	530	8.1
Sept. 18-25.....	5,970		3.34	.74	2.13		3.20						406	.55	3,280	34	1.5	612	8.2
Sept. 26-30.....	440		3.84	.99	3.00		3.52						530	.72	317	38	1.9	765	--
Total or weighted average.....	637,800	--	3.99	0.90	2.35	--	b 3.18	--	--	--	--	--	485	0.66	420,900	32	1.5	696	--

b Includes 0.57 equivalent per million of carbonate (CO_3).
c Includes 0.27 equivalent per million of carbonate (CO_3).
d Includes 0.20 equivalent per million of carbonate (CO_3).
e Includes 0.63 equivalent per million of carbonate (CO_3).
f Includes 0.10 equivalent per million of carbonate (CO_3).
g Includes 0.13 equivalent per million of carbonate (CO_3).
h Includes 0.50 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE BELOW ELEPHANT BUTTE DAM, N. MEX.
(Formerly published as Rio Grande below Elephant Butte Outlet, N. Mex.)

LOCATION.--At gaging station 1.0 miles downstream from dam, 1½ miles upstream from Cuchillo Negro River, and in Pedro Armendaris Grant.
DRAINAGE AREA.--28,900 square miles, approximately (includes 2,940 square miles in closed basin in San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses, 1933 to 1957.
REMARKS.--Chemical analyses by the U. S. Department of Agriculture, Agricultural Reasearch Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1956	20	326	--	5.12	1.81	7.77	--	2.90	7.91	4.20	--	(a)	0.24	980	1.33	434	53	4.2	1,450	7.9
November..	20	310	--	4.91	2.17	7.90	--	2.90	7.98	4.40	--	(a)	.17	977	1.33	412	53	4.2	1,470	7.9
December..	25	406	--	4.86	2.17	8.39	--	b2.80	8.17	4.85	--	0.01	.27	1,020	1.39	564	54	4.5	1,520	8.1
January 1957	20	373	18	5.09	2.44	8.35	0.20	3.07	8.23	4.75	0.06	(a)	.08	1,050	1.43	533	52	4.3	1,540	8.0
February ..	20	322	--	5.21	2.28	8.52	--	b3.15	8.19	4.95	--	(a)	.11	1,060	1.44	464	53	4.4	1,570	8.0
March	25	22,250	--	4.72	2.04	8.51	--	b2.95	7.44	5.10	--	(a)	.25	1,000	1.36	30,260	56	4.6	1,520	8.1
April	20	29,750	--	4.02	1.87	7.12	--	3.00	5.98	4.30	--	(a)	.19	865	1.18	35,100	55	4.1	1,310	8.1
May	20	512	--	4.13	1.97	7.42	--	c3.21	6.19	4.20	--	(a)	.16	878	1.19	609	55	4.2	1,340	8.2
June.....	25	81,280	--	3.15	1.28	4.56	--	d2.62	3.96	2.51	--	(a)	.15	591	.80	65,020	51	3.1	900	8.2
July	20	104,300	12	2.30	.87	2.45	.13	c2.20	2.37	1.18	.03	(a)	.10	360	.49	51,110	43	1.9	573	8.1
August.....	20	99,640	--	2.79	.91	2.20	--	2.55	2.58	.90	--	.01	.08	379	.52	51,810	37	1.6	583	7.7
September..	25	44,940	--	3.37	1.07	2.91	--	2.31	4.22	.95	--	.02	.10	494	.67	30,110	40	2.0	724	7.9
Total or weighted average..	--	384,400	--	3.02	1.14	3.63	--	2.48	3.56	1.85	--	--	0.12	509	0.69	265,200	45	2.4	779	--

a Less than 0.01 equivalent per million.
b Includes 0.10 equivalent per million of carbonate (CO_3).
c Includes 0.16 equivalent per million of carbonate (CO_3).
d Includes 0.12 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE NEAR EL PASO, TEX.

LOCATION.--At gaging station 5 miles northwest of El Paso, Tex., 6 miles northwest of Juarez, Chihuahua, and 1.9 river miles above the American Dam.
DRAINAGE AREA.--29,267 square miles (from International Boundary and Water Commission Water Bulletin Number 20).
RECORDS AVAILABLE.--Chemical analyses, 1933 to 1957.
REMARKS.--Chemical analyses by the U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1956 to September 1957 given in International Boundary and Water Commission Water Bulletin Numbers 26 and 27. Records for previous years are given in earlier Bulletins.

Chemical analyses, water year October 1956 to September 1957

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1956	31	151	--	8.25	3.02	37.44	--	4.30	23.01	21.70	--	0.01	0.89	3,200	4.35	657	77	16	4,580	8.0
November..	28	229	--	8.40	3.09	37.30	--	a 4.50	22.95	21.65	--	(e)	.44	3,160	4.30	985	76	16	4,610	8.2
December..	18	206	--	8.42	3.29	34.22	--	b 4.95	20.82	20.45	--	(e)	.79	2,980	4.06	836	75	14	4,400	8.5
January 1957	24	220	34	7.93	3.01	35.92	0.33	c 5.20	21.98	20.00	0.09	(e)	.82	3,040	4.13	909	76	15	4,420	8.2
February...	28	136	--	9.53	2.97	40.60	--	4.15	26.21	22.95	--	(e)	1.02	3,450	4.69	638	76	16	4,970	8.0
March.....	30	1,790	--	6.69	2.36	16.13	--	3.31	11.80	10.55	--	.02	.33	1,660	2.26	4,050	64	7.6	2,460	7.9
April.....	30	6,820	--	5.26	2.11	10.29	--	d 3.53	7.93	6.40	--	.01	.25	1,150	1.56	10,640	58	5.4	1,740	8.1
May.....	31	542	--	6.75	2.48	23.06	--	3.75	15.11	13.80	--	.01	.57	2,100	2.86	1,550	71	11	3,150	8.0
June.....	30	14,500	--	3.94	1.48	6.13	--	3.15	5.08	3.55	--	(e)	.21	759	1.03	14,940	53	3.7	1,160	7.8
July.....	31	37,000	13	3.13	1.11	3.11	.17	2.97	2.95	1.60	.03	(e)	.15	447	.61	22,570	41	2.1	733	7.9
August.....	31	47,500	--	3.18	.86	2.60	--	2.87	2.66	1.25	--	(e)	.12	428	.58	27,550	39	1.8	661	8.2
September..	30	27,700	--	3.68	1.20	3.62	--	2.65	3.92	1.85	--	.02	.11	523	.71	19,670	43	2.3	839	8.0
Total or weighted average.		136,800	--	3.55	1.52	4.20	--	2.94	3.82	2.28	--	--	0.16	559	0.76	104,000	43	2.7	884	--

a Includes 0.22 equivalent per million of carbonate (CO_3).
b Includes 0.60 equivalent per million of carbonate (CO_3).
c Includes 0.20 equivalent per million of carbonate (CO_3).
d Includes 0.10 equivalent per million of carbonate (CO_3).
e Less than 0.01 equivalent per million.

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RIO GRANDE BASIN--Continued

RIO GRANDE BELOW OLD FORT QUITMAN, TEX.

LOCATION.--At gaging station at the rectified channel of the Rio Grande, 1.5 miles below Old Fort Quitman, and 81.1 river miles below the American Dam at El Paso, Tex.

DRAINAGE AREA.--31,990 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20).

RECORDS AVAILABLE.--Chemical analyses 1933 to 1957.

REMARKS.--Chemical analyses by the U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1956 to September 1957 given in International Boundary and Water Commission Water Bulletin Numbers 26 and 27. Records for previous years are given in earlier Bulletins. No flow on many days during November 1956 to April 1957 and June 1957.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Number of Samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1956		a 58.0																		
May 1957...	2	738		2.95	0.40	2.09		2.65	2.14	0.65		0.04	0.13	358	0.49	362	38	1.6	542	8.0
July.....		a 532																		
August		a1,530																		
September..		a 893																		

a No samples collected.

RIO GRANDE BASIN--Continued

RIO GRANDE AT UPPER PRESIDIO, TEX.

LOCATION.--At gaging station 7.8 river miles above the junction of the Rio Conchos, and about 10 miles northwest of the towns of Presidio, Tex., and Ojinaga, Chihuahua, and 285.7 river miles below the American Dam at El Paso, Tex.

DRAINAGE AREA.--35,000 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20).

RECORDS AVAILABLE.--Chemical analyses 1935 to 1957.

REMARKS.--Chemical analyses by the U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1956 to September 1957 given in International Boundary and Water Commission Water Bulletin Numbers 26 and 27. Records for previous years are given in earlier Bulletins. No flow on many days during November 1956 to March 1957.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Number of Samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1956	--	a 115				--		--		--				--	--	--	--	--	--	
April 1957	--	a 186				--		--		--				--	--	--	--	--	--	
May	2	1,120		2.71		1.08		2.76		0.40				250	0.34	381	28	0.9	377	
June	6	1,580		5.76		1.99		2.31		.65				544	.74	1,170	26	1.2	751	
July	--	a 108				--		--		--				--	--	--	--	--	--	
August	--	a 29.4				--		--		--				--	--	--	--	--	--	
September	4	692		3.25		1.78		2.87		.60				302	.41	284	35	1.4	488	

a No samples collected.

RIO GRANDE BASIN--Continued

RIO GRANDE AT LANGTRY, TEX.

LOCATION.--At gaging station at Langtry, Tex., 24.1 river miles above the confluence with the Pecos River, and 614.1 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--79,375 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20).
RECORDS AVAILABLE.--Chemical analyses 1944 to 1957.
REMARKS.--Chemical analyses by the U. S. Department of Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1956 to September 1957 are given in International Boundary and Water Commission Water Bulletin Numbers 26 and 27.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1956	10	94,800	--	2.98	0.78	1.88	--	2.60	2.36	0.75	--	0.03	0.09	386	0.52	49,300	33	1.4	561	7.9
November...	4	35,300	--	4.59	1.70	4.98	--	a3.20	6.23	1.95	--	.04	.26	750	1.02	36,010	44	2.8	1,080	8.2
December...	4	35,800	--	4.37	1.80	4.96	--	3.20	5.91	2.05	--	.04	.26	743	1.01	36,160	45	2.8	1,070	8.0
January 1957	5	37,400	26	4.52	2.01	5.05	0.14	3.15	6.30	2.10	0.08	.04	.06	762	1.04	38,900	43	2.8	1,100	8.0
February...	8	50,600	--	4.33	1.28	4.37	--	2.93	5.56	1.65	--	.04	.17	675	.92	46,550	44	2.6	975	8.0
March	5	33,400	--	4.13	1.57	4.18	--	3.03	5.11	1.75	--	.04	.22	660	.90	30,060	42	2.5	954	8.0
April	8	89,000	--	2.63	.72	1.06	--	b2.50	1.25	.50	--	.04	.06	265	.36	32,040	24	.8	420	8.2
May	8	192,000	--	3.21	.51	1.32	--	2.76	1.82	.55	--	.03	.10	331	.45	86,400	26	1.0	506	7.9
June	4	68,200	--	4.12	1.09	2.60	--	c2.87	3.95	1.15	--	.02	.08	516	.70	47,740	33	1.6	759	8.0
July	4	34,800	13	3.70	1.39	2.50	.13	3.13	3.46	1.15	.05	.02	.11	455	.62	21,580	32	1.6	733	8.0
August	5	56,700	--	6.86	1.36	3.53	--	3.15	7.72	1.35	--	.03	.18	802	1.09	61,800	30	1.7	1,100	8.2
September ..	6	49,100	--	4.12	1.16	2.92	--	2.90	4.14	1.20	--	.04	.14	505	.69	33,880	36	1.8	788	8.0
Total or weighted average..	--	777,100	--	3.83	1.04	2.62	--	2.86	3.65	1.08	--	0.03	0.12	493	0.67	520,700	33	1.6	728	--

a Includes 0.16 equivalent per million of carbonate (CO_3).
b Includes 0.24 equivalent per million of carbonate (CO_3).
c Includes 0.10 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE AT LAREDO, TEX.

LOCATION (revised).--At gaging station 1.5 miles below the railroad bridge between Laredo, Tex., and Nuevo Laredo, Tamaulipas, Mexico, which is 884.3 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--135,976 square miles in United States and Mexico. (From International Boundary and Water Commission Bulletin No. 24).
RECORDS AVAILABLE.--Chemical analyses July 1955 to September 1957.
REMARKS.--Chemical analyses are by the U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1956 to September 1957 are given in International Boundary and Water Commission Water Bulletin Numbers 26 and 27. Records for previous years are given in earlier bulletins.

Chemical analyses, water year October 1956 to September 1957

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
October 1956	28	165,400	--	4.07		1.84	--	2.60	--	1.45	--	--	--	390	0.53	87,660	31	1.3	593	--
November..	28	64,760	--	5.98		4.68	--	2.85	--	3.45	--	--	--	693	.94	60,870	44	2.7	1,070	--
December..	30	64,390	--	6.09		4.92	--	a2.97	--	3.45	--	--	--	710	.97	62,460	45	2.8	1,100	--
January 1957	20	61,190	22	4.28	2.09	5.44	0.12	b3.00	4.99	3.90	0.05	0.05	0.21	766	1.04	63,640	46	3.0	1,180	8.1
February...	20	70,870	--	6.40		5.61	--	2.90	--	3.65	--	--	--	768	1.04	73,700	47	3.1	1,190	--
March	18	69,180	--	6.42		6.32	--	2.77	--	5.10	--	--	--	835	1.14	78,870	50	3.5	1,300	--
April	25	464,000	--	3.19		1.50	--	2.21	--	1.25	--	--	--	294	.40	185,600	32	1.2	476	--
May	30	1,351,000	--	3.25		1.22	--	2.30	--	1.05	--	--	--	281	.38	513,400	27	1.0	450	--
June	16	366,700	--	4.24		2.86	--	2.47	--	2.25	--	--	--	454	.62	227,400	40	2.0	718	--
July	10	70,550	10	3.76	1.74	4.14	.11	2.51	3.79	3.45	.03	.04	.10	604	.82	57,850	42	2.5	977	7.9
August.....	15	95,140	--	5.23		4.57	--	c2.50	--	2.80	--	--	--	578	.79	75,160	47	2.8	899	--
September..	15	169,200	--	3.88		2.27	--	2.31	--	1.72	--	--	--	364	.50	84,600	37	1.6	621	--
Total or weighted average .	--	3,012,000	--	3.89		2.19	--	2.40	--	1.71	--	--	--	384	0.52	1,566,000	33	1.5	609	--

a Includes 0.28 equivalent per million of carbonate (CO_3).
b Includes 0.24 equivalent per million of carbonate (CO_3).
c Includes 0.20 equivalent per million of carbonate (CO_3).

RIO GRANDE AT FALCON DAM - U. S. TAILRACE
(Formerly published as Rio Grande at Chapeno, Tex.)

LOCATION.--U. S. Tailrace at Falcon Dam.
DRAINAGE AREA.--164,482 square miles (above Falcon Dam, from International Boundary and Water Commission Water Bulletin Number 26).
RECORDS AVAILABLE.--Chemical analyses July 1955 to September 1957.
REMARKS.--Chemical analyses are by the U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for gaging station at Chapeno, Tex., electrical conductivity of individual water samples, and these same chemical analyses for water year October 1956 to September 1957 are available in International Boundary and Water Commission Bulletin Numbers 26 and 27. Records for previous years are given in earlier Bulletins.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Number of Samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1956	5	27,100	--	3.61	1.46	4.52	--	a 2.21	4.06	3.40	--	0.01	0.30	612	0.83	22,490	47	2.8	966	8.0
November ..	5	30,100	--	3.46	1.26	3.92	--	2.25	3.60	2.90	--	.04	.20	547	.74	22,270	45	2.6	873	8.0
December ..	11	188,000	--	3.62	1.39	3.78	--	2.45	3.46	2.85	--	.02	.15	559	.76	142,900	43	2.4	888	7.9
January 1957	10	163,000	11	3.71	1.51	4.10	0.14	2.60	3.77	3.00	0.04	.03	.14	600	.82	133,700	43	2.5	936	8.0
February...	6	42,600	--	4.23	1.77	5.00	--	a 2.87	4.52	3.70	--	.02	.21	708	.96	40,900	45	2.9	1,100	8.0
March.....	1	2,640	--	4.23	1.95	5.54	--	b 2.71	4.94	4.20	--	.01	.26	771	1.05	2,772	47	3.1	1,180	8.2
April	6	24,600	--	4.26	2.06	6.00	--	2.61	5.13	4.60	--	(c)	.22	786	1.07	26,320	49	3.4	1,220	8.0
May	10	217,000	--	2.71	.88	2.26	--	2.10	1.92	1.85	--	.01	.13	368	.50	108,500	39	1.7	595	7.9
June	8	165,000	--	2.53	.77	1.70	--	2.00	1.44	1.50	--	.02	.05	311	.42	69,300	34	1.3	506	7.9
July	14	111,000	4	2.65	.77	1.74	.10	2.25	1.51	1.45	.02	.01	.07	311	.42	46,620	33	1.3	521	7.8
August	12	206,000	--	2.72	.78	1.84	--	2.33	1.49	1.55	--	(c)	.10	344	.47	96,820	34	1.4	551	8.0
September ..	10	151,000	--	2.77	.78	1.99	--	2.35	1.58	1.65	--	.01	.11	336	.46	68,460	36	1.5	567	8.1
Total or weighted average..	--	1,328,000	--	3.06	1.28	2.69	--	2.32	2.40	2.16	--	0.02	0.12	433	0.59	783,500	39	1.9	694	--

a Includes 0.10 equivalent per million of carbonate (CO_3).
b Includes 0.20 equivalent per million of carbonate (CO_3).
c Less than 0.01 equivalent per million.

RIO GRANDE BASIN--Continued

PECOS RIVER BELOW ALAMOGORDO DAM, N. MEX.

LOCATION.--At gaging station, 1.200 feet downstream from Alamogordo Dam, 1½ miles downstream from Alamogordo Creek, and 4½ miles northeast of Guadalupe, De Baca County.
DRAINAGE AREA.--4,390 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: June 1937 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 3,070 micromhos Nov. 5; minimum daily, 549 micromhos Aug. 10.
Percent sodium: Maximum, 13 Dec. 1-31; minimum, 8 Sept. 1-24.
EXTREMES, 1937-57.--Specific conductance: Maximum daily, 3,200 micromhos Jan. 14, 1948; minimum daily, 513 micromhos July 22, 1937.
Percent sodium: Maximum, 19 July 1, 3-10, 1947; minimum, 1 Feb. 21-28, 1950.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956 ..	3,450	19	30.29	6.00	4.78		2.11	35.39	4.26		0.01		2,720	3.70	12,760	12	1.1	2,990	7.6
Nov. 1-4	48	19	28.54	6.25	4.65		2.49	33.10	4.06		.01		2,580	3.51	168	12	1.1	2,880	7.6
Nov. 5-7	3,440	21	29.89	6.41	5.00		2.62	34.77	4.43		.03		2,720	3.70	12,730	12	1.2	3,010	7.9
Nov. 8-12.....	748	18	28.94	6.25	4.61		2.59	33.52	4.09		.02		2,610	3.55	2,660	12	1.1	2,910	7.7
Nov. 13-14[a].....	75	17	28.94	6.99	4.78		2.54	33.94	4.23		.01		2,650	3.60	270	12	1.1	2,940	7.4
Nov. 16, 21-30[a]..	7.3	17	25.95	6.83	4.57		2.52	31.02	3.86		.05		2,430	3.30	24	12	1.1	2,760	7.6
Dec. 1-31.....	88	12	24.95	6.41	4.52		2.59	29.77	3.81		.06		2,340	3.18	280	13	1.1	2,690	7.2
Jan. 1-16, 18-31, 1957[a].....	2,230	18	27.94	7.24	4.44		2.16	32.69	4.15		.03		2,550	3.47	7,740	11	1.1	2,860	7.7
Feb. 1-28.....	28	17	24.75	7.24	4.35		2.44	29.56	3.81		.05		2,330	2.17	89	12	1.1	2,690	7.6
Mar. 1-31	15,540	21	29.74	6.00	4.74		2.52	33.94	4.29		.01		2,660	3.62	56,250	12	1.1	2,940	7.7
Apr. 1-30.....	2,710	19	29.34	6.83	4.83		2.25	33.94	4.43		.01		2,660	3,62	9,810	12	1.1	2,970	7.7
May 1-31	4,120	20	27.74	4.85	4.44		2.00	31.23	3.78		.01		2,430	3.30	13,600	12	1.1	2,710	7.7
June 1-30.....	5,010	17	19.61	3.54	3.09		2.08	21.65	2.54		.02		1,720	2.34	11,720	12	.9	2,040	7.7
July 1-26	18,790	19	19.01	3.54	3.04		1.95	21.24	2.54		.02		1,680	2.28	42,840	12	.9	2,000	7.7
July 27-Aug. 8 ...	23,100	14	7.63	1.64	1.17		2.07	7.52	.79		.04		667	.91	21,020	11	.5	932	7.3
Aug. 9-31.....	17,080	14	6.64	.82	.87		1.79	6.16	.45		.03		545	.74	12,640	10	.4	801	7.5

Sept. 1-24, 1957..	19,460	8.7	7.98	.90	.78		1.75	7.50	.42		.02		627	.85	16,540	8	.4	857	7.3
Sept. 25-30.....	652	9.7	13.37	1.56	1.83		2.25	13.39	1.35		.02		1,100	1.50	978	11	.7	1,390	7.4
Total or weighted average.....	116,600	16	15.97	3.04	2.44		2.05	17.47	2.00		0.02		1,400	1.90	221,500	11	0.8	1,680	--

a No flow Nov. 15, 17-20, Jan. 17.

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR ARTESIA, N. MEX.

LOCATION.--At gaging station at bridge on State Highway 83, 4.3 miles east of Artesia, Eddy County, 7.0 miles north of mouth of Rio Penasco, and 17 miles north of McMillan Dam.
DRAINAGE AREA.--15,300 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1957.
Water temperatures: April 1949 to September 1957.
Sediment records: January 1949 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 19,700 micromhos July 11; minimum daily, 792 micromhos July 26.
Percent sodium: Maximum, 66 July 11; minimum, 15 Aug. 13-17.
EXTREMES, 1937-57.--Specific conductance: Maximum daily, 20,700 micromhos Sept. 10, 1955; minimum daily, 745 micromhos Oct. 8, 1954.
Percent sodium: Maximum, 71 May 16, 1950; minimum, 12 Mar. 25-31, 1951.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1512.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-4, 1956...	110	23	36.13	26.32	92.22		2.38	55.80	93.91		--		9,270	12.6	1,390	60	17	12,700	7.5
Oct. 5-18	356	20	32.58	24.34	70.90		2.34	51.63	71.91		--		7,700	10.5	3,740	55	13	10,600	7.4
Oct. 19-21	143	20	29.64	23.03	80.48		2.43	46.22	82.63		--		7,970	10.8	1,540	60	16	11,300	7.6
Oct. 22-31	518	19	29.34	21.14	58.72		2.46	44.76	60.07		--		6,570	8.94	4,630	54	12	9,150	7.5
Nov. 1-8	488	17	28.74	21.30	54.38		2.75	43.93	56.96		0.06		6,320	8.60	4,200	52	11	8,820	7.7
Nov. 9-15	1,850	21	27.94	11.92	16.31		2.47	37.48	15.09		.04		3,510	4.77	8,820	29	3.7	4,290	8.0
Nov. 16-24	1,250	20	29.14	14.06	27.49		2.80	39.35	27.50		.04		4,360	5.93	7,410	39	5.9	5,700	7.6
Nov. 25-30	635	20	28.94	17.60	39.67		2.87	41.22	40.61		.06		5,240	7.13	4,530	46	8.2	7,080	7.8
Dec. 1-31	3,610	17	28.14	18.75	46.54		2.49	40.18	50.20		.06		5,670	7.71	27,830	50	9.6	7,920	7.9
Jan. 1-31, 1957..	3,850	17	27.74	19.16	49.59		2.70	40.39	53.30		.05		5,860	7.97	30,680	51	10	8,260	7.9
Feb. 1-28	2,940	18	29.14	20.15	54.38		2.59	43.10	57.53		--		6,280	8.54	25,110	52	11	8,820	7.6
Mar. 1-16	1,320	23	30.69	20.56	59.16		2.52	46.43	62.04		--		6,750	9.18	12,120	54	12	9,410	7.8
Mar. 17.....	875	26	28.89	13.65	25.53		3.36	42.89	22.98		.02		4,360	5.93	5,190	37	5.5	5,500	7.4
Mar. 18-23.....	7,410	29	29.54	7.81	9.79		2.44	36.44	8.74		.05		3,070	4.18	30,970	21	2.3	3,590	7.7
Mar. 24-25.....	646	19	29.34	8.96	15.49		2.25	36.85	14.95		.05		3,440	4.68	3,020	29	3.5	4,250	8.2
Mar. 26-31.....	738	17	30.49	12.50	26.19		2.43	40.81	25.94		.05		4,340	5.90	4,350	38	5.6	5,600	7.8

Apr. 1-5, 1957 ..	393	18	32.09	17.02	40.19		2.26	46.22	41.45		.06		5,550	7.55	2,970	45	8.1	7,360	7.5
Apr. 6-30	1,550	18	33.28	21.71	60.90		2.56	50.18	63.73		--		7,100	9.66	14,970	53	12	9,790	7.5
May 1-15.....	1,160	13	31.79	22.45	65.25		2.61	49.55	68.81		--		7,320	9.96	11,550	55	13	10,200	7.4
May 16-19	288	12	29.34	14.64	43.24		1.95	41.22	44.56		.05		5,390	7.33	2,110	50	9.2	7,470	7.1
May 20-27.....	196	14	32.48	22.45	61.77		1.87	49.34	65.99		--		7,120	9.68	1,900	53	12	9,880	7.2
May 28	841	26	29.54	10.53	25.66		3.34	38.52	24.25		.01		4,150	5.64	4,740	39	5.7	5,400	7.4
May 29-30	954	14	24.75	6.66	11.92		2.28	30.61	10.66		.05		2,780	3.78	3,610	28	3.0	3,480	7.6
May 31.....	3,230	20	7.63	1.73	5.96		a3.95	5.85	5.75		.02		936	1.27	4,100	39	2.7	1,480	8.3
June 1-2.....	2,720	--	11.08	3.29	6.13		3.49	--	5.36		--		b1,340	1.82	4,950	30	2.3	1,830	7.8
June 3-7	2,090	21	15.47	4.11	7.57		2.21	18.43	6.54		.07		1,740	2.37	4,950	28	2.4	2,320	7.8
June 8-10	305	25	11.08	12.91	15.27		2.20	21.44	14.80		.11		2,380	3.24	988	29	4.4	3,440	7.9
June 11-15	192	28	22.41	9.38	25.66		2.07	27.90	27.50		.06		3,560	4.84	929	45	6.4	5,180	7.6
June 16-22	80	26	27.94	13.49	42.63		2.41	38.10	42.58		.05		5,150	7.00	560	51	9.4	7,120	7.5
June 23-July 3 c .	45	28	35.68	18.34	62.20		2.13	50.38	63.17		--		7,120	9.68	436	54	12	9,720	7.5
July 11.....	450	--	47.55	31.42	153.99		2.92	--	166.38		--		b14,800	20.1	9,040	66	24	19,700	7.5
July 12-22	6,580	24	24.55	5.84	7.83		2.10	29.15	7.28		.05		2,490	3.39	22,310	20	2.0	3,000	7.5
July 23-25.....	1,820	21	18.61	4.28	7.22		2.10	21.44	6.49		.06		1,940	2.64	4,800	24	2.1	2,480	7.4
July 26-27	1,120	--	5.64	.99	2.18		2.74	--	2.17		--		b572	.78	874	25	1.2	860	8.2
July 28-30.....	224	15	7.63	2.30	5.79		1.75	8.37	5.81		.08		995	1.35	302	37	2.6	1,520	7.7
July 31	430	--	25.75	11.51	28.88		2.18	--	30.46		--		b4,470	6.08	2,610	44	6.7	5,540	7.7
Aug. 1-2	5,220	--	18.21	3.70	5.31		2.80	--	4.23		--		b1,870	2.54	13,260	20	1.6	2,200	7.5
Aug. 3-11	10,350	23	13.67	2.47	3.35		2.38	14.20	2.76		.05		1,260	1.71	17,700	17	1.2	1,660	7.4
Aug. 12	988	--	13.27	2.96	5.61		2.46	--	5.13		--		b1,460	1.99	1,970	26	2.0	1,900	7.5
Aug. 13-17	8,300	20	10.58	1.64	2.13		2.33	10.60	1.47		.03		934	1.27	10,540	15	.9	1,250	7.6
Aug. 18-23	2,230	15	13.17	2.63	5.48		2.21	13.80	5.30		.06		1,360	1.85	4,130	26	1.9	1,880	7.5
Aug. 24-31	440	21	22.60	8.22	25.66		1.84	28.73	25.52		.03		3,510	4.77	2,100	45	6.5	4,880	7.5
Sept. 1-15.....	181	19	28.74	13.90	41.11		1.90	38.73	42.58		.03		5,140	6.99	1,270	49	8.9	7,090	7.4
Sept. 16-20	93	21	39.42	20.23	91.35		1.79	53.09	98.14		--		9,240	12.6	1,170	60	17	13,100	7.4
Sept. 21.....	1,240	--	15.87	4.11	7.40		2.36	--	6.26		--		b1,840	2.50	3,100	27	2.3	2,340	7.5
Sept. 22-30	8,040	17	13.27	2.30	4.05		2.05	14.10	3.67		.03		1,270	1.73	13,910	21	1.5	1,700	7.5
Total or weighted average	88,510	20	20.21	7.73	17.44		2.49	25.19	17.60		--		2,840	3.86	341,600	38	4.7	3,790	--

a Includes 0.13 equivalent per million of carbonate (CO_3). b Residue on evaporation at 180°C. c No flow July 4-10.

RIO GRANDE BASIN--Continued

PECOS RIVER BELOW RED BLUFF DAM NEAR ORLA, TEX.

LOCATION.--Just below dam, 3 miles upstream from Salt (Screwbean) Draw, 5 miles northwest of Orla, Reeves County, and 14 miles upstream from gaging station near Orla.
DRAINAGE AREA.--20,720 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1957.
Water temperatures: March 1953 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 22,600 micromhos July 26; minimum daily, 4,870 micromhos Aug. 19.
Percent sodium: Maximum, 74 Aug. 1-13; minimum, 56 Sept. 12-23.
EXTREMES, 1937-57.--Specific conductance: Maximum daily, 24,200 micromhos Sept. 28, 30, 1953; minimum daily, 1,610 micromhos June 2, 1948.
Percent sodium: Maximum, 78 Oct. 4-8, 1954; minimum, 9 Aug. 17-19, 1944.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Orla for water year October 1956 to September 1957 given in WSP 1512. Mean discharge values reported below have been adjusted to reflect inflow from Salt (Screwbean) Draw which enters Pecos River between sampling point and gaging station.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956	1,540	14	33.98	18.67	107.03		1.69	49.14	108.85		--		9,650	13.1	20,170	67	21	13,700	7.7
Nov. 1-30	1,260	--	52.60		87.44		1.77	49.14	91.37		--		--	--	--	62	17	12,200	7.2
Dec. 1-31	1,370	14	33.58	20.15	107.93		2.11	48.72	110.83		--		9,740	13.2	18,080	67	21	14,100	7.6
Jan. 1-31, 1957	2,930	6.2	34.28	19.24	94.82		2.05	48.72	97.57		--		8,970	12.2	35,750	64	18	12,900	7.8
Feb. 1-28	14,700	5.0	32.39	18.01	90.68		2.08	46.22	92.78		--		8,540	11.6	170,500	64	18	12,200	7.6
Mar. 1-31	507	5.4	31.79	19.00	84.69		2.38	44.55	88.55		--		8,170	11.1	5,630	63	17	11,900	7.7
Apr. 1-30	474	8.2	34.38	20.48	101.16		2.16	47.26	106.60		--		9,390	12.8	6,070	65	13	13,900	7.5
May 1-31	2,400	3.8	35.13	25.08	129.79		1.97	52.67	135.36		--		11,400	15.5	37,200	68	24	16,300	7.8
June 1-30	1,210	9.6	30.79	19.24	106.82		1.62	44.97	110.26		--		9,440	12.8	15.490	68	21	13,800	7.8
July 1-31	1,040	8.8	30.79	20.48	125.19		1.31	46.84	128.31		--		10,600	14.4	14,980	71	25	15,500	7.2
Aug. 1-13	303	15	32.48	23.27	158.49		1.43	50.38	162.43		--		12,800	17.4	5,270	74	30	18,200	7.6
Aug. 14-18, 20-22	1,710	12	33.38	17.35	109.09		1.31	47.68	110.83		--		9,660	13.1	22,400	68	22	13,900	7.5
Aug. 19	25.8	--	--	--	--		--	--	--		--		--	--	--	--	--	4,870	7.5
Aug. 23-31	5,070	14	29.84	13.24	81.77		1.36	41.43	82.06		--		7,590	10.3	52,220	65	18	11,100	7.5
Sept. 1-11, 24-30	6,230	11	23.95	9.05	52.65		1.41	30.61	53.58		0.05		5,230	7.11	44,300	61	13	7,790	7.7
Sept. 12-23	3,110	6.4	22.06	6.66	36.35		1.11	27.27	36.66		.03		4,010	5.45	16,950	56	9.6	5,920	7.6
Total or weighted average	43,900	8.5	30.44	16.12	86.56		1.75	42.89	88.27		--		8,050	10.9	478,500	65	18	11,600	--

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR SHUMLA, TEX.

LOCATION.--At gaging station located 13.0 river miles upstream from the Pecos High Bridge, and 18.5 river miles above the confluence with the Rio Grande, which confluence is 638.2 river miles below the American Dam at El Paso, Tex.

DRAINAGE AREA.--35,162 square miles (from International Boundary and Water Commission Water Bulletin No. 24).

RECORDS AVAILABLE.--Chemical analyses, Jan. 1955 to September 1957. Chemical analyses for the period July 1954 through December 1954 are available for a station near the mouth and for the period February 1935 through June 1954 for a station 4.7 river miles upstream at the Pecos High Bridge.

REMARKS.--Chemical analyses are by the U. S. Department of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity for individual water samples, and these same chemical analyses for water year October 1956 to September 1957 are available in International Boundary and Water Commission Bulletin Numbers 26 and 27. Records of previous years are given in earlier Bulletins for a station near the mouth and for a station 4.7 river miles upstream at the Pecos High Bridge.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Number of Samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1956	7	21,800	--	4.52	2.80	8.21	--	2.50	4.26	8.65	--	0.04	0.07	997	1.36	29,650	53	4.3	1,580	7.8
November...	4	9,100	--	6.48	4.56	13.62	--	2.70	7.03	14.95	--	.04	.20	1,540	2.10	19,110	55	5.8	2,500	7.9
December ..	4	9,100	--	6.58	4.83	13.62	--	2.80	7.05	15.35	--	.02	.06	1,550	2.11	19,200	54	5.7	2,540	7.9
January 1957	5	8,890	8	7.79	5.80	18.15	0.16	2.70	9.17	20.20	0.04	.04	.19	2,040	2.77	24,630	57	7.0	3,180	7.8
February...	5	9,880	--	8.17	6.59	22.40	--	2.56	10.79	24.20	--	.03	.25	2,380	3.24	32,010	60	8.2	3,710	7.8
March	5	10,100	--	10.71	8.79	30.68	--	2.45	14.93	33.25	--	.02	.32	3,210	4.36	44,040	61	9.8	4,890	7.9
April	10	39,900	--	4.99	2.55	8.38	--	a 2.53	4.70	8.70	--	.03	.11	1,010	1.37	54,680	53	4.3	1,630	8.1
May	12	173,000	--	4.18	1.65	5.29	--	2.30	3.33	5.60	--	.01	.08	733	1.00	173,000	48	3.1	1,160	8.0
June	4	41,300	--	5.21	3.43	10.69	--	2.45	5.83	11.30	--	.03	.23	1,230	1.68	69,380	55	5.2	2,000	7.9
July	5	16,900	8	5.37	4.00	11.99	.18	2.55	6.27	12.65	.04	.04	.16	1,330	1.81	30,590	56	5.5	2,160	8.0
August	4	13,000	--	5.53	4.06	12.19	--	2.55	6.29	13.30	--	.03	.18	1,380	1.88	24,440	56	5.6	2,240	8.0
September..	4	16,000	--	5.28	3.66	10.74	--	2.60	5.54	11.78	--	.03	.25	1,210	1.65	26,400	55	5.1	2,040	8.0
Total or weighted average..	--	369,000	--	5.04	2.87	9.06	--	2.43	4.99	9.70	--	0.02	0.12	1,090	1.48	546,100	52	4.4	1,756	--

a Includes 0.16 equivalent per million of carbonate (CO_3).

PART 9. COLORADO RIVER BASIN

COLORADO RIVER MAIN STEM

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLO.

LOCATION.--At Shoshone power plant, 6 miles upstream from gaging station at Glenwood Springs, Garfield County, which is half a mile upstream from Roaring Fork.
DRAINAGE AREA.--4,560 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1941 to September 1957.
Water temperatures: May 1949 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,370 micromhos Dec. 11; minimum daily, 200 micromhos June 10.
Percent sodium: Maximum, 49 Jan. 11-12, 17-20; minimum, 16 June 1-10, 21-30.
EXTREMES, 1941-57.--Specific conductance: Maximum daily, 2,260 micromhos Aug. 10, 1947; minimum daily, 153 micromhos May 24, 1948.
Percent sodium: Maximum, 53 Dec. 11-20, 1954; minimum, 11 May 21-31, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for gaging station at Glenwood Springs for water year October 1956 to September 1956 given in WSP 1513. No appreciable inflow between Shoshone power plant and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	24,560	11	2.72	0.80	2.70	0.06	1.93	1.81	2.45	0.03	0.01	--	369	0.50	12,280	43	2.0	650	7.7
Oct. 11-20	21,840	12	2.88	.88	2.87	.06	2.02	1.98	2.59	.02	.01	0.37	392	.53	11,580	43	2.1	688	7.6
Oct. 21-31	19,860	12	3.36	1.20	3.22	.06	2.25	2.50	2.96	.02	.01	--	460	.63	12,510	41	2.1	794	7.8
Nov. 1-2, 4-10	16,210	12	4.04	1.40	3.70	.06	2.57	3.00	3.44	.02	.02	--	544	.74	12,000	40	2.3	922	7.7
Nov. 3	2,980	10	2.56	.84	1.27		1.87	1.62	1.16	--	.02	--	a276	.38	1,130	27	1.0	493	7.3
Nov. 11-20	16,230	14	3.68	1.40	3.31	.06	2.56	2.83	3.05	.02	.02	.20	508	.69	11,200	39	2.1	847	8.1
Nov. 21-30	14,170	14	4.20	1.40	4.09	.06	2.70	3.12	4.00	.02	.02	--	596	.81	11,480	42	2.4	1,010	8.0
Dec. 1-5, 9-11	9,950	14	4.24	1.36	4.74	.07	2.72	3.14	4.46	.01	.03	.02	629	.86	8,560	46	2.8	1,050	7.6
Dec. 6-8	5,160	12	3.20	1.04	2.61	.05	2.23	2.21	2.40	.01	.01	.03	417	.57	2,940	38	1.8	713	7.7
Dec. 12-20	12,380	13	3.92	1.36	4.35	.07	2.59	2.94	4.00	.01	.02	.03	581	.79	9,780	45	2.7	973	7.8
Dec. 21-31	13,190	14	4.08	1.36	4.70	.07	2.67	3.00	4.29	.01	.03	.04	605	.82	10,820	46	2.9	1,020	8.0
Jan. 1-10, 1957	14,680	14	3.60	1.12	4.05	.07	2.44	2.52	3.67	.01	.02	.04	530	.72	10,570	46	2.6	896	7.9
Jan. 11-12, 17-20	7,390	13	3.84	1.28	5.00	.08	2.56	2.81	4.74	.01	.02	.02	612	.83	6,130	49	3.1	1,050	7.6
Jan. 13-16	7,230	12	3.12	1.12	2.91	.06	2.26	2.12	2.76	.01	.01	.05	434	.59	4,270	40	2.0	733	7.8
Jan. 21-31	16,730	14	3.44	1.08	3.83	.07	2.38	2.46	3.67	.01	.02	--	517	.70	11,710	45	2.6	854	7.6

a Calculated from determined constituents.

Feb. 1-10, 1957.	15,390	14	3.44	1.08	3.74	.07	2.34	2.33	3.58	.01	.02	--	508	.69	10,620	45	2.5	839	7.7
Feb. 11-20	15,200	14	3.44	1.04	3.74	.07	2.33	2.37	3.47	.01	.02	0.02	503	.68	10,340	45	2.5	829	7.3
Feb. 21-28	13,220	13	3.40	1.08	3.48	.07	2.29	2.46	3.10	.02	.02	--	487	.66	8,730	43	2.3	797	7.5
Mar. 1-10	16,520	12	3.44	1.08	3.48	.07	2.28	2.50	3.13	.02	.02	--	494	.67	11,070	43	2.3	798	7.4
Mar. 11-20.....	16,370	12	3.52	1.16	3.48	.07	2.36	2.58	3.19	.02	.02	.03	499	.68	11,130	42	2.3	820	7.3
Mar. 21-31.....	17,820	12	3.48	1.12	3.35	.07	2.38	2.58	3.13	.02	.02	--	499	.68	12,120	42	2.2	807	7.5
Apr. 1-10	17,160	12	3.40	1.24	3.31	.07	2.41	2.73	2.93	.01	.02	--	495	.67	11,500	41	2.2	806	7.6
Apr. 11-20	26,990	13	3.28	1.30	2.57	.07	2.38	2.77	2.17	.01	.02	.05	458	.62	16,730	36	1.7	730	7.2
Apr. 21-30	47,900	12	2.64	.88	1.44	.06	2.10	1.89	1.07	.01	.03	--	320	.44	21,080	29	1.1	503	7.2
May 1-10	117,600	11	2.48	.62	.83	.06	2.18	1.25	.54	.03	.04	--	254	.35	41,160	21	.7	385	7.2
May 11-20.....	124,600	12	2.02	.62	.70	.05	1.87	1.08	.48	.03	.02	.04	224	.30	37,380	21	.6	336	7.1
May 21-31.....	107,900	12	2.10	.72	.87	.04	2.03	1.00	.62	.02	.02	--	231	.31	33,450	23	.7	365	7.1
June 1-10	280,200	11	1.64	.40	.39	.04	1.61	.58	.21	.03	.03	--	160	.22	61,640	16	.4	242	7.1
June 11-20.....	274,900	10	1.50	.45	.42	.03	1.48	.56	.23	.02	.02	.03	154	.21	57,730	18	.4	239	6.9
June 21-30	278,900	8.9	1.56	.39	.37	.03	1.48	.56	.22	.02	.02	--	148	.20	55,780	16	.4	234	6.9
July 1-10.....	265,200	8.4	1.44	.34	.41	.03	1.38	.54	.28	.03	.02	--	140	.19	50,390	18	.4	225	7.1
July 11-20.....	175,800	7.8	1.72	.36	.57	.04	1.46	.81	.45	.02	.02	.04	170	.23	40,430	21	.6	277	7.4
July 21-31.....	129,700	8.7	1.92	.42	.78	.04	1.54	1.02	.68	.03	.02	--	200	.27	35,020	25	.7	326	6.9
Aug. 1-10	76,620	8.5	2.10	.50	1.04	.04	1.59	1.23	.96	.02	.02	--	231	.31	23,750	28	.9	382	6.9
Aug. 11-20	52,780	9.7	2.30	.58	1.44	.05	1.74	1.48	1.21	.01	.01	.04	270	.37	19,530	33	1.2	448	7.1
Aug. 21-31	47,070	11	2.68	.78	1.74	.07	1.98	1.83	1.55	.01	.01	--	328	.45	21,180	33	1.3	543	7.0
Sept. 1-10.....	33,880	12	3.04	.84	2.22	.07	2.15	2.08	1.97	.01	.01	--	375	.51	17,280	36	1.6	621	7.3
Sept. 11-20	27,490	12	3.24	1.00	2.52	.07	2.29	2.17	2.43	.01	.01	.06	419	.57	15,670	37	1.7	691	7.3
Sept. 21-30.....	27,000	11	3.28	.88	2.57	.07	2.26	2.29	2.31	.01	.01	--	416	.57	15,390	38	1.8	692	7.1
Total or weighted average	2,409,000	10	2.10	0.58	1.09	0.05	1.75	1.12	0.90	0.02	0.02	--	237	0.32	770,900	29	0.9	382	--

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR CISCO, UTAH

LOCATION.--At gaging station, 1 mile downstream from Dolores River, 11 miles south of Cisco, Grand County, 97 miles upstream from Green River, and 235 miles upstream from San Juan River.
DRAINAGE AREA.--24,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1957.
Water temperatures: May 1949 to September 1957.
Sediment records: May 1930 to September 1957.
EXTREMES,1956-57.--Specific conductance: Maximum daily, 2,580 micromhos Oct. 31; minimum daily, 311 micromhos June 11, 13.
Percent sodium: Maximum, 48 Mar. 18, 20, 22, 25-27, 29; minimum, 18 June 1-10.
EXTREMES,1941-52 , 1953-57.--Specific conductance: Maximum daily, 4,100 micromhos Sept. 30, 1946; minimum daily, 310 Micromhos June 15, 1952.
Percent sodium: Maximum, 57 Mar. 2, 4, 1955; minimum, 18 June 1-10, 1957.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956 .	36,730	12	9.60	6.10	9.61	0.18	3.46	17.11	4.94		0.24	--	1,620	2.20	80,810	38	3.4	2,230	7.4
Oct. 11-20.....	37,170	12	9.30	6.10	9.79	.17	3.26	16.64	5.13		.26	0.17	1,600	2.18	81,030	39	3.5	2,210	7.8
Oct. 21-31.....	46,850	12	9.90	6.20	10.35	.21	3.57	17.01	5.78		.29	--	1,680	2.28	106,800	39	3.6	2,330	7.6
Nov. 2, 5, 7, 9, 13	30,550	14	8.10	5.20	9.09	.19	3.52	13,18	5.30		.26	.15	1,400	1.90	58,040	40	3.5	2,020	7.6
Nov. 16, 19, 23, 26, 28, 30.....	30,010	14	7.80	4.90	8.66	.16	3.64	12.37	4.94		.26	.15	1,330	1.81	54,320	40	3.4	1,920	7.7
Dec. 3, 5, 7, 9, 12	22,950	16	6.88	4.88	9.22	.18	2.72	12.30	5.78		.32	.14	1,330	1.81	41,540	44	3.8	1,980	7.4
Dec. 17, 19, 26, 28, 31.....	26,880	16	8.00	5.28	10.96	.22	3.41	13.22	7.33		.42	.15	1,520	2.07	55,640	45	4.3	2,240	7.7
Jan. 2, 4, 7, 9, 11, 14, 1957...	31,810	14	7.00	4.60	10.18	.21	3.13	11.26	6.99		.40	.11	1,360	1.85	58,850	46	4.2	2,060	7.5
Jan. 16, 18, 21, 23, 25, 28, 31 .	37,390	14	6.72	4.48	9.35	.18	3.29	10.93	6.20		.29	.11	1,290	1.75	65,430	45	4.0	1,930	7.3
Feb. 4, 6, 8, 11,13	27,830	13	6.56	4.08	9.09	.18	3.39	10.10	6.06		.29	.11	1,230	1.67	46,480	46	3.9	1,860	7.0
Feb. 15,18, 21,26	25,900	11	5.72	3.52	7.83	.16	3.02	9.43	4.29		.23	.09	1,070	1.46	37,810	45	3.7	1,610	7.2
Mar. 1, 4, 6, 8, 11, 13, 15.....	39,490	13	6.00	3.92	9.09	.18	3.25	9.87	5.78		.21	.12	1,190	1.62	63,970	47	4.1	1,790	7.0

Mar. 18, 20, 22, 25-27, 29, 1957	36,360	16	5.44	3.60	8.53	.17	2.85	9.04	5.50		.18	.10	1,100	1.50	54,540	48	4.0	1,640	7.2
Apr. 1, 3, 8, 15	35,090	12	4.96	2.96	7.00	.17	2.79	7.08	4.79		.18	.11	920	1.25	43,860	46	3.5	1,410	7.3
Apr. 18-30	243,600	12	3.44	1.40	2.39	.09	2.56	3.33	1.35		.07	.05	446	.61	148,600	33	1.5	701	7.0
May 1-4	98,480	11	3.38	1.52	2.35	.08	2.49	3.44	1.30		.08	--	445	.61	60,070	32	1.5	695	7.1
May 5-10	334,200	11	2.50	.82	1.00	.07	2.23	1.64	.51		.04	--	422	.36	120,300	23	.8	422	7.0
May 11-20	478,800	15	2.96	.98	1.35	.07	2.56	2.08	.62		.02	.05	320	.44	210,700	25	1.0	515	6.9
May 21-31	463,500	15	2.92	1.14	1.52	.07	2.43	2.39	.68		.06	--	342	.47	217,800	27	1.1	548	7.1
June 1-10	985,400	14	2.42	.66	.70	.05	2.28	1.08	.34		.04	--	223	.30	295,600	18	.6	371	6.9
June 11-20	931,200	12	2.26	.68	.74	.05	2.00	1.27	.39		.03	.04	221	.30	279,400	20	.6	370	7.0
June 21-30	942,100	11	2.14	.56	.70	.05	1.88	1.17	.37		.02	--	206	.28	263,800	20	.6	339	7.0
July 1-10	933,000	10	2.18	.52	.65	.07	1.97	1.08	.34		.02	.05	202	.27	251,900	19	.6	337	7.6
July 11-20	548,800	10	2.78	.74	1.22	.06	2.18	1.96	.62		.05	.07	290	.39	214,000	25	.9	462	7.6
July 21-31	470,500	11	3.44	1.08	1.61	.08	2.51	2.87	.87		.07	.05	382	.52	244,700	26	1.1	597	7.6
Aug. 1-5, 9-10 ..	208,700	12	3.50	1.40	1.87	.07	2.28	3.54	1.04		.08	.07	425	.58	121,000	27	1.2	660	7.6
Aug. 6-8	91,640	13	6.50	1.94	2.70	.13	3.69	6.41	1.21		.06	.10	700	.95	87,060	24	1.3	1,000	7.7
Aug. 11-20	184,700	13	4.12	1.90	2.87	.09	2.36	5.00	1.61		.07	.08	561	.76	140,400	32	1.7	865	7.8
Aug. 21-31	175,700	15	5.84	2.44	4.44	.13	2.87	7.58	2.48		.15	--	816	1.11	195,000	35	2.2	1,210	7.1
Sept. 1-10	166,800	14	5.28	2.40	3.52	.10	2.79	6.87	1.64		.19	--	718	.98	163,500	31	1.8	1,050	7.0
Sept. 11-20	79,060	15	6.08	3.64	6.09	.13	2.87	9.54	3.67		.10	.13	1,010	1.37	108,300	38	2.5	1,480	7.3
Sept. 21-30	67,870	14	6.96	4.40	7.35	.16	3.13	11.53	4.17		.08	--	1,180	1.60	108,600	39	3.1	1,720	7.0
Total or weighted average [a]	7,869,000	12	3.14	1.23	1.83	0.07	2.31	2.87	0.99		0.06	--	382	0.52	4,092,000	29	1.2	595	--
Total or weighted average [b]	8,486,000	12	3.39	1.40	2.31	0.08	2.38	3.39	1.33		0.07	--	440	0.62	5,092,000	32	1.5	679	--

a Represents 93 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

COLORADO RIVER MAIN STEM

COLORADO RIVER AT LEES FERRY, ARIZ.

LOCATION.--At gaging station at head of Marble Gorge at Lees Ferry, Coconio County, just upstream from Paria River, 16 miles downstream from site of 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 1957.
Water temperatures: July 1949 to September 1957.
Sediment records: October 1928 to December 1933, November 1942 to September 1944, October 1947 to September 1957.

EXTREMES, 1956-57.--Specific conductance: Maximum daily 2,050 micromhos Nov. 3; minimum daily, 351 micromhos July 6.
Percent sodium: Maximum, 43 Feb. 18; minimum, 18 July 1-18.

EXTREMES, 1928-30, 1942-45, 1947-57.--Specific conductance: (1942-45, 1947-57) maximum daily, 2,280 micromhos Oct. 15, 1945; minimum daily, 318 micromhos June 9, 1948.
Percent sodium: (1942-44, 1947-57) maximum, 46 Mar. 2, 4, 7, 10, 1944; minimum, 18 July 1-18, 1957.

REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956 ..	186,500	11	7.29	5.51	7.83	0.17	3.28	12.89	4.12	0.03	0.11	0.18	1,280	1.74	324,500	38	3.1	1,830	7.8
Nov. 1-13.....	135,700	11	7.73	4.69	7.70	.17	3.69	12.51	3.84	.03	.14	.20	1,260	1.71	232,000	38	3.1	1,790	7.6
Nov. 14-30.....	164,400	15	6.54	4.28	6.52	.15	3.79	9.93	3.30	.02	.12	.19	1,070	1.46	240,000	37	2.8	1,550	7.7
Dec. 1-31.....	246,900	14	6.74	4.44	7.35	.17	4.00	10.41	3.84	.02	.15	.26	1,140	1.55	382,700	39	3.1	1,670	7.7
Jan. 1-12, 1957 ..	96,670	16	6.69	4.61	7.48	.17	4.16	10.29	4.12	.02	.18	.19	1,160	1.58	152,700	39	3.1	1,710	7.7
Jan. 13-26.....	138,300	15	6.19	3.87	6.79	.16	3.84	9.04	3.84	.02	.16	.17	1,040	1.41	195,000	40	3.0	1,560	7.6
Jan. 27-31.....	49,500	14	5.64	3.62	6.05	.14	3.56	8.64	2.96	.02	.14	.16	952	1.29	63,860	39	2.8	1,410	7.9
Feb. 1-14	123,900	14	5.89	3.95	6.96	.16	3.59	9.02	4.00	.02	.15	.18	1,040	1.41	174,700	41	3.1	1,550	7.9
Feb. 15-17.....	38,550	12	5.89	3.70	6.83	.16	3.65	8.77	3.89	.02	.10	.20	1,010	1.37	52,810	41	3.1	1,530	8.0
Feb. 18.....	13,620	16	6.14	3.95	7.87	.17	3.62	9.10	5.27	--	.11	--	1,110	1.51	20,570	43	3.5	1,700	7.7
Feb. 19-28.....	147,200	12	5.44	3.29	6.00	.16	3.41	8.22	2.93	.02	.15	.15	917	1.25	184,000	40	2.9	1,370	7.8
Mar. 1-31	498,500	20	5.34	2.96	6.00	.15	3.61	7.99	2.74	.03	.13	.18	904	1.23	613,200	42	2.9	1,340	7.9
Apr. 1-20.....	399,900	17	4.89	2.71	5.26	.14	3.44	6.89	2.54	.03	.11	.21	806	1.10	439,900	40	2.7	1,210	7.9
Apr. 21-May 5 ...	616,100	17	4.19	1.81	2.70	.12	3.57	3.81	1.18	.03	.10	.12	529	.72	443,600	31	1.6	816	7.7

May 6-10, 1957...	391,800	16	4.14	1.56	2.00	.12	3.65	3.10	.90	.03	.10	.11	466	.63	246,800	26	1.2	727	7.8
May 11-19	988,900	16	3.29	1.15	1.39	.09	3.08	2.17	.51	.03	.07	.14	351	.48	474,700	23	.9	552	7.7
May 20-June 2....	1,206,000	16	3.59	1.40	1.83	.10	3.18	3.10	.56	.03	.06	.14	419	.57	687,400	26	1.2	633	7.7
June 3-9.....	1,186,000	16	2.94	1.07	1.17	.08	2.90	1.81	.45	.03	.05	.13	312	.42	498,100	22	.8	492	7.8
June 10-30.....	4,250,000	14	2.74	.82	.91	.07	2.66	1.50	.37	.03	.03	.10	271	.37	1,572,000	20	.7	432	7.7
July 1-18	2,766,000	15	2.79	1.23	.91	.07	2.95	1.50	.39	.02	.09	.15	291	.40	1,106,000	18	.6	499	8.2
July 19-31	1,248,000	18	3.24	1.64	1.65	.09	4.39	1.60	.48	.02	.12	.11	378	.51	636,500	25	1.1	661	8.0
Aug. 1-7.....	503,500	8.4	3.79	1.07	1.61	.07	3.28	2.54	.62	.02	.12	.13	387	.53	266,900	25	1.0	631	8.0
Aug. 8-24.....	850,700	9.2	5.29	1.89	2.44	.12	3.87	4.60	1.13	.02	.12	.13	584	.79	672,100	25	1.3	969	7.8
Aug. 25.....	38,270	19	6.34	4.03	5.72		a3.18	8.91	3.89	--	.11	.13	995	1.35	51,660	36	2.5	1,580	8.7
Aug. 26-31	211,600	10	7.58	2.71	3.78	.17	4.10	8.85	1.41	.02	.14	.11	896	1.22	258,200	27	1.7	1,250	8.1
Sept. 1-30	822,400	13	6.24	2.47	3.57	.14	3.90	6.54	1.83	.03	.13	.15	760	1.03	847,100	29	1.7	1,200	8.0
Total or weighted average.....	17,320,000	15	3.79	1.64	2.18	0.10	3.25	3.31	0.96	0.02	0.08	0.13	472	0.64	11,080,000	28	1.3	722	--

a Includes 0.33 equivalent per million of carbonate (CO_3).

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COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR GRAND CANYON, ARIZ.

LOCATION.--At gaging station at Kaibab Bridge, a quarter of a mile upstream from Bright Angel Creek, 11 miles by trail 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 1957.
Water temperatures: October 1936 to October 1942, September 1943 to September 1957.
Sediment records: October 1925 to November 1942, September 1943 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 2,090 micromhos Oct. 18; minimum daily, 373 micromhos June 28.
Percent sodium: Maximum, 50 Jan. 12-14; minimum, 20 Aug. 26.
EXTREMES, 1937-42, 1943-57.--Specific conductance: Maximum daily, 2,900 micromhos Sept. 6, 1940; minimum daily, 341 micromhos June 15, 1942.
Percent sodium: (1941-42, 1943-57) Maximum, 50 Jan. 12-14, 1957; minimum, 16 June 11-20, 1952.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956	202,300	12	7.04	5.18	9.87	0.21	3.56	12.05	6.37	0.03	0.11	0.35	1,370	1.86	376,300	44	4.0	2,030	7.7
Nov. 1-30	325,000	15	7.09	4.44	8.53	.18	3.95	10.89	5.02	.03	.14	.32	1,240	1.69	549,200	42	3.6	1,820	7.8
Dec. 1-31	274,300	14	6.79	4.36	8.70	.17	4.13	9.97	5.56	.02	.19	.28	1,220	1.66	455,300	43	3.7	1,820	7.8
Jan. 1-11, 1957	92,940	15	6.79	4.52	8.87	.17	4.38	9.81	5.70	.02	.16	.22	1,230	1.67	155,200	44	3.7	1,850	7.7
Jan. 12-14	58,020	15	4.84	2.14	7.00	.14	4.03	5.87	4.17	.03	.03	.21	858	1.17	67,880	50	3.7	1,350	7.7
Jan. 15-31	191,600	16	5.94	3.45	7.70	.16	3.88	8.16	4.91	.02	.15	.19	1,050	1.43	274,000	45	3.6	1,620	8.0
Feb. 1-22	262,600	15	5.79	3.54	7.83	.17	3.82	8.16	5.08	.02	.15	.17	1,060	1.44	378,100	45	3.6	1,630	7.8
Feb. 23-28	107,800	13	5.29	2.88	6.26	.16	3.62	7.16	3.52	.02	.12	.17	890	1.21	130,400	43	3.1	1,360	7.7
Mar. 1-31	541,200	19	5.24	2.96	6.74	.16	3.59	7.47	3.61	.02	.12	.18	924	1.26	681,900	45	3.3	1,400	7.9
Apr. 1-4	60,760	18	5.29	3.21	7.13	.16	3.64	7.66	4.12	.02	.11	.17	964	1.31	79,600	45	3.5	1,460	8.0
Apr. 5-19	290,200	18	4.89	2.71	6.05	.16	3.51	6.70	3.33	.03	.09	.19	846	1.15	333,700	44	3.1	1,300	7.7
Apr. 20-30	460,500	21	3.84	1.73	3.26	.14	3.26	3.83	1.72	.03	.03	.16	545	.74	340,800	36	1.9	845	7.7
May 1-9	437,800	20	3.74	1.73	2.87	.12	3.11	3.69	1.52	.03	.05	.18	515	.70	306,500	34	1.7	785	7.6
May 10-31	2,063,000	18	3.34	1.40	1.83	.10	3.13	2.60	.79	.03	.04	.10	398	.54	1,114,000	27	1.2	618	7.7

June 1-6, 1957....	732,100	16	3.24	1.23	1.65	.11	3.03	2.31	.70	.03	.04	.09	368	.50	366,000	26	1.1	567	7.7
June 7-30.....	4,808,000	14	2.89	.76	1.09	.10	2.69	1.56	.45	.02	.03	.08	284	.39	1,875,000	23	.8	457	7.7
July 1-20.....	2,998,000	15	2.74	.74	1.00	.08	2.59	1.29	.59	.03	.03	.21	269	.37	1,109,000	22	.8	440	7.7
July 21-Aug. 7...	1,547,000	16	3.19	1.32	1.91	.10	2.75	2.79	.96	.03	.03	.16	397	.54	835,400	29	1.3	624	7.7
Aug. 8-25.....	929,200	16	5.14	1.89	3.57	.15	3.31	5.87	1.52	.03	.05	.18	668	.91	845,600	33	1.9	960	7.7
Aug. 26.....	41,650	14	11.38	2.96	3.57	--	3.64	11.58	2.65	--	.02	.23	1,120	1.52	63,230	20	1.3	1,740	7.4
Aug. 27-31.....	187,200	18	8.43	2.80	4.78	.18	5.47	8.74	1.92	.03	.01	.22	991	1.35	252,700	30	2.0	1,290	7.6
Sept. 1-30.....	884,400	21	5.59	2.80	4.70	.16	3.28	7.29	2.62	.03	.08	.23	828	1.13	999,400	35	2.3	1,250	7.7
Total or weighted average.....	17,500,000	16	3.74	1.56	2.61	0.12	3.02	3.50	1.38	0.03	0.05	0.15	486	0.66	11,550,000	33	1.6	746	--

COLORADO RIVER MAIN STEM--Continued

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

LOCATION.--At Hoover Dam, state line between Mohave County, Ariz., and Clark County, Nev., about 1 mile upstream from gaging station.
DRAINAGE AREA.--167,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1939 to September 1957.
Water temperatures: October 1941 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,280 micromhos Oct. 18-19; minimum daily, 1,090 micromhos Jan. 2.
Percent sodium: Maximum, 40 on several periods during the year; minimum, 38 Dec. 1-10.
EXTREMES, 1939-57.--Specific conductance: Maximum daily, 1,580 micromhos June 20, 1955; minimum daily, 712 micromhos Nov. 22-26, 1952.
Percent sodium: Maximum, 41 during several periods in 1951, 1952 and 1956; minimum, 32 Jan. 21-22, 25-29, 31, June 12-17, 19-20, 1944.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	153,700	--	5.16	2.84	5.22	--	2.85	--	--	--	---	--	857	1.17	179,800	39	2.6	1,270	7.7
Oct. 11-20.....	146,600	13	5.28	2.72	5.31	0.14	2.87	7.33	2.96	0.02	0.07	--	853	1.16	170,100	39	2.7	1,280	7.4
Oct. 21-31.....	189,300	--	5.20	2.72	5.22	--	2.85	--	--	--	--	--	854	1.16	219,600	40	2.6	1,260	7.6
Nov. 1-10	186,700	--	4.88	3.00	5.18	--	2.88	--	--	--	--	--	847	1.15	214,700	40	2.6	1,250	8.0
Nov. 11-20	193,000	11	4.24	3.36	4.87	--	2.77	7.14	2.76	--	.07	--	826	1.12	216,200	39	2.5	1,200	7.7
Nov. 21-30	174,500	11	4.44	3.04	4.96	--	2.72	6.97	2.71	--	.07	--	801	1.10	192,000	40	2.6	1,180	7.7
Dec. 1-10	157,600	11	4.40	3.40	4.87	--	2.82	7.31	2.76	--	.07	--	840	1.14	179,700	38	2.5	1,220	7.5
Dec. 11-20	157,700	11	4.00	3.40	4.65	--	2.70	6.81	2.68	--	.06	--	788	1.07	168,700	39	2.4	1,150	7.5
Dec. 21-31.....	142,000	11	3.96	3.36	4.65	--	2.64	6.72	2.68	--	.07	--	792	1.08	153,400	39	2.4	1,150	7.6
Jan. 1-10, 1957..	172,700	11	4.08	3.40	4.74	--	2.74	6.68	2.76	--	.06	--	795	1.08	186,500	39	2.4	1,170	7.2
Jan. 11-20	155,000	11	4.80	2.36	4.78	.12	2.70	6.41	2.65	.01	.06	0.18	775	1.05	162,800	40	2.5	1,130	7.7
Jan. 21-28	149,100	--	4.84	2.40	4.87	--	2.72	--	--	--	--	--	788	1.07	159,500	40	2.6	1,140	7.6
Jan. 29-31, Feb. 1-10	198,500	--	4.80	2.48	4.70	--	2.75	--	--	--	--	--	786	1.07	212,400	39	2.5	1,160	7.5
Feb. 11-20	196,700	--	4.96	2.52	4.83	--	2.79	--	--	--	--	--	801	1.09	214,400	39	2.5	1,180	7.2
Feb. 21-28	132,500	--	4.92	2.60	4.92	--	2.49	--	--	--	--	--	805	1.09	144,400	40	2.5	1,170	7.4
Mar. 1-10	206,400	--	4.96	2.76	5.00	--	2.85	--	--	--	--	--	824	1.12	231,200	39	2.5	1,210	7.3
Mar. 11-20	237,200	--	3.88	3.68	5.05	--	2.88	--	--	--	--	--	815	1.11	263,300	40	2.6	1,190	7.4
Mar. 21-31	295,100	--	4.96	2.48	4.96	--	2.88	--	--	--	--	--	811	1.10	324,600	40	2.6	1,190	7.6

Apr. 1-10, 1957.	284,300	--	5.00	2.48	4.96	--	2.87	--	---	--	--	--	804	1.09	309,900	40	2.6	1,190	7.4
Apr. 11-20	295,100	12	5.00	2.48	4.96	.13	2.88	6.81	2.93	.02	.05	.16	807	1.10	324,600	39	2.6	1,190	7.2
Apr. 21-30	311,000	--	4.92	2.52	4.92	--	2.88	--	--	--	--	--	801	1.09	339,000	40	2.6	1,180	7.4
May 1-10	262,400	--	4.92	2.48	4.83	--	2.84	--	--	--	--	--	794	1.08	283,400	39	2.5	1,170	7.4
May 11-20	213,600	--	4.96	2.40	4.83	--	2.85	--	--	--	--	.15	788	1.07	228,600	40	2.5	1,170	7.3
May 21-31	292,500	--	4.92	2.36	4.74	--	2.82	--	--	--	--	--	786	1.07	313,000	39	2.5	1,170	7.3
June 1-10	254,200	--	4.88	2.40	4.65	--	2.79	--	--	--	--	--	775	1.05	266,900	39	2.4	1,150	7.5
June 11-20	291,400	--	4.88	2.40	4.57	--	2.80	--	--	--	--	.14	779	1.06	308,900	39	2.4	1,150	7.3
June 21-30	282,500	--	4.88	2.36	4.57	--	2.80	--	--	--	--	--	777	1.06	299,400	39	2.4	1,150	7.5
July 1-10	245,300	--	4.84	2.32	4.70	--	2.84	--	--	--	--	.14	780	1.06	260,000	40	2.5	1,160	7.3
July 11-20	264,800	11	5.00	2.24	4.65	.14	2.84	6.60	2.74	.02	.04	.18	774	1.05	278,000	39	2.5	1,140	7.4
July 21-31	276,000	--	4.80	2.32	4.70	--	2.82	--	--	--	--	.14	771	1.05	289,800	40	2.5	1,160	7.2
Aug. 1, 15	59,900	--	4.80	2.28	4.70	--	2.82	--	--	--	--	.16	757	1.03	61,700	40	2.5	1,150	7.2
Sept. 3, 16	59,110	--	4.80	2.32	4.57	--	2.80	--	--	--	--	.14	750	1.02	60,290	39	2.4	1,140	7.2
Total or weighted average [a]	6,637,000	--	4.79	2.63	4.83	--	2.80	--	--	--	--	--	800	1.09	7,234,000	39	2.5	1,180	--
Total or weighted average [b]	8,088,000	--	4.79	2.55	4.78	--	2.80	--	--	--	--	--	791	1.08	8,735,000	39	2.5	1,170	--

a Represents 82 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

DIVERSIONS AND RETURN FLOWS AT AND BELOW IMPERIAL DAM

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, 3½ miles downstream from siphon-drop powerplant, and a quarter of a 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 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,520 micromhos Jan. 16; minimum daily, 1,230 micromhos Aug. 21-22. Percent sodium: Maximum, 43 Oct. 1 to Jan. 31, June 1-30; minimum, 32 July 1-31.
EXTREMES, 1943-57.--Specific conductance: Maximum daily, 1,520 micromhos Jan. 16, 1957; minimum daily, 795 micromhos Jan. 5, 1953. Percent sodium: Maximum, 46 Nov. 21-30, 1953; minimum, 32 several periods in 1945, 1946, 1948, 1949, and 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956.	23,740	16	5.24	2.96	6.26	0.15	2.77	7.99	3.75	0.02	0.03	0.30	912	1.24	29,440	43	3.1	1,370	7.7
Nov. 1-30	22,290	14	5.29	3.13	6.44	.15	2.90	8.16	3.89	.02	.02	.34	940	1.28	28,530	43	3.1	1,400	7.9
Dec. 1-31	15,040	13	5.44	3.21	6.61	.15	3.02	8.24	3.98	.03	.03	.34	959	1.30	19,550	43	3.2	1,430	8.0
Jan. 1-31, 1957.	14,930	15	5.49	3.37	6.74	.15	3.08	8.29	4.17	.02	.02	.24	1,000	1.36	20,300	43	3.2	1,470	8.0
Feb. 1-28	22,320	12	5.44	3.13	6.44	.15	2.97	8.14	3.92	.02	.02	.24	970	1.32	29,460	43	3.1	1,420	8.0
Mar. 1-31.....	26,630	15	5.44	2.88	6.09	.15	2.82	7.83	3.61	.02	.03	.22	905	1.23	32,750	42	3.0	1,360	7.7
Apr. 30	24,710	16	5.29	2.80	5.83	.14	2.79	7.56	3.41	.02	.03	.21	867	1.18	29,160	41	2.9	1,300	7.8
May 1-31	29,410	14	5.24	2.71	5.96	.14	2.77	7.58	3.58	.02	.03	.21	876	1.19	35,000	42	3.0	1,300	7.9
June 1-30	32,020	17	5.09	2.71	5.96	.14	2.75	7.37	3.55	.02	.03	.21	873	1.19	38,100	43	3.0	1,300	7.9
July 1-31	36,910	8.2	6.69	2.88	4.61	.12	2.92	8.02	3.44	.02	.00	.21	899	1.22	45,030	32	2.1	1,380	8.2
Aug. 1-31	31,100	8.8	5.39	2.38	4.61	.12	2.88	6.60	2.99	.02	.00	.20	791	1.08	33,590	37	2.3	1,270	8.2
Sept. 1-30	35,700	7.9	5.39	2.55	4.96	.12	2.95	6.77	3.38	.02	.03	.21	822	1.12	40,000	38	2.5	1,280	8.2
Total or weighted average	314,800	13	5.49	2.80	5.70	0.14	2.87	7.62	3.58	0.02	0.02	0.24	889	1.21	380,900	40	2.8	1,340	--

GUNNISON RIVER BASIN

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

Location.--At road bridge about a half mile downstream from gaging station, 1 mile downstream from point of diversion of Redlands power canal, and 1½ miles upstream from mouth and Grand Junction, Mesa County.
DRAINAGE AREA.--8,020 square miles, approximately (at gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1931 to September 1957.
Water temperatures: April 1949 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 2,700 micromhos Oct. 27; minimum daily, 291 micromhos June 28.
Percent sodium: Maximum, 35 Oct. 11-20, Feb. 11-20; minimum, 17 May 4-10, June 1-10, 21-30.
EXTREMES, 1941-57.--Specific conductance: Maximum daily, 2,730 micromhos Sept. 10, 1956; minimum daily, 280 micromhos May 23, 1948.
Percent sodium (1950-57): Maximum, 35 Sept. 21-30, 1956; minimum, 10 June 2-5, 10, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	10,690	a 16	11.84	7.52	10.14	a 0.21	3.23	a25.19	a 1.07	0.05	a 0.09	--	2,110	2.87	30,680	34	3.3	2,430	7.8
Oct. 11-20	9,990	16	11.20	7.50	10.18	.21	2.80	25.19	1.07	.05	.09	0.08	2,080	2.83	28,270	35	3.3	2,440	7.8
Oct. 21-31	13,830	a 16	12.72	8.28	9.74	a .21	3.95	a25.49	a 1.08	.09	a .09	--	2,190	2.98	41,210	32	3.0	2,470	7.7
Nov. 1-10	20,040	a 22	9.56	5.84	6.31	a .20	4.13	a17.01	a .56	--	a .16	--	1,480	2.01	40,280	29	2.3	1,810	7.9
Nov. 11-20	18,480	a 22	8.68	5.76	6.00	a .19	4.03	a16.22	a .54	--	a .16	--	1,400	1.90	35,110	29	2.2	1,720	7.8
Nov. 21-30	16,560	21	8.32	5.64	6.22	.19	3.70	15.89	.51	--	.16	--	1,390	1.89	31,300	31	2.4	1,690	7.8
Dec. 1-10	15,910	20	7.76	5.52	6.18	.16	3.43	15.26	.56	--	.18	--	1,350	1.84	29,270	31	2.4	1,650	7.9
Dec. 11-20	16,090	19	7.84	5.52	6.18	.16	3.62	15.26	.62	--	.16	.20	1,340	1.82	29,280	31	2.4	1,650	7.8
Dec. 21-31	15,370	21	8.40	5.76	6.39	.16	4.16	15.64	.56	--	.18	--	1,410	1.92	29,510	31	2.4	1,720	7.7
Jan. 1-10, 1957	16,360	18	7.64	5.32	5.74	.17	3.97	14.14	.51	--	.13	--	1,280	1.74	28,470	30	2.3	1,590	7.5
Jan. 11-20	17,610	19	7.68	5.32	6.48	.17	3.88	15.28	.56	--	.16	.19	1,320	1.80	31,700	33	2.5	1,650	7.4
Jan. 21-31	18,110	19	7.80	4.20	5.61	.16	3.72	12.95	.56	--	.16	--	1,200	1.63	29,520	32	2.3	1,520	7.3
Feb. 1-10	16,170	17	6.28	5.56	5.48	.12	3.54	13.37	.56	--	.16	--	1,180	1.60	25,870	31	2.3	1,480	7.7
Feb. 11-20	23,110	16	6.88	5.64	6.79	.19	3.87	14.95	.62	--	.19	.17	1,300	1.77	40,900	35	2.7	1,630	7.5
Feb. 21-28	15,500	17	7.32	4.52	5.79	.13	3.34	13.78	.62	--	.13	--	1,200	1.63	25,260	33	2.4	1,510	7.5
Mar. 1-10	17,340	16	6.04	4.60	5.05	.14	3.33	11.99	.48	--	.10	.20	1,100	1.50	26,010	32	2.2	1,380	7.9
Mar. 11-20	18,190	17	5.04	4.80	4.35	.13	3.20	10.70	.45	--	..07	.17	979	1.33	24,190	30	2.0	1,270	7.7
Mar. 21-31	20,380	16	5.04	4.40	4.09	.11	3.11	10.04	.42	--	.08	.20	931	1.27	25,880	30	1.9	1,210	7.7

a Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

GUNNISON RIVER BASIN--Continued

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-14, 1957	32,790	16	3.96	4.44	3.65	0.13	3.15	8.58	0.34	--	0.08	0.17	811	1.10	36,070	30	1.8	1,070	7.6
Apr. 15-20	46,430	16	2.36	2.04	1.39	.08	2.43	3.08	.16	--	.05	.16	376	.51	23,680	24	.9	551	7.6
Apr. 21-25	33,580	20	2.90	1.20	1.26	.07	2.38	2.66	.25	--	.07	--	331	.45	15,110	23	.9	521	7.6
Apr. 26-30, May 1-3	45,620	19	3.96	1.80	2.13	.10	2.80	4.68	.39	--	.07	--	513	.70	31,930	27	1.3	742	7.4
May 4-10	157,000	16	2.76	.68	.74	.08	2.47	1.60	.20	--	.06	--	267	.36	56,520	17	.6	409	7.4
May 11-20	167,600	16	2.92	1.16	1.22	.08	2.28	2.77	.28	--	.05	.09	346	.47	78,770	23	.9	515	7.4
May 21-31	206,100	17	3.02	1.02	1.13	.09	2.57	2.37	.23	--	.04	--	328	.45	92,745	21	.8	491	7.3
June 1-10	445,700	15	2.40	.70	.65	.08	2.33	1.25	.24	--	.03	--	236	.32	142,600	17	.5	366	7.3
June 11-20	350,300	14	2.40	.72	.74	.07	2.11	1.62	.24	--	.03	.08	250	.34	119,100	19	.6	377	7.3
June 21-30	372,300	14	2.32	.48	.57	.05	1.88	1.46	.07	--	.03	--	224	.30	111,700	17	.5	338	7.1
July 1-10	345,500	14	2.32	.48	.65	.06	1.92	1.42	.08	--	.05	--	220	.30	103,600	19	.5	338	6.9
July 11-20	197,100	13	2.84	.88	1.00	.08	2.23	2.42	.11	--	.04	.07	302	.41	80,810	21	.7	464	7.1
July 21-31	176,800	14	3.64	1.16	1.35	.06	2.33	3.69	.13	--	.04	--	404	.51	97,240	22	.9	591	7.1
Aug. 1-10	102,400	15	3.84	1.20	1.57	.08	2.20	4.31	.18	--	.05	--	438	.60	61,440	23	1.0	630	7.1
Aug. 11-20	62,700	15	5.04	2.08	2.22	.12	2.69	6.31	.28	--	.07	.13	615	.84	52,670	23	1.2	853	7.1
Aug. 21-31	58,690	20	7.00	2.60	3.35	.11	3.18	9.41	.39	--	.11	--	912	1.24	72,780	26	1.5	1,180	7.3
Sept. 1-10	58,870	20	6.24	2.80	3.52	.11	3.15	9.12	.42	--	.09	--	836	1.14	67,110	28	1.7	1,120	7.1
Sept. 11-20	26,360	20	8.24	4.56	5.35	.12	3.21	14.62	.54	--	.13	.20	1,260	1.71	45,080	29	2.1	1,550	7.4
Sept. 21-30	23,110	21	9.36	5.84	6.31	.15	3.62	17.70	.62	--	.15	--	1,510	2.05	47,380	29	2.3	1,800	7.4
Total or weighted average[b]	3,208,000	a15	3.44	1.48	1.61	a 0.08	2.41	a3.91	a0.23	--	a0.05	--	433	0.59	1,893,000	24	1.0	602	--

a Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.
b Represents 100 percent of runoff for water year October 1956 to September 1957.

GREEN RIVER BASIN

GREEN RIVER AT GREEN RIVER, UTAH

LOCATION.--At gaging station, 1 mile southeast of the town of Green River, Emery County, 22 miles upstream from San Rafael River, and 117 miles upstream from mouth,
DRAINAGE AREA.--40,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1957.
Water temperatures: April 1949 to September 1957.
Sediment records: May 1930 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,710 micromhos Aug. 30; minimum daily, 313 micromhos July 7.
Percent sodium: Maximum, 46 Mar. 1-10; minimum, 19 Aug. 7.
EXTREMES, 1941-57.--Specific conductance: Maximum daily, 2,420 micromhos Sept. 29, 1943; minimum daily, 272 micromhos May 13, 1956.
Percent sodium (1950-57): Maximum, 47 Nov.21-24, 26, Dec. 1-10, 1954; minimum, 19 Aug. 7, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples are available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956...	20,350	7.1	3.40	2.76	4.48	0.07	3.31	6.00	1.35		0.02	--	662	0.90	18,320	42	2.5	988	7.9
Oct. 11-20	22,140	6.5	3.52	2.92	4.57	.07	3.41	6.37	1.41		.02	0.15	695	.95	21,030	41	2.6	1,030	7.7
Oct. 21-31	33,980	7.6	3.84	2.80	4.92	.07	3.52	6.75	1.41		.04	--	729	.99	33,640	42	2.7	1,070	7.7
Nov. 1-10	36,810	8.8	4.00	3.00	5.09	.08	3.79	7.08	1.49		.04	--	763	1.04	38,280	42	2.7	1,110	7.7
Nov. 11-20	38,240	10	3.88	2.88	4.61	.07	4.00	6.29	1.24		.03	.22	702	.95	36,330	40	2.5	1,040	7.9
Nov. 21-30	24,080	11	4.48	3.28	4.96	.07	4.43	7.12	1.30		.04	--	799	1.09	26,250	39	2.5	1,150	7.9
Dec. 1-10	25,350	14	4.36	3.20	4.83	.08	4.26	6.85	1.47		.04	--	776	1.06	26,870	39	2.5	1,140	7.5
Dec. 11-20	25,370	13	3.92	3.56	4.96	.08	3.87	7.43	1.41		.04	.24	789	1.07	27,150	40	2.6	1,150	7.9
Dec. 21-31	28,700	13	4.24	3.52	4.65	.07	4.49	6.56	1.47		.04	--	758	1.03	29,560	37	2.4	1,120	7.6
Jan. 1-10, 1957...	27,350	11	4.20	3.52	4.35	.07	4.49	6.27	1.38		.04	--	739	1.01	27,620	36	2.2	1,100	7.4
Jan. 11-20	27,110	12	3.32	3.80	4.00	.06	4.16	5.89	1.24		.04	.21	682	.93	25,210	36	2.1	1,020	7.7
Jan. 21-31	28,800	12	2.72	4.20	4.22	.06	3.87	5.98	1.33		.04	--	686	.93	26,780	38	2.3	1,020	7.8
Feb. 1-10	29,200	12	3.28	3.64	4.05	.06	4.02	5.77	1.30		.04	--	669	.91	26,570	37	2.2	994	7.8
Feb. 11-20	32,390	12	2.96	3.76	4.00	.06	3.84	5.68	1.24		.03	.19	660	.90	29,150	37	2.2	990	7.7
Feb. 21-28	38,460	11	3.92	3.08	4.83	.07	3.70	6.97	1.18		.04	--	734	1.00	38,460	41	2.6	1,080	7.7
Mar. 1-10	88,880	9.5	2.76	2.64	4.65	.08	3.03	5.93	1.18		.05	--	637	.87	77,330	46	2.8	960	7.5

GREEN RIVER BASIN--Continued

GREEN RIVER AT GREEN RIVER, UTAH--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons				
Mar. 11-20, 1957..	82,570	12	3.24	2.28	4.61	0.06	3.28	5.70	1.18		0.06	0.09	643	0.87	71,840	45	2.8	953	7.3
Mar. 21-31.....	65,040	11	3.84	2.72	4.65	.07	3.85	6.16	1.30		.05	--	706	.96	62,440	41	2.6	1,040	7.1
Apr. 1-10	70,990	12	3.52	2.60	4.70	.07	3.57	6.08	1.18		.05	--	686	.93	66,020	43	2.7	1,000	7.3
Apr. 11-18	56,150	13	3.64	2.66	4.31	.07	3.57	6.04	1.18		.05	.11	682	.93	52,220	40	2.4	997	7.3
Apr. 19-30	163,100	14	2.84	1.68	2.18	.07	3.02	3.08	.56		.08	--	417	.57	92,970	32	1.5	635	7.1
May 1-10	171,200	17	2.76	1.58	2.13	.09	3.05	2.75	.68		.07	--	408	.55	94,160	32	1.5	619	7.5
May 11-20	401,700	17	2.12	1.40	1.57	.09	2.85	1.94	.39		.06	.09	322	.44	176,700	30	1.2	497	7.4
May 21-31	339,800	14	2.44	1.40	1.78	.09	2.93	2.29	.39		.05	--	354	.48	163,100	31	1.3	547	7.4
June 1-10	520,900	13	2.10	1.02	1.09	.08	2.56	1.44	.28		.04	--	260	.35	182,300	25	.9	406	7.3
June 11-20	812,600	12	2.06	.84	1.04	.09	2.38	1.31	.27		.04	.08	249	.34	276,300	26	.9	387	7.4
June 21-30	537,100	13	2.08	.84	1.04	.06	2.36	1.39	.23		.01	--	247	.34	182,600	26	.9	392	7.3
July 1-10	541,100	12	1.94	.72	.78	.04	2.23	1.08	.20		.02	--	212	.29	156,900	22	.7	338	7.2
July 11-19	327,500	12	2.26	.84	1.04	.06	2.33	1.64	.28		.01	.07	259	.35	114,600	25	.8	410	7.2
July 20.....	31,140	13	2.92	1.08	2.18	.09	2.62	3.12	.54		.00	--	a387	.53	16,500	35	1.5	609	7.1
July 21-31	264,100	13	2.38	1.06	1.52	.07	2.59	2.06	.42		.01	--	305	.41	108,300	30	1.2	482	7.2
Aug. 1-5.....	80,730	11	2.40	1.16	1.57	.07	2.51	2.29	.45		.01	--	317	.43	34,710	30	1.2	501	7.4
Aug. 6, 8-10.....	65,550	13	3.78	1.74	2.91	.12	2.87	5.10	.68		.01	--	553	.75	49,160	34	1.8	807	7.2
Aug. 7	21,420	13	11.72	2.24	3.31	.16	2.62	14.39	.51		.01	--	a1,150	1.56	33,420	19	1.3	1,430	7.0
Aug. 11-20	102,200	14	2.90	1.82	2.70	.09	2.93	3.96	.68		.01	.14	474	.64	65,410	36	1.7	711	7.4
Aug. 21-27	70,450	14	3.56	1.88	3.26	.07	3.34	4.77	.79		.00	--	557	.76	53,540	37	2.0	821	7.3
Aug. 28-31	45,920	14	8.08	2.92	4.52	.12	3.33	11.53	.82		.01	--	1,070	1.46	67,040	29	1.9	1,370	7.3
Sept. 9-15	43,910	11	3.30	2.62	3.18	.10	3.29	5.00	.85		.01	.18	570	.78	34,250	35	1.9	836	7.5
Sept. 16-30.....	77,710	9.1	3.36	2.40	3.61	.07	3.31	5.31	1.02		.00	--	604	.82	63,720	38	2.1	882	7.3
Total or weighted average[b].....	5,420,000	13	2.54	1.40	1.91	0.07	2.75	2.69	0.51		0.03	--	370	0.50	2,710,000	32	1.4	562	--
Total or weighted average[c].....	5,501,000	13	2.59	1.40	1.91	0.07	2.77	2.73	0.51		0.03	--	374	0.51	2,806,000	32	1.4	566	--

a Calculated from determined constituents.
b Represents 99 percent of runoff for water year October 1956 to September 1957.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

SAN JUAN RIVER BASIN

SAN JUAN RIVER NEAR ARCHULETA, N. MEX.

LOCATION.--At gaging station, 4½ miles downstream from Los Pinos River and 4½ miles northeast of Archuleta, San Juan County.
DRAINAGE AREA.--3,240 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1954 to September 1957.
Water temperatures: December 1954 to September 1957.
Sediment records: December 1954 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 659 micromhos Nov. 22; minimum daily, 101 micromhos July 2.
Percent sodium: Maximum, 45 Feb. 13-17; minimum, 14 Apr. 13-14, Aug. 1.
EXTREMES, 1954-57.--Specific conductance: Maximum daily, 659 micromhos Nov. 22, 1956, minimum daily, 101 micromhos July 2, 1957.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Flow affected by ice Nov. 14-Jan. 24, Jan. 29-Feb. 7. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-23, 1956 ..	7,770	9.1	2.30	0.82	1.70	0.10	2.79	1.73	0.27	0.02	0.01	0.10	278	0.38	2,950	35	1.4	456	7.6
Oct. 24-31.....	4,210	14	2.50	.90	1.83	.13	2.75	2.10	.39	.03	.01	.12	315	.43	1,810	34	1.4	502	7.4
Nov. 1-6	2,930	--	2.35	.82	1.61	--	2.62	--	--	--	---	--	299	.41	1,200	34	1.3	458	8.0
Nov. 7-20	5,300	--	2.45	.90	1.78	--	2.79	--	--	--	--	--	328	.45	2,380	35	1.4	492	8.2
Nov. 21-23	853	--	3.19	1.07	2.31	--	3.31	--	--	--	--	--	415	.56	478	35	1.6	622	7.7
Nov. 24-30	2,260	--	2.89	.82	1.91	--	2.97	--	--	--	--	--	351	.48	1,080	34	1.4	541	7.7
Dec. 1-18	5,510	--	2.64	.82	1.96	--	2.79	--	--	--	--	--	349	.47	2,590	36	1.5	527	8.1
Dec. 19-31	3,270	--	3.04	.99	2.04	--	3.03	--	--	--	--	--	379	.52	1,700	34	1.4	582	7.9
Jan. 1-31, 1957 ..	13,290	16	2.69	.72	1.83	.10	2.56	2.50	.34	.03	.01	.07	331	.45	5,980	34	1.4	511	7.7
Feb. 1-7	2,420	--	2.79	.90	1.87	--	2.70	--	--	--	--	--	347	.47	1,140	34	1.4	538	8.0
Feb. 8-11	2,340	--	2.40	.74	1.70	--	2.41	--	--	--	--	--	305	.41	959	35	1.4	477	7.7
Feb. 12	1,290	--	1.95	.76	1.35	--	2.33	--	--	--	--	--	239	.33	426	33	1.2	385	7.4
Feb. 13-17	7,190	--	2.25	.82	2.52	--	2.90	--	--	--	--	--	348	.47	3,380	45	2.0	543	7.6
Feb. 18	1,670	--	2.50	.72	1.65	--	2.29	--	--	--	--	--	310	.42	701	34	1.3	485	8.0
Feb. 19-28	15,250	--	2.74	1.07	1.70	--	2.44	--	--	--	--	--	346	.47	7,170	31	1.2	535	7.7

SAN JUAN RIVER BASIN--Continued

SAN JUAN RIVER NEAR ARCHULETA, N. MEX.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-9, 1957 ..	11,030	--	2.79	1.15	1.78	--	2.67	--	--	--	--	--	360	0.49	5,400	31	1.3	557	7.7
Mar. 10-12	5,600	--	2.84	1.15	1.35	--	2.66	--	--	--	--	--	334	.45	2,520	25	1.0	511	7.7
Mar. 13-15	4,110	--	2.54	1.23	1.17	--	2.34	--	--	--	--	--	305	.41	1.690	24	.9	474	7.9
Mar. 16-21	8,080	--	2.79	1.23	1.22	--	2.51	--	--	--	--	--	328	.45	3,640	23	.9	502	7.6
Mar. 21-31.....	16,790	--	2.54	1.15	.96	--	2.36	--	--	--	--	--	293	.40	6,720	21	.7	448	7.7
.....																			
Apr. 1-10	18,240	--	2.54	.90	1.00	--	2.33	--	--	--	--	--	283	.38	6,930	23	.8	428	7.7
Apr. 11-12	8,570	--	2.69	.80	.70	--	2.66	--	--	--	--	--	251	.34	2,910	17	.5	388	8.1
Apr. 13-14	12,530	--	2.15	.78	.48	--	2.25	--	--	--	--	--	216	.29	3,630	14	.4	321	7.6
Apr. 15-16	13,860	--	1.80	.54	.41	--	1.82	--	--	--	--	--	180	.24	3,330	15	.4	264	7.7
Apr. 17-20	25,540	--	1.45	.43	.39	--	1.48	--	--	--	--	--	154	.21	5,360	17	.4	224	7.6
Apr. 21-23	16,200	--	1.35	.51	.42	--	1.59	--	--	--	--	--	157	.21	3,400	18	.4	224	7.5
Apr. 24-30	25,120	16	1.50	.61	.48	0.06	1.61	0.92	0.08	0.02	0.02	0.09	a163	.22	5,530	18	.5	261	7.3
May 1-31	222,100	--	1.45	.54	.39	--	b2.53	--	--	--	--	--	140	.19	42,200	16	.4	217	10.5
June 1-13	225,600	--	1.20	.31	.48	--	c2.07	--	--	--	--	--	112	.15	33,840	24	.6	168	8.6
June 14-30	254,100	--	.85	.20	.39	--	d1.64	--	--		--	--	85	.12	30,490	27	.5	129	8.8
July 1-11.....	127,000	4.8	.50	.30	.57	.05	.98	.35	.06	.02	.01	.02	85	.11	13,970	40	.9	119	7.7
July 12-17	33,570	--	.85	.35	.39	--	e1.84	--	--	--	--	--	97	.13	4,360	25	.5	148	8.4
July 18-20	19,180	--	1.55	.31	.83	--	f2.61	--	--	--	---	--	170	.23	4,410	31	.9	259	8.7
July 21-25	28,260	--	1.05	.31	.44	--	d2.07	--	--	--	--	--	114	.16	4,520	24	.5	175	8.4
July 26-27	52,130	--	1.70	.41	.83	--	f2.64	--	--	--	--	--	188	.26	13,550	28	.8	289	8.6
July 28-31.....	66,310	--	1.30	.27	.52	--	g2.21	--	--	--	--	--	120	.16	10,610	25	.5	186	8.4

Aug. 1, 1957....	9,380	--	.90	.20	.18	--	1.07	--	--	--	--	--	100	.14	1,310	14	.2	142	7.8
Aug. 2-4.....	22,570	--	1.50	.43	.57	--	h2.54	--	--	--	--	--	153	.21	4,740	23	.6	238	8.8
Aug. 5-7.....	32,560	--	1.80	.58	.96	--	f2.79	--	--	--	--	--	219	.30	9,770	29	.9	322	8.8
Aug. 8-12	26,510	----	1.15	.27	.31	--	1.41	--	--	--	--	--	124	.17	4,510	18	.4	189	7.2
Aug. 13-24	45,550	--	1.50	.43	.48	--	1.84	--	--	--	--	--	158	.21	9,570	20	.5	248	7.1
Aug. 25	3,290	--	2.89	.63	1.13	--	3.69	--	--	--	--	--	275	.37	1,220	24	.9	445	7.4
Aug. 26-30.....	16,860	--	1.20	.27	.43	--	1.46	--	--	--	--	--	149	.20	3,370	23	.5	209	7.3
Aug. 31-Sept. 1 .	13,980	--	1.75	.47	.48	--	2.10	--	--	--	--	--	134	.18	2,520	18	.5	268	7.6
Sept. 2-15	39,970	--	1.20	.31	.40	--	1.43	--	--	--	--	--	140	.19	7,590	21	.5	202	7.2
Sept. 16-30	20,330	--	1.45	.39	.61	--	1.64	--	--	--	--	--	158	.21	4,270	25	.6	251	7.3
Total or weighted average.....	1,501,000	--	1.35	0.42	0.57	--	2.00	--	--	--	--	--	143	0.19	285,200	24	0.6	218	--

a Calculated from determined constituents.
b Includes 1.20 equivalents per million of carbonate (CO_3).
c Includes 0.37 equivalent per million of carbonate (CO_3).
d Includes 0.33 equivalent per million of carbonate (CO_3).
e Includes 0.20 equivalent per million of carbonate (CO_3).
f Includes 0.87 equivalent per million of carbonate (CO_3).
g Includes 0.47 equivalent per million of carbonate (CO_3).
h Includes 0.70 equivalent per million of carbonate (CO_3).

SAN JUAN RIVER BASIN--Continued

SAN JUAN RIVER NEAR BLUFF, UTAH

LOCATION.--At bridge on State Highway 47, 1,800 feet downstream from gaging station and 20 miles southwest of Bluff, San Juan County.
DRAINAGE AREA.--23,000 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: February to June 1927, October 1929 to September 1957.
Water temperatures: May 1944 to September 1957.
Sediment records: August to September 1928, July 1929 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 2,100 micromhos Oct. 3, 5; minimum daily, 228 micromhos July 3.
Percent sodium: Maximum 46 Oct. 1-10, Aug. 18-19; minimum, 18 June 21-30.
EXTREMES, 1929-57.--Specific conductance (1941-57): Maximum daily, 2,310 micromhos Aug. 3, 1956; minimum daily, 208 micromhos June 17, 1952.
Percent sodium: Maximum, 58 Sept. 10, 1954; minimum, 11 May 21, 23-27, 29-31, July 1-10, 1944.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	1,660	15	7.40	4.36	10.20	0.16	2.46	17.09	2.17		0.21	--	1,500	2.04	3,390	46	4.2	1,990	7.7
Oct. 11-20	2,960	13	6.56	3.44	8.22	.13	2.66	13.70	1.64		.23	0.18	1,230	1.67	4,940	45	3.7	1,670	8.0
Oct. 21-31	8,000	14	6.40	2.60	6.26	.13	3.15	10.53	1.41		.13	--	1,030	1.40	11,200	40	2.9	1,430	7.7
Nov. 1-10	10,510	12	6.28	2.36	5.26	.13	3.70	9.22	1.16		.12	--	898	1.22	12,820	37	2.5	1,280	7.5
Nov. 11-20.....	9,560	12	6.40	2.68	5.22	.13	3.56	9.24	1.27		.12	.13	931	1.27	12,140	36	2.4	1,300	7.8
Nov. 22, 24, 27...	2,810	15	6.32	2.80	5.66	.12	3.47	9.85	1.30		.14	--	970	1.32	3,710	38	2.7	1,320	7.7
Dec. 1-10.....	9,170	15	6.32	2.80	5.83	.12	3.44	10.10	1.24		.14	--	976	1.33	12,200	39	2.7	1,320	7.9
Dec. 11-20.....	8,310	13	6.40	2.80	5.70	.12	3.41	10.10	1.24		.14	.11	973	1.32	10,970	38	2.7	1,320	7.8
Dec. 21-31.....	7,630	14	7.32	3.24	6.57	.13	3.80	11.76	1.49		.16	--	1,130	1.54	11,750	38	2.9	1,500	7.9
Jan. 1-10, 1957 ..	10,250	12	6.28	2.92	5.61	.13	3.16	10.22	1.30		.14	--	970	1.32	13,530	38	2.6	1,330	7.9
Jan. 14-17	6,060	14	6.04	2.68	5.61	.14	3.54	10.04	1.02		.16	.11	955	1.30	7,880	39	2.7	1,310	7.6
Jan. 23-31	11,350	14	5.76	2.24	5.09	.13	3.05	8.91	1.07		.14	--	866	1.18	13,390	39	2.5	1,200	7.5
Feb. 1-10.....	9,570	12	6.36	2.68	5.26	.11	3.34	9.99	1.13		.13	--	948	1.30	12,440	37	2.5	1,290	7.5
Feb. 11-20.....	24,580	13	5.36	2.32	4.70	.13	3.29	8.37	.85		.13	.10	818	1.11	27,280	38	2.4	1,140	7.5
Feb. 21-28.....	30,090	17	4.64	1.96	3.78	.13	3.11	6.45	.68		.10	--	671	.91	27,380	36	2.1	957	7.3
Mar. 1-10	22,760	13	5.44	2.56	4.09	.12	3.06	8.33	.76		.11	.11	800	1.09	24,810	33	2.0	1,090	7.6

Mar. 11-20, 1957	22,220	12	4.80	2.72	3.44	.12	3.05	7.29	.70	.08	.10	724	.98	21,780	31	1.8	1,000	7.7
Mar. 21-31	25,710	12	4.16	2.72	3.00	.11	2.88	6.45	.62	.05	.10	648	.88	22,620	30	1.6	909	7.6
Apr. 1-13	39,990	12	3.44	2.64	2.35	.11	2.70	5.33	.51	.08	.08	556	.76	30,390	28	1.3	793	7.7
Apr. 14-20	60,040	12	2.60	.84	1.09	.08	2.06	2.21	.20	.06	.07	294	.40	24,020	24	.8	444	7.6
Apr. 21-28	58,710	14	3.20	1.08	1.52	.13	2.33	3.10	.34	.05	--	384	.52	30,530	26	1.0	572	7.6
Apr. 29-30, May 1-3	28,090	14	3.28	3.06	2.44	.10	3.13	5.06	.51	.06	--	572	.78	21,910	27	1.4	822	7.3
May 4-10	86,140	15	3.16	.88	1.26	.07	2.31	2.66	.25	.05	--	346	.47	40,490	23	.9	519	7.6
May 11-20	118,500	13	3.00	.94	1.22	.06	2.16	2.71	.28	.03	.06	341	.46	54,510	23	.9	512	7.7
May 21	9,960	11	4.28	1.40	1.56		3.03	3.58	.56	.07	--	a 437	.59	5,880	22	.9	690	7.1
May 22-31	96,630	13	2.72	.92	1.30	.06	2.21	2.46	.34	.02	--	318	.43	41,550	26	1.0	480	7.5
June 1-10	270,500	13	2.42	.46	.83	.05	1.97	1.56	.27	.03	--	245	.33	89,260	22	.7	377	7.6
June 11-20	235,600	12	2.06	.40	.65	.05	1.72	1.27	.14	.01	.06	204	.28	65,970	21	.6	317	7.4
June 21-30	280,500	11	1.76	.32	.48	.08	1.56	.85	.10	.02	--	169	.23	64,520	18	.5	262	7.5
July 1-10	218,000	14	1.82	.22	.48	.04	1.57	.81	.12	.04	--	172	.23	50,140	19	.5	261	7.8
July 11-18	89,830	13	2.22	.42	.87	.04	1.72	1.60	.24	.03	.04	234	.32	28,750	25	.8	360	7.7
July 19-25	75,770	15	2.90	.68	1.35	.06	2.15	2.50	.23	.03	--	319	.43	32,580	27	1.0	484	7.7
July 26-28	84,060	14	4.80	.84	3.39	.11	3.02	6.00	.25	.01	--	594	.81	68,090	37	2.0	858	7.6
July 29-31, Aug. 1, 4	162,300	14	2.42	.30	.96	.06	1.82	1.75	.14	.04	--	239	.33	53,560	26	.8	373	7.9

a Calculated from determined constituents.

SAN JUAN RIVER BASIN--Continued

SAN JUAN RIVER NEAR BLUFF, UTAH--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 5-6, 9-10, 1957	64,440	14	3.24	0.36	2.00	0.08	2.62	2.87	0.20		0.03	--	366	0.50	32,220	35	1.5	554	7.8
Aug. 7-8	57,320	14	5.20	.92	3.87	.10	3.38	6.58	.34		.00	--	654	.89	51,010	38	2.2	931	8.1
Aug. 11-17, 20 ..	67,020	16	3.24	.66	1.78	.07	2.39	3.12	.25		.02	.10	372	.51	34,180	31	1.3	558	7.7
Aug. 18-19.....	17,280	19	4.24	.52	4.18	.09	3.67	5.27	.28		.00	--	594	.81	14,000	46	2.7	870	7.7
Aug. 21-26, 29 ..	42,210	16	3.88	.64	2.44	.09	2.93	3.71	.34		.04	--	450	.61	25,750	35	1.6	665	6.9
Aug. 27-28, 30 .	28,980	17	6.12	.88	4.87	.12	3.54	8.14	.37		.03	--	797	1.08	31,300	41	2.6	1,070	7.0
Sept. 3-10	53,950	13	3.24	.64	1.83	.07	2.25	3.31	.28		.04	--	374	.51	27,510	32	1.3	549	7.0
Sept. 11-20	30,290	15	3.84	1.20	2.31	.07	2.33	4.46	.48		.05	.09	481	.65	19,690	31	1.5	681	7.1
Sept. 21-30	21,680	12	4.48	1.64	2.87	.08	2.59	5.87	.56		.05	--	586	.80	17,340	32	1.6	823	7.0
Total or weighted average[b].....	2,521,000	13	2.94	0.80	1.61	0.07	2.18	2.91	0.28		0.04	--	353	0.48	1,210,000	30	1.2	519	--
Total or weighted average[c].....	2,597,000	13	2.99	0.81	1.61	0.07	2.20	2.98	0.31		0.04	--	357	0.49	1,273,000	29	1.2	525	--

b Represents 97 percent of runoff for water year October 1956 to September 1957.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

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LITTLE COLORADO RIVER BASIN

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, and 9.5 miles downstream from Moenkopi Wash.
DRAINAGE AREA.--26,500 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1957.
Water temperatures: October 1951 to September 1957.
Sediment records: October 1947 to September 1956 (monthly), October 1956 to September 1957 (daily).
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for station near Cameron for water year October 1956 to September 1957 given in WSP 1513. 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.

Chemical analyses, January to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Jan. 11, 1957		--	2.10	0.78	6.31	--	4.00	--	--	--	--	--	598	0.81		69	5.3	936	7.6
Jan. 12-23		9.8	1.30	.33	3.52	0.07	2.39	0.87	2.00	0.01	0.01	0.15	328	.45		67	3.9	541	8.0
Jan. 24-27		8.5	1.90	.54	4.31	.07	1.92	.92	3.89	.02	.01	.09	408	.55		63	3.9	719	7.9
Jan. 28-31		8.4	2.25	.74	5.70	.07	1.79	1.77	5.10	.02	.02	.11	529	.72		65	4.7	930	7.9
Feb. 1-8		--	2.79	.74	8.70	--	2.10	--	--	--	--	--	739	1.01		71	6.5	1,320	7.5
Feb. 14		--	3.19	.51	7.70	--	2.93	--	--	--	--	--	680	.92		68	5.7	1,200	7.6
Feb. 15		--	1.90	.23	4.83	--	2.87	--	--	--	--	--	424	.58		69	4.7	740	7.7
Feb. 16-28		--	1.55	.25	3.31	--	2.72	--	--	--	--	--	310	.42		65	3.5	521	7.9
Mar. 1-12		--	1.55	.23	3.13	--	2.51	--	--	--	--	--	306	.42		64	3.3	519	7.9
Mar. 13-16		--	1.60	.20	2.70	--	2.47	--	--	--	--	--	269	.37		60	2.8	462	8.0
Mar. 17-23		--	1.95	.25	2.78	--	2.47	--	--	--	--	--	304	.41		56	2.7	516	7.9
Mar. 24-31		--	2.20	.31	3.09	--	2.51	--	--	--	--	--	342	.47		55	2.8	595	7.8
Apr. 1-12		18	2.10	.43	3.92	.08	2.16	.79	3.58	.02	.01	.07	390	.53		60	3.5	694	7.7
Apr. 13-19		--	2.10	.58	5.74	--	2.05	--	--	--	--	--	515	.70		68	5.0	921	7.8
Apr. 21-22		--	2.40	.51	6.74	--	2.05	--	--	--	--	--	597	.81		70	5.6	1,060	7.7
July 17-18		--	.39	.00	4.57	--	3.62	--	--	--	--	--	377	.51		92	10	498	8.2
July 19		--	.39	.00	6.92	--	a 4.43	--	--	--	--	--	494	.67		95	16	702	8.5

a Includes 0.27 equivalent per million of carbonate (CO_3).

LITTLE COLORADO RIVER BASIN--Continued

LITTLE COLORADO RIVER AT CAMERON, ARIZ.--Continued

Chemical analyses, January to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 27-28, 1957..		--	5.34	1.56	15.05	--	9.23	--	--	--	--	--	1,350	1.84		69	8.1	2,070	7.5
July 29-31.....		20	4.14	1.07	10.57	0.13	6.10	5.23	4.74	0.05	0.01	0.33	977	1.33		66	6.6	1,530	7.7
Aug. 2-5.....		--	6.14	1.97	8.00	--	9.21	--	--	--	--	--	1,100	1.50		50	4.0	1,680	7.6
Aug. 7-15, 17-31, Sept. 1-2		--	3.94	1.07	6.61	--	6.20	--	--	--	--	--	784	1.07		57	4.2	1,220	7.7
Sept. 3-4, 6-9....		--	3.89	.99	8.92	--	3.70	--	--	--	--	--	858	1.17		65	5.7	1,430	7.7
Sept. 10-12, 14-16		--	4.04	.90	10.96	--	2.85	--	--	--	--	--	1,030	1.40		69	7.0	1,640	7.8

VIRGIN RIVER BASIN

VIRGIN RIVER AT LITTLEFIELD, ARIZ.

LOCATION.--At gaging station, three-eights of a mile downstream from Beaverdam Wash, three-eights of a mile upstream from Littlefield, Mohave County, and 36 miles upstream from water line 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 1957.
Water temperatures: October 1947 to September 1957.
Sediment records: October 1947 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 3,740 micromhos Oct. 25, Aug. 26; minimum daily, 1,560 micromhos Feb. 24.
Percent sodium: Maximum, 36 Jan. 1-10, Feb. 1-10, 11-20, Mar. 11-20: minimum, 25 Aug. 21-31.
EXTREMES, 1949-57.--Specific conductance: Maximum daily, 4,090 micromhos Oct. 5, 1955; minimum daily, 734 micromhos Apr. 28, 1952.
Percent sodium (1953-57): Maximum, 36 Jan. 1-10, Feb. 1-10, 11-20, Mar. 11-20, 1957; minimum, 16 Aug. 11-20, 1955.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956...	1,190	25	17.40	9.40	11.57	0.74	4.21	24.15	10.58		0.04	1.1	2,450	3.33	3,860	30	3.2	3,260	7.6
Oct. 11-20	1,250	24	17.50	9.60	11.40	.74	4.41	23.94	10.58		.03	1.1	2,440	3.32	4,150	29	3.1	3,250	7.6
Oct. 21-31	1,710	24	18.70	9.30	13.27	.74	4.29	25.19	11.84		.05	1.1	2,610	3.55	6,070	32	3.5	3,470	7.6
Nov. 1-10	1,800	22	19.20	9.10	13.57	.72	4.72	24.98	12.27		.06	.98	2,640	3.59	6,460	32	3.6	3,520	7.7
Nov. 11-20.....	1,970	22	18.70	8.60	14.01	.72	4.75	24.36	12.46		.05	.96	2,610	3.55	6,990	33	3.8	3,490	7.6
Nov. 21-30.....	2,320	20	17.80	8.70	13.27	.69	5.20	22.90	11.90		.06	.95	2,500	3.40	7,890	33	3.6	3,390	7.7
Dec. 1-10.....	2,320	20	17.90	8.20	13.31	.72	5.43	22.28	12.07		.06	.92	2,480	3.37	7,820	33	3.7	3,360	7.7
Dec. 11-20.....	2,480	20	17.00	8.50	13.05	.69	5.56	21.44	11.62		.06	.94	2,400	3.26	8,080	33	3.7	3,280	7.6
Dec. 21-31.....	2,760	19	16.80	8.50	12.92	.69	5.74	21.24	11.51		.05	.92	2,390	3.25	8,970	33	3.6	3,250	7.6
Jan. 1-10, 1957..	2,790	23	15.40	7.90	13.31	.74	4.65	20.36	11.70		.06	.86	2,300	3.13	8,730	36	3.9	3,160	7.2
Jan. 11-20	4,790	21	14.50	6.00	10.57	.56	4.57	17.45	9.31		.05	.66	1,960	2.67	12,790	33	3.3	2,710	7.3
Jan. 21-31	4,390	20	13.10	6.80	11.14	.61	4.62	16.78	10.15		.05	.67	1,950	2.65	11,630	35	3.5	2,730	7.3
Feb. 1-10	3,620	19	13.10	6.90	11.66	.61	4.85	16.78	10.01		.05	.68	1,970	2.68	9,700	36	3.7	2,740	7.2
Feb. 11-20.....	4,440	19	11.60	6.20	10.18	.51	4.23	14.78	9.16		.06	.63	1,750	2.38	10,570	36	3.4	2,420	7.3
Feb. 21-28.....	5,640	17	11.30	4.90	7.83	.43	4.26	13.24	6.77		.05	.50	1,510	2.05	11,560	32	2.8	2,130	7.2
Mar. 1-10	4,550	17	11.80	6.00	9.92	.51	4.59	14.53	8.88		.05	.65	1,730	2.35	10,690	35	3.3	2,450	7.3

VIRGIN RIVER BASIN--Continued

VIRGIN RIVER AT LITTLEFIELD, ARIZ.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 11-20, 1957	3,240	19	13.00	7.00	11.48	0.59	4.75	16.61	10.15		0.04	0.79	1,960	2.67	8,650	36	3.6	2,740	7.3
Mar. 21-31	2,120	20	16.50	8.70	12.35	.72	5.11	21.44	11.00		.03	.97	2,350	3.20	6,780	32	3.5	3,150	7.3
Apr. 1-10	1,330	25	17.20	9.40	11.48	.79	4.20	23.73	10.72		.04	.97	2,430	3.30	4,390	30	3.1	3,180	7.3
Apr. 11-20.....	2,140	23	15.20	8.20	11.61	.74	4.46	19.82	11.00		.05	.82	2,200	2.99	6,400	32	3.4	3,000	7.4
Apr. 21-30	2,660	19	14.80	7.00	11.01	.67	5.03	18.36	10.29		.05	.79	2,080	2.83	7,530	33	3.3	2,870	7.6
May 1-10	3,370	20	12.80	6.20	9.92	.61	4.36	15.91	9.45		.06	.71	1,840	2.50	8,420	34	3.2	2,580	7.5
May 11-20	5,100	18	11.20	4.90	8.61	.49	4.34	13.16	8.18		.02	.57	1,570	2.14	10,910	34	3.0	2,240	7.8
May 21-31	6,770	18	9.60	3.90	6.83	.38	3.87	10.43	6.15		.06	.50	1,270	1.73	11,710	33	2.6	1,880	6.9
June 1-10	2,750	24	13.50	6.00	10.09	.59	3.67	17.59	9.16		.05	.91	1,910	2.60	7,150	33	3.2	2,630	7.0
June 11-20	4,630	23	17.10	6.30	9.96	.56	4.56	19.92	8.88		.07	.87	2,110	2.87	13,290	29	2.9	2,850	6.9
June 21-30	1,270	25	17.80	8.70	11.79	.74	4.20	23.94	10.86		.05	1.1	2,450	3.33	4,230	30	3.2	3,220	7.0
July 1-10	1,200	26	16.90	8.90	12.09	.77	3.31	24.15	10.72		.03	1.1	2,420	3.29	3,950	31	3.4	3,200	6.9
July 11-20	1,440	24	18.10	8.00	11.61	.72	4.06	24.15	10.58		.05	1.1	2,440	3.32	4,780	30	3.2	3,210	7.1
July 21-31	1,400	22	17.90	8.80	11.79	.77	4.13	23.94	10.72		.02	1.1	2,450	3.33	4,660	30	3.2	3,230	6.9
Aug. 1-10.....	1,290	23	17.50	8.50	11.92	.74	3.90	23.94	10.72		.03	1.1	2,430	3.30	4,260	31	3.3	3,230	7.0
Aug. 11-20.....	1,330	22	17.90	8.40	11.61	.74	4.29	23.73	10.72		.05	1.1	2,430	3.30	3,230	30	3.2	3,230	7.0
Aug. 21-31.....	6,410	23	23.00	8.00	10.44	.61	4.16	28.52	9.45		.04	.81	2,680	3.64	23,330	25	2.7	3,470	7.1
Sept. 1-10	1,310	26	16.40	9.30	11.61	.74	3.64	23.94	10.86		.04	1.1	2,410	3.28	4,300	31	3.2	3,240	7.0
Sept. 11-20	1,160	25	16.40	9.60	11.57	.77	3.70	23.53	10.72		.03	1.1	2,390	3.25	3,770	30	3.2	3,220	6.9
Sept. 21-30	1,240	25	16.80	9.00	11.79	.77	3.87	23.73	10.66		.04	1.0	2,410	3.28	4,070	31	3.3	3,230	7.0
Total or weighted average	100,200	21	15.02	7.07	10.79	0.61	4.47	19.05	9.73		0.05	0.80	2,080	2.83	283,600	32	3.2	2,840	--

GILA RIVER BASIN

GILA RIVER AT KELVIN, ARIZ.

LOCATION.--Just above mouth of Mineral Creek, and 1,200 feet upstream from gaging station at Kelvin, Pinal County, 17 miles downstream from San Pedro River, and 19½ miles upstream from Ashurst-Hayden Dam.
DRAINAGE AREA.--18,011 square miles, of which 5,125 square miles is below Coolidge Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 3,660 micromhos May 27; minimum daily, 500 micromhos Sept. 12.
Percent sodium: Maximum, 60 June 16-18; minimum, 10 Oct. 1-31, July 1-8.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 3,860 micromhos July 15, 1955; minimum daily, 407 micromhos Jan. 20, 1952.
Percent sodium: Maximum, 67 July 15, 1955; minimum, 9 July 11-18, Sept. 10-30, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1513. No appreciable inflow from Mineral Creek between sampling point and gaging station, except during periods of heavy local rains.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956...	62	42	27.15	10.77	4.35	0.18	4.65	34.35	2.62	0.03	0.01	0.15	2,850	3.88	241	10	1.0	2,950	7.6
Nov. 1-30.....	210	--	13.17	4.77	11.09	--	3.85	--	--	--	--	--	1,940	2.64	554	38	3.7	2,540	7.7
Dec. 1-31.....	434	--	11.58	4.19	11.01	--	3.84	--	--	--	--	--	1,770	2.41	1,050	41	3.9	2,370	7.5
Jan. 1-8, 1957....	152	34	9.83	3.70	9.53	.36	3.46	14.10	5.58	.11	.03	.28	1,530	2.08	316	41	3.7	2,080	7.6
Jan. 9.....	2,280	--	6.54	1.97	3.09	--	5.41	--	--	--	--	--	761	1.03	2,350	27	1.5	1,040	7.6
Jan. 10-11.....	3,270	--	3.54	.90	1.44	--	3.47	--	--	--	--	--	362	.49	1,600	24	1.0	543	7.4
Jan. 12.....	91	--	6.04	2.06	3.92	--	3.13	--	--	--	--	--	752	1.02	93	33	1.9	1,100	7.4
Jan. 13-14.....	77	--	8.93	3.45	7.57	--	3.70	--	--	--	--	--	1,300	1.77	136	38	3.0	1,820	7.7
Jan. 15.....	28	--	7.24	2.55	5.31	--	3.56	--	--	--	--	--	970	1.32	37	35	2.4	1,400	7.4
Jan. 16-28.....	298	--	11.18	4.52	9.27	--	4.43	--	--	--	--	--	1,610	2.19	653	37	3.3	2,200	7.9
Jan. 29.....	65	--	3.89	1.32	3.31	--	2.82	--	--	--	--	--	547	.74	48	39	2.1	834	7.7
Jan. 30.....	274	--	4.99	1.81	4.61	--	3.82	--	--	--	--	--	711	.97	266	40	2.5	1,080	8.2
Jan. 31.....	313	--	7.34	2.96	7.00	--	4.11	--	--	--	--	--	1,080	1.47	460	40	3.1	1,580	7.9
Feb. 1.....	155	--	6.24	2.71	5.57	--	3.92	--	--	--	--	--	917	1.25	194	38	2.6	1,360	7.8
Feb. 2.....	89	--	7.73	3.13	6.92	--	3.92	--	--	--	--	--	1,140	1.55	138	39	3.0	1,650	7.5

GILA RIVER BASIN--Continued

GILA RIVER AT KELVIN, ARIZ.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Feb. 3-5, 1957	184	--	8.43	3.54	8.00	--	3.84	--	--	--	--	--	1,290	1.75	322	40	3.3	1,830	8.1
Feb. 6-18	397	--	10.03	4.28	9.40	--	3.82	--	--	--	--	--	1,550	2.11	838	40	3.5	2,140	7.9
Feb. 19	95	--	5.89	2.06	3.65	--	2.18	--	--	--	--	--	752	1.02	97	31	1.8	1,080	7.5
Feb. 20	38	--	8.13	2.96	6.87	--	3.56	--	--	--	--	--	1,170	1.59	60	38	2.9	1,650	7.4
Feb. 21-28	272	--	9.28	3.54	8.83	--	3.61	--	--	--	--	--	1,420	1.93	525	41	3.5	1,980	7.9
Mar. 1-8	192	--	9.98	3.62	11.09	--	4.15	--	--	--	--	--	1,670	2.27	436	45	4.3	2,260	7.8
Mar. 9-20	6,410	--	4.54	1.64	8.26	--	4.02	--	--	--	--	--	911	1.24	7,950	57	4.7	1,530	7.7
Mar. 21-31	1,550	--	6.24	2.80	9.83	--	4.64	--	--	--	--	--	1,210	1.65	2,560	52	4.6	1,880	7.9
Apr. 1-5	173	35	7.63	4.03	11.14	0.36	3.03	12.43	7.81	0.08	0.03	0.38	1,540	2.09	362	48	4.6	2,170	7.9
Apr. 6-30	374	--	17.12	6.58	9.05	--	4.02	--	--	--	--	--	2,290	3.11	1,160	28	2.6	2,740	7.7
May 1-31	152	--	18.21	6.25	8.66	--	3.69	--	--	--	--	--	2,330	3.17	482	26	2.5	2,740	7.7
June 1-15	20	--	26.05	9.87	4.78	--	3.70	--	--	--	--	--	2,890	3.93	79	12	1.1	2,930	7.7
June 16-18	167	--	6.44	2.55	13.75	--	3.10	--	--	--	--	--	1,450	1.97	329	60	6.5	2,380	8.1
June 19-30	25	--	27.15	9.54	5.26	--	5.46	--	--	--	--	--	2,930	3.98	100	13	1.2	3,040	7.6
July 1-8	11	42	28.34	10.36	4.35	.20	3.64	38.31	1.89	.02	.01	.21	3,080	4.19	46	10	1.0	3,040	7.7
July 9-11	33	--	19.41	4.28	4.61	--	2.54	--	--	--	--	--	1,980	2.69	89	16	1.3	2,210	7.4
July 12-13	.8	--	28.54	10.12	4.74	--	5.80	--	--	--	--	--	3,050	4.15	3	11	1.1	3,080	7.7
July 14-20	2.6	--	28.04	10.03	4.70	--	5.62	--	--	--	--	--	2,950	4.01	10	11	1.1	3,030	7.5
July 30-31	984	--	3.49	.90	4.26	--	3.84	--	--	--	--	--	543	.74	728	49	2.9	875	7.9
Aug. 1-10	6,500	--	4.39	1.23	3.04	--	4.90	--	--	--	--	--	552	.75	4,880	35	1.8	841	7.8
Aug. 11-22	13,570	--	3.74	1.15	2.61	--	4.51	--	--	--	--	--	465	.63	8,550	35	1.7	720	7.5
Aug. 23-31	4,970	--	3.29	.82	2.61	--	3.69	--	--	--	--	--	425	.58	2,880	39	1.8	660	7.8
Sept. 1-30	18,940	--	2.40	.63	2.44	--	2.98	--	--	--	--	--	356	.48	9,090	45	2.0	552	7.9
Total or weighted average	a 62,840	--	4.09	1.32	3.70	--	3.90	--	--	--	--	--	583	0.79	49,640	41	2.3	886	--
Total or weighted average	b 67,470	--	4.09	1.32	3.70	--	3.90	--	--	--	--	--	580	0.79	53,300	41	2.3	886	--

a Average for 356 days of flow which includes 93 percent of total runoff.

b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

GILA RIVER BASIN--Continued

SALT RIVER AT STEWART MOUNTAIN DAM, ARIZ.

LOCATION.--Just below dam, 3½ miles above gaging station below Stewart Mountain Dam which is 6 miles upstream from Verde River, Maricopa County.
DRAINAGE AREA.--6,211 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,950 micromhos Dec. 30; minimum daily, 1,220 micromhos Sept. 13-17.
Percent sodium: Maximum, 72 Dec. 1 to Feb. 8; minimum, 69 Oct. 1-12, Aug. 16 to Sept. 17.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 2,490 micromhos Aug. 20, 1951; minimum daily, 620 micromhos Mar. 28, 1953.
Percent sodium: Maximum, 76 July 21-31, Aug. 11-26, 1951; minimum, 53 Mar. 21-31, Apr. 11-30, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for gaging station below Stewart Mountain Dam for water year October 1956 to September 1957 given in WSP 1513. No inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-12, 1956...	10,570	19	2.79	1.97	11.22	0.19	2.98	1.33	11.73	0.02	0.03	0.18	926	1.26	13,320	69	7.2	1,720	7.6
Oct. 13-31	7,320	--	2.99	2.06	12.53	--	3.10	--	--	--	--	--	1,010	1.37	10,030	71	7.9	1,850	7.7
Nov. 1-30.....	5,620	--	3.09	2.30	13.14	--	3.16	--	--	--	--	--	1,050	1.43	8,040	71	8.0	1,920	7.8
Dec. 1-Feb. 8, 1957 [a].....	22,630	--	3.14	2.06	13.31	--	3.21	--	--	--	--	--	1,050	1.43	32,360	72	8.3	1,940	8.0
Feb. 20-26, Mar. 28-Apr. 30[a]	31,510	19	3.19	1.81	12.09	.19	3.15	1.50	12.92	.02	.03	.18	1,040	1.41	44,430	70	7.6	1,880	7.8
May 1-9, 11-13, June 4-30[a].....	54,080	--	2.99	1.97	12.31	--	3.05	--	--	--	--	--	1,050	1.43	77,330	71	7.8	1,850	7.9
July 1-31.....	73,850	--	2.79	1.97	11.83	--	2.70	--	--	--	--	--	999	1.36	100,400	71	7.6	1,760	7.9
Aug. 1-15.....	39,220	--	2.79	1.32	9.92	--	2.74	--	--	--	--	--	877	1.19	46,670	71	6.9	1,550	7.8
Aug. 16-31.....	43,190	--	2.59	1.15	8.40	--	2.64	--	--	--	--	--	759	1.03	44,490	69	6.1	1,350	7.7
Sept. 1-17.....	49,970	--	2.50	1.07	8.09	--	2.52	--	--	--	--	--	704	.96	47,970	69	6.1	1,250	7.9
Sept. 18-30.....	23,250	--	2.45	1.15	8.92	--	2.43	--	--	--	--	--	773	1.05	24,410	71	6.6	1,380	7.8
Total or weighted average	361,300	--	2.79	1.64	10.70	--	2.80	--	--	--	--	--	915	1.24	448,000	71	7.2	1,630	--

a No flow Feb. 9-19, Feb. 27 to Mar. 27, May 10, May 14 to June 3.

GILA RIVER BASIN--Continued

VERDE RIVER BELOW BARTLETT DAM, ARIZ.

LOCATION.--At gaging station 2¼ miles downstream from Bartlett Dam, Maricopa County, and 3½ miles upstream from Camp Creek.
DRAINAGE AREA.--6,188 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 958 micromhos Nov. 10; minimum daily, 286 micromhos May 1.
Percent sodium: Maximum, 28 Oct. 1-31; minimum, 16 Apr. 13 to May 31.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 958 micromhos Nov. 10, 1956; minimum daily, 234 micromhos Jan. 13, 15, 1952.
Percent sodium: Maximum, 31 July 21-31, 1951, Nov. 1-20, 1953; minimum, 12 Jan. 4-20, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956...	6,410	28	2.40	3.37	2.26	0.11	4.98	2.00	0.99	0.03	0.01	0.28	443	0.60	3,850	28	1.3	729	8.2
Nov. 1-8.....	3,240	--	2.54	3.45	2.13	--	5.18	--	--	--	--	--	428	.58	1,880	26	1.2	720	7.9
Nov. 9-14.....	299	--	3.64	3.95	2.44	--	6.80	--	--	--	--	--	526	.72	215	24	1.3	875	7.8
Nov. 15-30.....	2,390	--	2.99	3.54	2.09	--	5.69	--	--	--	--	--	450	.61	1,460	24	1.2	758	7.8
Dec. 1-12.....	545	--	3.29	4.28	2.61	--	6.65	--	--	--	--	--	519	.71	387	26	1.3	876	8.1
Dec. 13-17.....	5,000	--	2.59	3.45	1.87	--	5.33	--	--	--	--	--	408	.55	2,750	24	1.1	694	8.2
Dec. 18-21.....	240	--	3.74	4.52	2.70	--	7.00	--	--	--	--	--	550	.75	180	25	1.3	929	7.6
Dec. 22-31.....	460	--	3.14	4.03	2.48	--	6.16	--	--	--	--	--	488	.66	304	26	1.3	823	8.0
Jan. 1-16, 1957...	1,070	23	2.89	3.04	1.74	.09	5.33	1.48	.79	.02	.02	.26	414	.56	599	22	1.0	688	8.0
Jan. 17-24.....	1,570	--	2.30	2.38	1.30	--	4.28	--	--	--	--	--	330	.45	706	22	.8	545	8.2
Jan. 25-30.....	597	--	1.90	1.73	.96	--	3.34	--	--	--	--	--	264	.36	215	21	.7	426	8.1
Jan. 31.....	42	--	2.35	2.30	1.30	--	4.25	--	--	--	--	--	332	.45	19	22	.9	542	8.1
Feb. 1-4.....	204	--	2.35	2.38	1.30	--	4.26	--	--	--	--	--	325	.44	90	22	.8	546	8.1
Feb. 5-9.....	401	--	1.85	1.73	.91	--	3.21	--	--	--	--	--	255	.35	140	20	.7	422	7.9
Feb. 10.....	135	--	1.85	1.73	.87	--	3.16	--	--	--	--	--	234	.32	43	20	.7	413	7.8
Feb. 11-28.....	6,790	--	1.65	1.32	.65	--	2.56	--	--	--	--	--	203	.28	1,900	18	.5	333	7.9
Mar. 1-31.....	53,620	--	1.65	1.32	.65	--	2.61	--	--	--	--	--	208	.28	15,010	18	.5	337	7.8
Apr. 1-12.....	12,870	19	1.65	1.23	.61	.06	2.61	.58	.34	.02	.03	.23	206	.28	3,600	17	.5	332	7.8

Apr. 13-30, 1957..	7,380	--	1.50	1.15	.52	--	2.38	--	--	--	--	--	184	.25	1,840	16	.5	296	8.0
May 1-31.....	41,640	--	1.50	1.15	.52	--	2.44	--	--	--	--	--	188	.26	10,830	16	.5	296	7.9
June 1-30	51,270	--	1.65	1.23	.61	--	2.67	--	--	--	--	--	206	.28	14,360	17	.5	325	8.1
July 1-21	33,330	--	1.80	1.64	.74	--	3.00	--	--	--	--	--	239	.33	11,000	18	.6	377	8.2
July 22-23	335	--	1.85	1.64	.83	--	3.15	--	--	--	--	--	247	.34	114	19	.6	394	8.2
July 24-31.....	8,660	--	1.85	1.73	.87	--	3.23	--	--	--	--	--	250	.34	2,940	20	.7	411	8.0
Aug. 1-3.....	4,600	--	2.00	1.56	.96	--	3.41	--	--	--	--	--	262	.36	1,660	21	.7	428	8.2
Aug. 4-29.....	18,840	--	2.20	1.73	1.17	--	3.74	--	--	--	--	--	292	.40	7,540	23	.8	479	8.2
Aug. 30-31.....	1,570	--	2.20	2.06	1.35	--	3.97	--	--	--	--	--	325	.44	691	24	.9	517	8.1
Sept. 1-30.....	18,620	--	2.35	2.14	1.48	--	a 4.18	--	--	--	--	--	346	.47	8,750	25	1.0	555	8.3
Total or weighted average	282,200	--	1.80	1.56	0.83	--	3.05	--	--	--	--	--	242	0.33	93,130	20	0.6	389	--

a Includes 0.10 equivalent per million of carbonate (CO_3).

GILA RIVER BASIN--Continued

AGUA FRIA RIVER BELOW LAKE PLEASANT DAM, ARIZ.

LOCATION.--At water-stage recorder on canal 1¼ miles downstream from Lake Pleasant Dam on Agua Fria River, 19 miles north of Marinette, Maricopa County, and 23 miles upstream from New River.
DRAINAGE AREA.--1,459 square miles (above Lake Pleasant).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 501 micromhos Sept. 19; minimum daily, 362 micromhos June 30.
Percent sodium: Maximum, 37 June 23-28; minimum, 25 June 29 to July 3.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 698 micromhos Oct. 19, 1955; minimum daily, 241 micromhos Jan. 29, 1952.
Percent sodium: Maximum, 37 June 23-28, 1957; minimum, 14 Jan. 29-31, Feb. 1-10, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Samples collected from diversion canal when there is flow. Records of discharge furnished by Maricopa County Water District through Surface Water Branch, Tucson District for water year October 1956 to September 1957. Monthly diversions to canal below Lake Pleasant diversion dam are published as Agua Fria River at Lake Pleasant Dam in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 23-28, 1957[a]	856		1.55	1.15	1.61		3.08						262	0.36	308	37	1.4	428	7.6
June 29-July 3....	874		1.45	1.40	.96		2.16						240	.33	288	25	.8	375	7.3
July 4-31.....	4,920	20	2.00	1.07	1.17	0.13	3.18	0.62	0.56	0.03	0.04	0.14	266	.36	1,770	27	.9	418	7.8
Aug. 1-31.....	5,370		2.10	1.15	1.22		3.23						268	.36	1,930	27	1.0	439	7.8
Sept. 1-25.....	5,050		2.20	1.23	1.30		3.43						290	.39	1,970	27	1.0	467	7.7
Total or weighted average	17,060	--	2.05	1.15	1.22	--	3.21	--	--	--	--	--	272	0.37	6,310	28	1.0	437	--

a No flow Oct. 1 to June 22, Sept. 26-30.

GILA RIVER BASIN--Continued

GILA RIVER BELOW GILLESPIE DAM, ARIZ.

LOCATION.--About 1 mile below gaging station on Gila Bend Canal which is 200 feet below 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.--49,620 square miles (above gaging station).

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.

EXTREMES, 1956-57.--Specific conductance: Maximum daily, 9,580 micromhos Nov. 17, 18; minimum daily, 1,790 micromhos Aug. 23.
Percent sodium: Maximum, 69 July 2-16, Aug. 1-10, Aug. 29 to Sept. 30; minimum, 61 Jan. 14.

EXTREMES, 1950-57.--Specific conductance: Maximum daily, 10,200 micromhos Oct. 3, 1951; minimum daily, 370 micromhos Aug. 2, 1955.
Percent sodium: Maximum, 70 July 27-31, 1956; minimum, 36 Jan. 23-24, 1952.

REMARKS.--Values reported for dissolved solids are residues on evaporation at 180° C. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. 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. Records of separate and combined discharge for the river and canals for water year October 1956 to September 1957 given in WSP 1513.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956...	823	26	18.61	13.65	67.86	0.28	4.87	30.61	63.73	0.15	0.55	3.7	6,070	8.26	6,800	68	17	9,050	7.7
Nov. 1-24.....	756	--	19.71	16.53	70.04	--	5.82	--	--	--	--	--	6,510	8.98	6,790	66	16	9,480	7.8
Nov. 25-30.....	216	--	18.61	15.05	63.94	--	5.62	--	--	--	--	--	6,050	8.31	1,790	66	16	8,840	7.9
Dec. 1-6.....	222	--	17.42	15.87	67.86	--	4.34	--	--	--	--	--	5,920	8.05	1,790	67	17	8,740	7.8
Dec. 7-31.....	924	--	18.81	16.78	70.47	--	5.61	--	--	--	--	--	6,260	8.51	7,860	66	17	9,240	7.8
Jan. 1-11, 1957...	424	30	20.11	13.57	66.99	.31	6.16	30.40	64.58	.14	.71	3.7	6,270	8.53	3,620	66	16	9,080	7.8
Jan. 12	46	--	16.17	11.60	51.33	--	4.98	--	--	--	--	--	4,910	6.68	307	65	14	7,300	6.9
Jan. 13	210	--	10.68	7.24	32.93	--	3.69	--	--	--	--	--	3,160	4.30	903	65	11	4,950	7.2
Jan. 14	101	--	8.03	4.28	19.23	--	3.23	--	--	--	--	--	1,980	2.69	272	61	7.8	3,080	7.9
Jan. 15-16	125	--	15.37	10.44	47.85	--	5.21	--	--	--	--	--	4,550	6.19	774	65	13	6,760	8.0
Jan. 17-30	886	--	19.31	14.56	65.68	--	5.87	--	--	--	--	--	6,200	8.43	7,470	66	16	8,940	7.8
Jan. 31-Feb. 19 ..	1,030	--	19.11	14.39	63.94	--	5.57	--	--	--	--	--	5,980	8.13	8,370	66	16	8,830	7.9
Feb. 20-22.....	190	--	15.77	11.27	49.59	--	4.97	--	--	--	--	--	4,710	6.41	1,220	65	13	7,120	7.7
Feb. 23-28.....	309	--	19.81	13.49	62.20	--	5.77	--	--	--	--	--	5,880	8.00	2,470	65	15	8,670	7.9
Mar. 1-31	1,640	--	17.22	13.32	58.72	--	5.03	--	--	--	--	--	5,690	7.74	12,690	66	15	8,300	7.7

GILA RIVER BASIN--Continued

GILA RIVER BELOW GILLESPIE DAM, ARIZ.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-4, 1957	196	23	15.77	15.77	61.77	0.26	4.16	27.69	59.50	0.13	0.39	2.2	5,670	7.71	1,510	66	16	8,380	7.7
Apr. 5-7	91	33	11.98	9.46	44.37	.22	4.10	19.63	40.33	.21	.60	4.2	4,040	5.49	500	67	14	6,150	7.9
Apr. 8-28	992	--	17.32	14.97	63.51	--	5.18	--	--	--	--	--	5,800	7.89	7,830	66	16	8,510	7.8
Apr. 29-May 31	868	--	17.42	14.31	63.08	--	5.24	--	--	--	--	--	5,950	8.09	7,020	67	16	8,590	7.9
June 1-13	230	--	16.17	17.11	67.42	--	4.57	--	--	--	--	--	6,160	8.38	1,930	67	17	9,060	7.6
June 14-23	208	--	15.07	14.06	62.20	--	4.33	--	--	--	--	--	5,670	7.71	1,600	68	16	8,240	7.6
June 24-July 1	137	--	16.47	15.21	66.99	--	4.28	--	--	--	--	--	6,070	8.26	1,130	68	17	8,810	7.6
July 2-16	269	--	14.77	13.98	62.64	--	3.88	--	--	--	--	--	5,660	7.70	2,070	69	17	8,300	7.6
July 17-31	317	--	16.37	15.54	66.12	--	4.39	--	--	--	--	--	5,990	8.15	2,580	67	17	8,680	7.8
Aug. 1-10	219	--	16.62	11.76	69.94	--	4.11	--	--	--	--	--	5,820	7.92	1,730	69	17	8,420	7.7
Aug. 11-16	258	--	9.88	6.25	33.80	--	3.62	--	--	--	--	--	3,180	4.32	1,110	68	12	4,830	7.7
Aug. 17-18	192	--	4.29	1.97	11.79	--	1.95	--	--	--	--	--	1,170	1.59	305	65	6.6	1,910	7.7
Aug. 19	93	--	7.39	4.36	22.40	--	2.87	--	--	--	--	--	2,220	3.02	281	66	9.2	3,430	7.3
Aug. 20-21	161	--	16.27	10.94	53.07	--	5.36	--	--	--	--	--	5,230	7.11	1,140	66	14	7,520	8.1
Aug. 22-23	240	--	4.29	1.81	10.61	--	2.38	--	--	--	--	--	1,100	1.50	360	63	6.1	1,790	8.0
Aug. 24	109	--	4.64	1.48	12.18	--	3.51	--	--	--	--	--	1,240	1.69	184	67	7.0	1,900	7.6
Aug. 25	87	--	11.98	7.07	38.67	--	5.00	--	--	--	--	--	3,600	4.90	426	67	13	5,410	7.8
Aug. 26	56	--	11.88	7.15	39.11	--	5.02	--	--	--	--	--	3,640	4.95	277	67	13	5,420	7.9
Aug. 27-28	65	--	17.42	11.35	58.72	--	5.80	--	--	--	--	--	5,560	7.56	491	67	15	7,980	8.1
Aug. 29-Sept. 30	882	--	17.12	12.25	65.25	--	4.82	--	--	--	--	--	6,010	8.17	7,210	69	17	8,640	7.9
Total or weighted average	13,580	--	16.82	13.24	60.03	--	5.00	--	--	--	--	--	5,560	7.56	102,700	67	15	8,150	--

PART 10. THE GREAT BASIN

SEVIER LAKE BASIN

SEVIER RIVER NEAR LYNNDYL, UTAH

LOCATION.--At bridge on State Highway 125, 1½ miles upstream from gaging station, which is 3½ miles southwest of Lynndyl, Millard County.
DRAINAGE AREA.--6,270 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 4,180 micromhos Jan. 20; minimum daily, 1,410 micromhos Feb. 10-12.
Percent sodium: Maximum, 56 May 31, June 1-10, 11-20; minimum, 42 Dec. 11-20.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 7,040 micromhos Jan. 21, 1955; minimum daily, 855 micromhos Mar. 11, 1955.
Percent sodium: Maximum, 61 Sept. 11-20, 1955; minimum, 34 Apr. 17-20, 1956.
REMARKS.--Values reported for dissolved solids are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1514.
REVISION.--WSP 1485, 1956: The bicarbonate value for Apr. 17-20, should read,"Includes 0.27 equivalent per million of carbonate (CO_3).", instead of 8 equivalents per million as reported.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956...	651	14	3.64	6.52	9.09	0.14	4.47	5.79	9.16		0.04	0.27	1,120	1.52	990	47	4.0	1,880	7.8
Oct. 11-20	738	14	3.48	6.36	7.96	.13	4.41	5.23	8.32		.03	.22	1,030	1.40	1,030	44	3.6	1,730	7.7
Oct. 21-31	900	13	3.92	6.64	8.05	.14	4.62	5.62	8.60		.06	.22	1,080	1.47	1,320	43	3.5	1,820	7.8
Nov. 1-10.....	744	13	4.08	6.84	8.61	14	4.75	5.85	9.31		.05	.24	1,140	1.55	1,150	44	3.7	1,900	7.9
Nov. 11-20.....	795	15	4.36	7.04	8.96	.14	4.95	6.12	9.59		.05	.23	1,190	1.62	1,290	44	3.8	1,980	7.9
Nov. 21-30.....	823	16	4.40	6.28	8.26	.10	5.02	5.18	8.46		.04	.15	1,080	1.47	1,210	43	3.6	1,810	7.9
Dec. 1-10.....	831	16	4.56	6.48	8.53	.11	5.16	5.34	8.74		.05	.20	1,120	1.52	1,260	43	3.6	1,850	7.8
Dec. 11-20.....	881	16	4.40	6.20	7.74	.11	4.90	5.06	8.18		.04	.19	1,040	1.41	1,240	42	3.4	1,750	7.7
Dec. 21-31.....	932	16	4.88	7.60	9.96	.12	5.31	6.48	10.43		.04	.20	1,280	1.74	1,620	44	4.0	2,100	7.9
Jan. 1-10, 1957...	419	17	6.56	10.32	19.97	.15	5.67	11.64	19.04		.04	.44	2,140	2.91	1,220	54	6.9	3,450	7.9
Jan. 11-20	345	22	7.60	11.40	23.45	.19	6.26	13.70	21.86		.04	.54	2,480	3.37	1,160	55	7.6	3,920	7.2
Jan. 21-31	371	22	8.10	11.90	23.66	.20	6.83	14.03	22.70		.04	.56	2,570	3.50	1,300	54	7.5	4,030	7.3
Feb. 1-8.....	276	21	7.70	11.10	23.06	.19	6.23	13.66	21.70		.04	.53	2,460	3.35	925	55	7.5	3,860	7.5
Feb. 9-12.....	290	14	3.70	4.40	6.31	.09	4.06	3.91	6.49		.05	.20	834	1.13	328	44	3.1	1,420	7.2
Feb. 13-20.....	508	15	5.10	7.70	11.53	.18	4.41	8.16	11.70		.04	.27	1,430	1.94	986	47	4.6	2,290	7.4

SEVIER LAKE BASIN--Continued

SEVIER RIVER NEAR LYNNDYL, UTAH--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 21-28, 1957	674	15	4.80	8.40	10.92	0.15	4.85	7.79	11.42		0.03	0.27	1,400	1.90	1,280	45	4.3	2,270	7.4
Mar. 1-10	849	15	5.06	7.58	10.88	.16	4.92	7.29	11.14		.04	.30	1,360	1.85	1,570	46	4.3	2,210	7.6
Mar. 11-20	660	18	5.42	8.02	12.53	.17	5.11	8.04	12.69		.04	.33	1,510	2.05	1,350	48	4.8	2,440	7.6
Mar. 21-31	460	19	6.46	9.74	18.18	.19	5.08	11.37	18.05		.04	.47	2,030	2.76	1,270	53	6.4	3,280	7.5
Apr. 1-10	393	18	6.68	10.04	18.44	.21	5.38	11.41	18.33		.03	.50	2,070	2.82	1,110	52	6.4	3,330	7.6
Apr. 11-16	268	16	5.56	8.88	15.66	.20	5.15	9.45	15.51		.03	.43	1,760	2.39	641	52	5.8	2,840	7.5
Apr. 17-20	240	17	4.52	7.04	10.74	.15	4.92	6.52	10.94		.03	.32	1,300	1.77	425	48	4.5	2,130	7.5
Apr. 21-26	593	16	3.72	5.52	7.18	.11	4.34	4.39	7.61		.02	.21	940	1.28	759	43	3.3	1,600	7.6
Apr. 27-30, May 1-10	4,000	19	4.44	7.26	11.79	.17	4.82	7.29	11.51		.05	.32	1,380	1.88	7,520	50	4.9	2,260	7.5
May 11-21	10,890	25	4.50	6.18	13.53	.17	5.02	7.37	11.79		.13	.40	1,440	1.96	21,340	55	5.8	2,310	7.5
May 22-27	2,050	23	5.14	7.36	15.70	.19	4.90	9.24	14.24		.09	.46	1,690	2.30	4,720	55	6.3	2,720	7.7
May 28-30	581	15	3.16	5.26	6.70	.13	4.54	3.91	6.77		.03	.24	867	1.18	686	44	3.3	1,460	7.7
May 31, June 1-10	10,650	21	4.28	5.76	12.83	.16	4.85	6.70	11.28		.12	.39	1,350	1.84	19,600	56	5.7	2,220	7.6
June 11-20	2,270	20	4.56	6.24	13.96	.16	4.84	7.85	12.41		.07	.40	1,480	2.01	4,560	56	6.0	2,400	8.0
June 21-30	4,560	23	3.96	4.48	10.40	.13	4.62	5.64	8.74		.14	.30	1,130	1.54	7,020	55	5.1	1,820	8.0
July 1-10	11,700	21	3.80	3.88	8.66	.12	4.52	4.68	7.33		.12	.27	976	1.33	15,560	53	4.4	1,620	8.0
July 11-20	4,050	20	3.80	4.60	9.57	.13	4.52	5.39	8.32		.06	.30	1,070	1.46	5,910	53	4.7	1,780	7.9
July 21-31	4,860	18	3.80	3.92	8.57	.13	4.31	4.85	7.47		.06	.26	975	1.33	6,460	52	4.4	1,610	8.1
Aug. 1-10	5,350	20	4.12	3.76	8.96	.11	4.52	4.79	7.33		.08	.28	990	1.35	7,220	53	4.5	1,660	7.6
Aug. 11-20	3,640	21	2.48	5.36	9.35	.12	4.49	4.96	7.47		.08	.30	999	1.36	4,950	54	4.7	1,690	7.5
Aug. 21-31	4,980	20	3.44	5.12	10.35	.12	4.65	5.37	8.60		.08	.33	1,100	1.50	7,470	54	5.0	1,860	7.5
Sept. 1-10	914	18	5.24	6.92	15.18	.16	5.03	8.41	13.54		.05	.43	1,600	2.18	1,990	55	6.1	2,630	7.7
Sept. 11-20	466	16	3.80	8.88	14.70	.15	5.00	8.45	14.10		.04	.42	1,600	2.18	1,020	53	5.8	2,670	7.6
Sept. 21-30	680	13	3.52	6.48	9.70	.10	4.56	5.66	9.59		.04	.30	1,140	1.55	1,050	49	4.3	1,950	7.6
Total or weighted average	85,270	20	4.14	5.59	11.05	0.14	4.74	6.20	9.87		0.09	0.32	1,230	1.67	142,400	53	5.0	2,020	--

HUMBOLDT RIVER BASIN

HUMBOLDT RIVER NEAR RYE PATCH, NEV.

LOCATION.--Below Rye Patch Dam, 1,000 feet upstream from gaging station, and 2 miles northwest of Rye Patch, Pershing County.
DRAINAGE AREA.--13,700 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1951 to September 1957.
Water temperatures: December 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,340 micromhos Jan. 21; minimum daily, 468 micromhos Feb. 14.
Percent sodium: Maximum, 59 Dec. 10-13, 18, Mar. 1-10, Apr. 25; minimum, 48 June 11-20, 21-30, July 11-20.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 4,010 micromhos Sept. 2, 1954; minimum daily, 384 micromhos June 24, 1956.
Percent sodium: Maximum, 71 Sept. 1-5, 1954; minimum, 21 June 24, 1956.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1514. No appreciable inflow between gaging station and sampling point except during periods of local rains.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	1,570	38	2.36	1.48	4.48	0.38	5.57	1.48	1.75		0.02	0.51	541	0.74	1,160	51	3.2	841	8.1
Oct. 11-20	1,040	43	2.88	1.60	5.18	.31	5.36	1.67	3.05		.02	.54	615	.84	874	52	3.5	982	8.0
Oct. 21-31	13	42	2.64	1.56	5.18	.28	5.29	1.67	2.88		.02	.62	596	.81	11	54	3.6	859	8.0
Nov. 1-10	16	44	2.88	1.60	5.39	.31	5.31	1.71	3.33		.02	.58	638	.87	14	53	3.6	1,020	8.1
Nov. 11-20.....	16	38	2.32	1.48	4.70	.38	a 5.57	1.50	1.83		.02	.55	561	.76	12	53	3.4	863	8.4
Nov. 21-30.....	16	40	2.28	1.46	5.09	.41	5.56	1.52	1.97		.01	.59	559	.76	12	55	3.7	874	8.2
Dec. 1-9	12	40	2.36	1.50	5.31	.41	5.67	1.60	2.12		.01	.60	579	.79	9	55	3.8	896	8.1
Dec. 10-13, 18 ..	6.9	52	3.48	1.48	7.31	.18	5.16	1.89	5.13		.02	.72	752	1.02	7	59	4.6	1,210	--
Dec. 14-17, 19-20	8.3	29	1.72	1.14	4.18	.31	4.26	1.19	1.78		.01	.48	438	.60	5	57	3.5	700	8.1
Dec. 21-31.....	15	40	2.40	1.52	5.61	.43	5.72	1.64	2.40		.02	.60	598	.81	12	56	4.0	935	8.2
Jan. 1-10, 1957 .	12	40	2.36	1.64	5.74	.43	5.77	1.64	2.54		.02	.66	623	.85	10	56	4.1	962	8.1
Jan. 11-19	11	44	2.44	1.62	6.00	.43	5.93	1.73	2.68		.00	.67	b625	.85	9	57	4.2	978	7.7
Jan. 20-31	14	53	3.40	1.78	7.13	.17	5.28	1.98	5.36		.00	.68	b759	1.03	14	57	4.4	1,220	7.4
Feb. 1-10.....	12	51	3.40	1.80	7.26	.18	5.24	1.94	5.36		.00	.67	b757	1.03	12	57	4.5	1,230	7.5
Feb. 11-12, 16-20	8.3	42	2.60	1.70	6.35	.33	5.38	1.77	3.81		.01	.64	647	.88	7	58	4.3	1,060	7.7
Feb. 13-15.....	3.6	24	1.38	.96	3.52	.25	3.31	1.02	1.80		.01	.50	374	.51	2	58	3.3	617	7.6

a Includes 0.3 equivalent per million of carbonate (CO_3).

HUMBOLDT RIVER BASIN--Continued

HUMBOLDT RIVER NEAR RYE PATCH, NEV.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons				
Feb. 21-28, 1957	9.5	39	2.34	1.68	6.18	0.43	5.64	1.81	3.38		0.02	0.69	b643	0.87	8	58	4.4	1,010	7.8
Mar. 1-10	12	39	2.56	1.46	6.48	.49	5.70	1.83	3.24		.01	.74	b651	.89	10	59	4.6	1,030	7.9
Mar. 11-20	12	39	2.60	1.42	6.05	.43	5.69	1.75	3.07		.01	.75	632	.86	10	58	4.3	1,020	7.9
Mar. 21-31	13	40	2.50	1.50	6.18	.49	5.62	1.75	3.10		.01	.75	632	.86	11	58	4.4	1,020	7.9
Apr. 1-10	1,700	36	2.50	1.52	6.31	.46	5.67	1.79	3.13		.00	.75	633	.86	1,460	58	4.5	1,020	8.0
Apr. 11-20.....	6,590	39	2.60	1.44	6.13	.43	5.57	1.73	3.16		.00	.79	640	.87	5,730	58	4.3	1,020	7.6
Apr. 21-24, 26-30	6,240	39	2.48	1.44	5.83	.38	5.39	1.73	2.96		.01	.66	616	.84	5,240	58	4.2	976	7.8
Apr. 25	720	38	2.52	1.40	6.13	.41	5.44	1.67	3.16		.01	--	b619	.84	605	59	4.4	--	7.6
May 1-10	12,830	35	2.36	1.28	5.05	.36	5.02	1.58	2.54		.01	.56	559	.76	9,750	56	3.7	884	7.7
May 11-20.....	9,010	34	2.40	1.18	4.48	.31	4.74	1.44	2.12		.01	.50	505	.69	6,220	54	3.3	797	7.7
May 21-31.....	7,990	34	2.38	1.16	4.05	.31	4.61	1.33	1.83		.00	.46	480	.65	5,190	51	3.0	757	7.6
June 1-10	7,730	37	2.46	1.14	3.78	.31	4.59	1.37	1.78		.01	.39	477	.65	5,020	49	2.8	733	7.7
June 11-20	4,160	39	2.44	1.04	3.39	.26	4.47	1.23	1.49		.04	.37	441	.60	2,500	48	2.6	706	8.0
June 21-30	6,800	37	2.44	1.04	3.44	.26	4.51	1.23	1.52		.05	.32	438	.60	4,080	48	2.6	711	7.9
July 1-10	12,470	41	2.54	.96	3.65	.28	4.67	1.35	1.44		.05	.37	453	.62	7,730	49	2.8	716	8.0
July 11-20.....	10,430	46	2.58	1.10	3.70	.28	5.00	1.29	1.44		.04	.37	480	.65	6,780	48	2.7	738	8.0
July 21-31.....	7,370	44	2.64	1.06	4.09	.31	5.23	1.42	1.47		.04	.40	495	.67	4,940	50	3.0	764	8.1
Aug. 1-10.....	3,300	44	2.48	1.28	4.35	.36	5.47	1.50	1.41		.02	.44	515	.70	2,310	51	3.2	785	7.7
Aug. 11-20.....	5,930	46	2.50	1.26	4.22	.38	5.52	1.33	1.41		.03	.46	518	.70	4,150	50	3.1	793	7.7
Aug. 21-31.....	7,280	44	2.46	1.30	4.22	.38	5.62	1.23	1.41		.02	.47	517	.70	5,100	50	3.1	790	7.8
Sept. 1-10.....	6,210	46	2.46	1.20	4.39	.36	5.61	1.33	1.44		.02	.44	516	.70	4,350	52	3.2	792	7.9
Sept. 11-20	3,450	44	2.36	1.36	4.39	.38	5.64	1.31	1.44		.02	.48	515	.70	2,420	52	3.2	789	7.8
Sept. 21-30	30	43	2.34	1.44	4.39	.38	5.61	1.37	1.47		.02	.48	512	.70	21	51	3.2	791	7.7
Total or weighted average.....	123,100	40	2.50	1.23	4.35	0.33	5.06	1.42	1.89		0.02	0.47	513	0.70	86,170	52	3.2	802	--

a Includes 0.3 equivalent per million of carbonate (CO_3).

b Calculated from determined constituents.

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PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA

SAN JOAQUIN RIVER BASIN

SAN JOAQUIN RIVER NEAR BIOLA, CALIF.

LOCATION.--At Skaggs bridge, 1.9 miles upstream from gaging station, and about 2.5 miles northwest of Biola, Fresno County.
DRAINAGE AREA.--1,805 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1952 to September 1957.
Water temperatures: November 1952 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 132 micromhos Apr. 5; minimum daily, 32.8 micromhos Oct. 21.
Percent sodium: Maximum, 47 June 10-12; minimum, 34 Oct. 17-31.
EXTREMES, 1952-57.--Specific conductance: Maximum daily, 170 micromhos Jan. 3, 1953; minimum daily, 32.7 micromhos June 18, 1956.
Percent sodium: Maximum, 49 Nov. 1-5, 7-10, 1952; minimum, 27 Jan. 26, 1956.
REMARKS.--Daily samples for chemical analysis composited by discharge. Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1956 to September 1957 given in WSP 1515. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-16, 1956	23,150	11	0.17	0.01	0.12	0.02	0.26	0.00	0.03	0.01	0.01	0.04	36	0.05	1,160	38	0.4	36.5	6.7
Oct. 17-31	21,310	10	.16	.03	.11	.02	.26	.00	.04	.01	.02	.02	34	.05	1,070	34	.4	36.2	6.6
Nov. 1-8	5,640	11	.20	.04	.16	.02	.34	.00	.06	.01	.02	.07	42	.06	338	38	.5	48.3	6.6
Nov. 9-15.....	8,430	9.7	.17	.05	.13	.02	.26	.02	.06	.01	.01	.01	37	.05	422	35	.4	40.3	6.6
Nov. 16-30	4,330	12	.30	.12	.26	.02	.51	.07	.10	.01	.02	.03	57	.08	346	37	.6	75.3	6.9
Dec. 1-12	2,040	16	.43	.25	.40	.04	.82	.10	.13	.01	.05	.01	74	.10	204	36	.7	106	7.3
Dec. 13-31.....	14,330	10	.20	.10	.19	.02	.33	.08	.08	.01	.02	.07	42	.06	860	37	.5	52.1	6.7
Jan. 1-14, 1957.	6,570	10	.25	.09	.21	.03	.36	.08	.10	.01	.02	.06	42	.06	394	36	.5	54.8	6.7
Jan. 15-31	3,010	14	.37	.15	.34	.03	.62	.08	.14	.01	.03	.02	64	.09	271	38	.7	89.8	6.9
Feb. 1-14	2,050	13	.43	.17	.38	.04	.74	.08	.16	.01	.03	.05	68	.09	184	37	.7	101	6.9
Feb. 15-28.....	1,950	14	.46	.18	.40	.03	.77	.10	.16	.01	.03	.09	72	.10	195	37	.7	106	7.1
Mar. 1-16	2,530	13	.44	.26	.44	.03	.87	.10	.16	.01	.03	.13	76	.10	253	38	.7	104	6.7
Mar 17-31	1,760	14	.45	.19	.52	.03	.82	.16	.17	.01	.02	.03	85	.12	211	44	.9	112	6.7
Apr. 1-8	734	12	.45	.23	.52	.04	.87	.14	.20	.01	.01	.02	80	.11	81	42	.9	114	6.6
Apr. 9-22.....	3,370	9.8	.32	.14	.32	.03	.51	.12	.15	.01	.02	.05	55	.07	236	40	.7	76.6	6.7
Apr. 23-30.....	1,640	9.8	.35	.15	.38	.03	.56	.16	.16	.01	.01	.04	62	.08	131	42	.8	88.1	6.7
May 1-13	2,370	10	.37	.11	.36	.04	.56	.16	.14	.01	.01	.00	62	.08	190	41	.7	84.5	6.7

SAN JOAQUIN RIVER BASIN--Continued

SAN JOAQUIN RIVER NEAR BIOLA, CALIF.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 14-31, 1957	3,500	10	0.32	0.12	0.37	0.05	0.56	0.12	0.12	0.00	0.03	0.16	50	0.07	245	43	0.8	84.2	6.9
June 1-9	1,740	11	.30	.10	.34	.04	.61	.06	.13	.00	.03	.20	a 55	.07	122	44	.8	80.2	6.9
June 10-12	1,940	9.6	.22	.04	.27	.04	.34	.04	.11	.00	.03	.25	a 40	.11	213	47	.7	52.6	6.7
June 13-30	3,600	7.9	.26	.10	.28	.04	.56	.02	.08	.01	.02	.31	62	.08	288	41	.7	73.0	6.7
July 1-10	2,290	8.2	.23	.11	.32	.04	.44	.06	.16	.00	.02	.11	48	.07	160	46	.8	71.1	6.7
July 11-20	2,160	9.1	.25	.10	.29	.03	.48	.02	.15	.00	.02	.07	53	.07	151	43	.7	72.1	7.0
July 21-31	2,320	8.5	.28	.08	.29	.03	.48	.02	.14	.00	.01	.02	55	.07	162	43	.7	73.2	6.7
Aug. 1-10	1,980	9.5	.30	.06	.29	.03	.49	.03	.15	.00	.01	.05	55	.07	139	43	.7	74.1	6.7
Aug. 11-31	4,010	10	.32	.05	.30	.04	.49	.03	.14	.01	.02	.03	67	.09	361	42	.7	75.6	6.5
Sept. 1-15	2,520	10	.26	.15	.34	.04	.56	.08	.14	.01	.01	.06	60	.08	202	43	.8	79.6	6.7
Sept. 16-30	2,710	11	.28	.10	.31	.03	.54	.04	.13	.00	.01	.03	60	.08	217	43	.7	76.9	7.0
Total or weighted average[b]	134,000	11	0.24	0.08	0.22	0.03	0.41	0.05	0.09	0.01	0.02	0.06	47	0.06	8,040	39	0.6	58.6	--

a Calculated from determined constituents.

b Represents 100 percent of runoff for water year October 1956 to September 1957.

SAN JOAQUIN RIVER BASIN--Continued

SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.

LOCATION.--at gaging station in El Pescadero Grant, at Durham Ferry highway bridge, 3 miles downstream from Stanislaus River, and 3.4 miles northeast of Vernalis, San Joaquin County.
DRAINAGE AREA.--14,010 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 1,020 micromhos Feb. 24; minimum daily, 104 micromhos June 11.
Percent sodium: Maximum, 53 Feb. 1-12, 18-28; minimum, 42 June 8-11.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 1,150 micromhos Nov. 14, 1955; minimum daily, 60.0 micromhos June 21, 1953.
Percent sodium: Maximum, 56 Jan. 21-31, 1954; minimum, 27 Dec. 24-28, 1955.
REMARKS.--Daily samples for chemical analysis composited by discharge. Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1956 to September 1957 given in WSP 1515.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-13, 1956..	49,860	29	1.60	1.12	2.83	0.08	2.11	0.75	2.71	0.01	0.05	0.12	354	0.48	23,930	50	2.4	593	7.2
Oct. 14-26	53,450	28	1.40	1.00	2.35	.08	1.92	.58	2.31	.01	.05	.09	300	.41	21,910	49	2.1	488	7.3
Oct. 27-31	19,580	28	1.60	1.14	2.83	.07	1.95	.87	2.79	.02	.05	.15	346	.47	9,200	50	2.4	596	7.3
Nov. 1-5	17,180	30	1.70	1.22	2.91	.08	2.07	.92	2.93	.01	.04	.29	380	.52	8,930	49	2.4	635	7.0
Nov. 6-20.....	57,820	25	1.50	1.04	2.57	.07	1.75	.77	2.54	.01	.04	.21	332	.45	26,020	50	2.3	564	7.0
Nov. 21-30.....	56,610	18	.95	.73	1.52	.05	1.18	.54	1.58	.01	.03	.18	210	.29	16,420	47	1.7	359	6.5
Dec. 1-18.....	91,560	20	1.10	.66	1.78	.05	1.26	.62	1.69	.01	.04	.12	234	.32	29,300	50	1.9	382	6.7
Dec. 19-24.....	33,880	20	1.00	.60	1.65	.04	1.16	.58	1.52	.01	.03	.11	212	.29	9,830	50	1.8	353	6.7
Dec. 25-31.....	28,600	22	1.25	.83	1.96	.05	1.11	.73	2.14	.01	.04	.11	268	.36	10,300	48	1.9	455	6.8
Jan. 1-6, 1957...	23,350	23	1.30	1.00	2.31	.06	1.54	.73	2.34	.00	.05	.09	288	.39	9,110	49	2.2	485	7.1
Jan. 7-21	59,350	24	1.50	1.20	2.96	.07	1.92	1.02	2.71	.01	.06	.20	384	.52	30,860	52	2.5	599	7.1
Jan. 22-31	35,440	27	1.60	1.50	3.48	.08	2.13	1.21	3.13	.01	.06	.25	416	.57	20,200	52	2.8	695	7.1
Feb. 1-12.....	40,280	26	1.70	1.58	3.74	.07	2.13	1.31	3.41	.01	.06	.25	438	.60	24,170	53	2.9	744	7.1
Feb. 13-17.....	23,640	25	1.60	1.34	3.26	.08	2.00	1.17	2.96	.01	.06	.28	394	.54	12,770	52	2.7	657	7.1
Feb. 18-28.....	34,000	29	2.20	1.64	4.35	.09	2.52	1.35	4.00	.02	.06	.33	529	.72	24,480	53	3.1	847	7.4
Mar. 1-19.....	109,500	27	1.65	1.07	2.78	.08	1.93	1.08	2.65	.02	.07	.19	356	.48	52,560	50	2.4	591	7.3

SAN JOAQUIN RIVER BASIN--Continued

SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 20-26, 1957	55,680	20	0.95	0.61	1.48	0.05	1.16	0.60	1.38	0.01	0.04	0.07	202	0.27	15,030	48	1.7	336	7.3
Mar. 27-Apr. 3..	31,930	30	1.45	.99	2.44	.07	1.70	.73	2.37	.01	.04	.18	340	.46	14,690	49	2.2	544	7.3
Apr. 4-18	25,310	30	2.40	1.62	4.05	.11	2.41	.73	4.74	.01	.05	.41	484	.66	16,700	50	2.9	876	7.1
Apr. 19-30.....	44,250	26	1.55	.97	2.35	.08	1.97	.44	2.31	.01	.06	.15	310	.42	18,580	47	2.1	527	7.2
May 1-9.....	18,820	14	2.15	1.53	4.05	.13	2.29	1.25	4.12	.01	.03	.33	470	.64	12,040	52	3.0	807	7.2
May 10-19.....	29,040	28	1.80	1.20	3.22	.10	2.02	1.02	3.24	.01	.03	.27	394	.51	14,810	51	2.6	662	7.1
May 20-31.....	110,900	18	.80	.42	1.09	.06	1.08	.31	.90	.01	.02	.00	152	.21	23,290	46	1.4	239	6.9
June 1-7	70,590	17	.55	.33	.74	.05	.80	.35	.62	.01	.03	.31	114	.16	11,290	44	1.1	178	7.4
June 8-11	68,970	13	.36	.26	.48	.05	.57	.20	.39	.00	.03	.13	89	.12	8,280	42	.9	116	6.7
June 12-19	52,090	19	.80	.46	1.22	.07	1.10	.40	1.02	.01	.03	.20	166	.23	11,980	48	1.5	265	7.0
June 20-30	32,050	24	1.60	1.12	2.74	.10	1.90	.92	2.71	.01	.03	.28	350	.48	15,380	49	2.3	581	7.1
July 1-9	20,710	32	2.00	1.46	3.57	.11	2.43	1.08	3.72	.02	.02	.19	444	.60	12,430	50	2.7	752	7.4
July 10-19.....	15,660	34	2.50	1.62	4.13	.12	2.67	1.17	4.62	.02	.01	.20	526	.72	11,280	49	2.9	879	7.3
July 20-31	17,420	34	2.40	1.64	4.18	.12	2.77	1.15	4.54	.02	.03	.17	525	.71	12,370	50	2.9	884	7.3
Aug. 1-11	14,850	33	2.30	1.74	4.13	.13	2.64	1.08	4.37	.02	.03	.20	520	.71	10,540	50	2.9	877	7.3
Aug. 12-20.....	14,020	33	2.30	1.66	4.05	.12	2.77	1.08	4.20	.02	.03	.21	509	.69	9,670	50	2.9	864	7.4
Aug. 21-31	17,420	33	2.25	1.66	4.22	.12	2.75	1.46	4.12	.02	.03	.14	504	.69	12,020	51	3.0	850	7.6
Sept. 1-5	10,130	34	2.00	1.36	3.65	.11	2.52	.92	3.84	.01	.03	.22	463	.63	6,380	51	2.8	760	7.3
Sept. 6-16	22,020	37	2.20	1.64	4.13	.13	2.77	1.06	4.40	.01	.03	.22	511	.69	15,190	51	3.0	844	7.2
Sept. 17-30	36,200	33	1.90	1.46	3.57	.12	2.62	.96	3.52	.01	.04	.22	429	.58	21,000	51	2.8	760	7.1
Total or weighted average[a].....	1,442,000	24	1.40	0.99	2.48	0.07	1.69	0.75	2.34	0.01	0.04	0.18	308	0.42	605,600	50	2.1	510	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

SAN JOAQUIN RIVER BASIN--Continued

MOKELUMNE RIVER AT WOODBRIDGE, CALIF.

LOCATION.--At dam of Woodbridge Irrigation District, San Joaquin County, 0.4 mile upstream from gaging station at Woodbridge.
DRAINAGE AREA.--644 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 70.2 micromhos Jan. 28; minimum daily, 35.4 micromhos Dec. 25.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 202 micromhos Dec. 15, 1952; minimum daily, 29.4 micromhos July 9, 1952.
Percent sodium (1951-54): Maximum, 33 Nov. 21-30, 1952; minimum, 10 Dec. 22-23, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1956 to September 1957 given in WSP 1515.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 1956 ..	9,940		0.20	0.08	0.08		0.38						33	0.04	398		0.2	39.9	6.6
Oct. 16-31	12,350		.19	.08	.11		.38						33	.04	494		.3	39.8	6.6
Dec. 12-31.....	27,180		.20	.06	.08		.28						33	.04	1,080		.2	38.5	7.2
Jan. 1-10, 1957...	7,080		.24	.04	.10		.26						36	.05	354		.3	41.6	6.8
Jan. 11-20	6,200		.18	.12	.10		.28						38	.05	310		.3	43.1	6.8
Jan. 21-27, 29-31.	6,060		.22	.10	.10		.30						38	.05	303		.2	45.4	6.8
Jan. 28	575		.28	.36	.14		.49						--	--	--		.2	71.2	6.7
Feb. 1-10.....	2,720		.28	.14	.13		.36						38	.05	136		.3	60.2	6.9
Feb. 11-20.....	1,880		.28	.10	.13		.33						40	.05	94		.3	57.0	6.7
Feb. 21-28.....	2,520		.28	.14	.12		.34						38	.05	126		.3	58.6	6.6
Mar. 1-6	10,540		.32	.14	.14		.33						52	.07	738		.3	66.4	6.4
Mar. 7-18	27,040		.24	.14	.10		.28						32	.04	1,080		.2	45.4	6.7
Mar. 19-31.....	15,690		.24	.08	.09		.30						30	.04	628		.2	47.1	6.6
Apr. 1-10.....	9,040		.26	.06	.10		.33						40	.05	452		.2	46.6	7.0
Apr. 11-20	9,710		.29	.03	.10		.26						42	.06	583		.2	50.3	6.7
Apr. 21-30	8,930		.30	.04	.10		.33						42	.06	536		.2	47.8	6.8

SAN JOAQUIN RIVER BASIN--Continued

MOKELUMNE RIVER AT WOODBRIDGE, CALIF.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 1-10, 1957..	7,630		0.28	0.06	0.11		0.34						42	0.06	458		0.3	52.0	6.8
May 11-20	8,280		.28	.06	.10		.33						42	.06	497		.2	51.1	6.9
May 21-31.....	13,400		.29	.07	.10		.38						43	.06	804		.2	52.1	6.9
June 1-12	58,320		.22	.14	.14		.33						32	.04	2,330		.3	49.2	6.8
June 13-23	22,470		.22	.14	.12		.33						31	.04	899		.3	49.2	6.9
June 24-30	5,530		.22	.06	.10		.30						29	.04	221		.3	41.0	6.5
July 1-10.....	2,040		.20	.08	.11		.26						32	.04	82		.3	40.7	6.3
July 11-20	1,790		.20	.06	.10		.30						22	.03	54		.3	38.8	7.0
July 21-31	2,150		.21	.04	.10		.26						27	.04	86		.3	43.2	6.9
Aug. 1-15.....	2,910		.21	.09	.10		.33						43	.06	174		.3	42.8	7.1
Aug. 16-31	4,950		.25	.09	.10		.39						46	.06	297		.2	43.8	6.9
Sept. 1-7	2,380		.22	.12	.10		.36						44	.06	143		.2	40.1	7.0
Sept. 8	319		.37	.11	.09		.39						--	--	--		.2	56.8	6.9
Sept. 9-20	4,910		.12	.16	.11		.26						36	.05	245		.3	39.6	6.5
Sept. 21-30	5,730		.20	.10	.11		.30						32	.04	229		.3	44.3	7.0
Total or weighted average [a]	300,300		0.23	0.10	0.11		0.31						b35	0.05	15,060		0.3	47.0	--
Total or weighted average [c]	356,400		0.23	0.09	0.11		0.31						35	0.05	17,820		0.2	45.7	--

a Represents 84 percent of runoff for water year October 1956 to September 1957.
b Includes estimates for missing data.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

SACRAMENTO RIVER BASIN

SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.

LOCATION.-- At Southern Pacific Railroad bridge, at Knights Landing, Yolo County, just downstream from gaging station, and about 34 miles upstream from Sacramento.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 301 micromhos Aug. 25; minimum daily, 115 micromhos Mar. 16.
Percent sodium: Maximum, 36 Aug. 14-23, 24-31, Sept. 1-15; minimum, 22 Feb. 25-28, Mar. 15-22.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 447 micromhos Sept. 9, 1952; minimum daily, 83.7 micromhos Dec. 9, 1955.
Percent sodium: Maximum, 46 May 12, 19, 21, 23-29, 1953; minimum, 15 Dec. 21-23, 29, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1956 to September 1957 given in WSP 1515. Considerable inflow during irrigation season of irrigation waste water from drainage canal about 0.3 mile above sampling site. Mixing not complete at sampling site.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	157,700	29	0.65	0.49	0.41	0.03	1.29	0.16	0.14	0.01	0.01	0.16	112	0.15	23,660	26	0.5	157	6.9
Oct. 11-20	155,900	27	.65	.51	.48	.03	1.29	.18	.16	.00	.01	.09	113	.15	23,380	29	.6	158	7.0
Oct. 21-31	178,900	28	.65	.47	.44	.04	1.26	.18	.14	.01	.01	.05	116	.16	28,620	28	.6	160	6.7
Nov. 1-10	186,100	27	.60	.48	.39	.03	1.20	.16	.14	.01	.01	.15	112	.15	27,920	26	.5	157	6.9
Nov. 11-20	166,500	28	.60	.52	.41	.03	1.25	.16	.16	.01	.01	.03	114	.16	26,640	26	.5	156	6.8
Nov. 21-30	157,600	28	.65	.55	.48	.05	1.38	.12	.17	.01	.00	.09	144	.20	31,520	28	.6	168	6.8
Dec. 1-10.....	155,500	30	.70	.48	.48	.05	1.39	.16	.17	.01	.01	.23	116	.16	24,880	28	.6	166	7.1
Dec. 11-20.....	159,500	31	.70	.52	.52	.04	1.44	.16	.14	.01	.01	.18	120	.16	25,520	29	.7	176	7.1
Dec. 21-31.....	166,800	30	.70	.52	.52	.04	1.44	.18	.17	.01	.01	.18	120	.16	26,690	29	.7	175	7.0
Jan. 1-9, 1957 ..	115,600	31	.70	.62	.52	.04	1.52	.18	.18	.01	.01	.21	126	.17	19,650	28	.6	186	7.1
Jan. 10-14	67,000	33	.75	.67	.65	.04	1.66	.18	.25	.01	.01	.21	146	.20	13,400	31	.8	206	7.2
Jan. 15-19	96,540	27	.65	.55	.57	.04	1.23	.25	.27	.02	.02	.20	130	.18	17,380	31	.7	184	6.8
Jan. 20-31	166,200	32	.80	.62	.61	.04	1.49	.33	.28	.02	.01	.17	146	.20	33,240	29	.7	208	7.0
Feb. 1-21.....	221,500	31	.80	.83	.57	.04	1.61	.31	.27	.01	.01	.08	143	.19	42,080	25	.6	205	7.8
Feb. 22-24.....	45,220	19	.55	.35	.28	.03	.89	.19	.12	.02	.02	.08	86	.12	5,430	23	.4	119	7.7
Feb. 25-28.....	178,500	19	.55	.33	.26	.03	.85	.15	.11	.02	.02	.01	84	.11	19,640	22	.4	118	7.4

SACRAMENTO RIVER BASIN--Continued

SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-14, 1957	648,200	25	0.55	0.57	0.34	0.03	1.13	0.20	0.13	0.01	0.01	0.02	100	0.14	90,750	23	0.5	136	7.5
Mar. 15-22	327,100	23	.55	.51	.30	.03	1.07	.16	.12	.01	.01	.05	94	.13	42,520	22	.4	130	7.4
Mar. 23-31	236,000	26	.70	.70	.48	.03	1.41	.27	.21	.01	.01	.06	125	.17	40,120	25	.6	184	7.5
Apr. 1-10.....	169,100	30	.80	.60	.48	.05	1.52	.20	.20	.01	.01	.17	132	.18	30,440	25	.6	189	7.4
Apr. 11-20.....	122,800	30	.75	.59	.48	.04	1.51	.18	.18	.01	.01	.25	133	.18	22,100	26	.6	183	7.3
Apr. 21-30.....	157,400	26	.70	.60	.52	.04	1.41	.20	.24	.01	.01	.17	134	.18	28,330	28	.6	187	7.4
May 1-18	283,100	27	.70	.70	.70	.05	1.52	.40	.25	.01	.01	.21	145	.20	56,620	33	.8	213	7.2
May 19-22	137,900	23	.48	.36	.29	.03	.97	.12	.08	.01	.01	.20	103	.14	19,310	25	.4	117	7.4
May 23-28	205,900	27	.55	.49	.35	.03	1.11	.16	.11	.01	.01	.19	106	.14	28,830	25	.5	135	7.3
May 29-31	76,360	24	.70	.56	.57	.03	1.41	.31	.20	.00	.01	.26	137	.19	14,510	31	.7	185	7.3
June 1-16	293,700	28	.70	.66	.74	.05	1.54	.27	.25	.01	.03	.11	138	.19	55,800	34	.9	209	7.2
June 17-30	161,900	30	.70	.64	.70	.05	1.48	.25	.27	.01	.02	.15	132	.18	29,140	33	.9	186	7.1
July 1-15	179,800	29	.70	.56	.70	.05	1.51	.27	.23	.01	.02	.16	a 135	.18	32,360	35	.9	199	7.2
July 16-31	197,000	28	.70	.74	.74	.04	1.57	.35	.23	.01	.02	.16	a 143	.19	37,430	33	.9	209	7.3
Aug. 1-13	157,200	31	.75	.73	.78	.04	1.70	.40	.25	.01	.02	.15	151	.21	33,010	34	.9	219	7.3
Aug. 14-23.....	116,000	29	.80	.84	.96	.05	1.90	.35	.31	.01	.02	.18	163	.22	25,520	36	1.1	236	7.3
Aug. 24-31.....	95,560	28	.80	.86	.96	.05	1.93	.35	.34	.01	.02	.14	161	.22	21,020	36	1.1	257	7.3
Sept. 1-15	208,900	26	.70	.90	.91	.05	1.90	.37	.28	.02	.00	.16	161	.22	45,960	36	1.0	250	7.2
Sept. 16-22	107,500	29	.70	.74	.74	.05	1.61	.35	.24	.01	.02	.00	141	.19	20,420	33	.9	204	7.3
Sept. 23-28.....	84,650	28	.55	.49	.52	.07	1.08	.25	.23	.01	.05	.23	112	.15	12,700	32	.7	158	7.2
Sept. 29-30.....	50,980	29	.60	.64	.70	.06	1.21	.35	.34	.01	.04	.14	134	.18	9,180	35	.9	191	7.0
Total or weighted average[b].....	6,392,000	27	0.65	0.59	0.52	0.04	1.38	0.23	0.19	0.01	0.01	0.13	125	0.17	1,086,000	29	0.7	177	--

a Calculated from determined constituents.
b Represents 100 percent of runoff for water year October 1956 to September 1957.

SACRAMENTO RIVER BASIN--Continued

FEATHER RIVER AT NICOLAUS, CALIF.

LOCATION (revised).--At gaging station at Nicolaus, Sutter County, 0.3 mile downstream from old highway bridge site, and 2.9 miles downstream from Bear River.

RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.

Water temperatures: March 1951 to September 1957.

EXTREMES, 1956-57.--Specific conductance: Maximum daily, 209 micromhos Oct. 5; minimum daily, 62.3 micromhos May 20.

EXTREMES, 1951-57.--Specific conductance (1951-55, 1956-57): Maximum daily, 245 micromhos June 21, 1954; minimum daily, 50.0 micromhos May 28, 1952.

Percent sodium (1951-54): Maximum, 27 Dec. 1-2, 4, 7, 1952; minimum, 8 June 21-30, 1951, Jan. 11-20, 1953.

REMARKS.--Daily samples for chemical analysis composited by discharge. Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1956 to September 1957 given in WSP. 1515.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-3, 1956..	15,530		1.20	0.68	0.21		1.93						129	0.18	2,800	--	0.2	205	6.7
Oct. 4-8	25,980		.90	.46	.24		1.46						106	.14	3,640	--	.3	156	6.7
Oct. 9-31	140,900		.75	.47	.23		1.29						100	.14	19,730	--	.3	147	6.8
Nov. 1-2.....	24,750		.50	.30	.18		.84						77	.10	2,480	--	.3	99.9	6.8
Nov. 3-15.....	109,200		.60	.36	.23		1.05						79	.11	12,010	--	.3	118	6.6
Nov. 16-30	96,480		.70	.34	.22		1.20						72	.10	9,650	--	.3	127	7.0
Dec. 1-15.....	84,240		.70	.38	.23		1.20						78	.11	9,270	--	.3	132	6.9
Dec. 16-31.....	88,640		.85	.45	.22		1.38						82	.11	9,750	--	.3	148	6.9
Jan. 1-6, 1957 .	33,340		.75	.41	.21		1.25						93	.13	4,330	--	.3	137	6.8
Jan. 7-8	10,020		.95	.61	.20		1.64						116	.16	1,600	--	.2	171	7.1
Jan. 9-31	184,800		.65	.37	.20		1.07						88	.12	22,180	--	.3	125	6.8
Feb. 1-8	52,220		.75	.41	.21		1.20						98	.13	6,790	--	.3	139	6.8
Feb. 9-23.....	137,500		.65	.37	.21		1.08						90	.12	16,500	--	.3	123	6.9
Feb. 24-25	172,200		.48	.28	.13		.67						--	--	--	--	.2	90.9	6.9
Feb. 26-28.....	401,500		.33	.19	.10		.49						68	.09	36,140	--	.2	67.8	--
Mar. 1-5	271,900		.40	.08	.13		.61						72	.10	27,190	21	.3	76.0	7.4
Mar. 6-8	214,200		.44	.44	.16		.62						76	.10	21,420	15	.2	91.1	7.0
Mar. 9-31	690,700		.46	.26	.13		.66						72	.10	69,070	15	.2	85.3	7.0

SACRAMENTO RIVER BASIN--Continued

FEATHER RIVER AT NICOLAUS, CALIF.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-14, 1957	238,800		0.44	0.32	0.14		0.72						70	0.10	23,880	16	0.2	87.8	7.2
Apr. 15-20	128,000		.46	.26	.13		.70						64	.09	11,520	15	.2	84.0	7.4
Apr. 21-30	154,200		.50	.26	.14		.75						72	.10	15,420	16	.2	91.9	7.1
May 1-10	170,700		.48	.28	.14		.74						72	.10	17,070	16	.2	88.4	7.4
May 11-18	102,300		.46	.28	.14		.74						66	.09	9,210	16	.2	86.3	7.7
May 19-21	218,400		.38	.20	.10		.56						58	.08	17,470	15	.2	68.0	7.4
May 22-31	342,900		.38	.26	.11		.62						60	.08	27,430	15	.2	72.5	7.4
June 1-7	136,400		.43	.28	.13		.66						54	.07	9,550	--	.2	83.1	6.8
June 8-18	118,500		.50	.26	.15		.72						58	.08	9,480	--	.2	93.4	6.9
June 19-27	46,990		1.10	.54	.20		1.67						105	.14	6,580	--	.2	182	7.4
June 28-30	10,430		.95	.57	.22		1.61						100	.14	1,460	--	.3	167	7.2
July 1-3	8,710		.60	.48	.24		1.18						78	.11	958	--	.3	132	7.3
July 4	2,360		1.10	.86	.23		2.00						104	.14	330	--	.2	206	7.3
July 5-31	44,560		.70	.54	.28		1.28						90	.12	5,350	--	.4	149	7.0
Aug. 1-13	17,920		.75	.49	.25		1.31						89	.12	2,150	--	.3	147	7.6
Aug. 14-21	10,540		.75	.45	.25		1.28						92	.13	1,370	--	.3	146	7.3
Aug. 22-31	12,330		.75	.57	.27		1.38						98	.13	1,600	--	.3	152	8.1
Sept. 1-6	9,480		.70	.52	.33		1.31						93	.13	1,230	--	.4	150	7.4
Sept. 7	1,810		.80	.54	.37		1.31						96	.13	235	--	.5	172	7.1
Sept. 8-15	22,430		.70	.50	.24		1.15						112	.15	3,360	--	.3	133	7.4
Sept. 16-30	72,420		.55	.53	.27		1.21						96	.13	9,410	--	.4	136	7.0
Total or weighted average [a]	4,624,000		0.50	0.30	0.15		0.80						b74	0.10	462,500	--	0.2	96.5	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.
b Includes estimates for missing data.

SACRAMENTO RIVER BASIN--Continued

AMERICAN RIVER AT FAIR OAKS, CALIF.

LOCATION.--In San Juan Grant at old highway bridge just downstream from gaging station, 1,500 feet upstream from new highway bridge at Fair Oaks, Sacramento County, 26 miles downstream from Nimbus Dam, and 10 miles downstream from South Fork.
DRAINAGE AREA.--1,921 square miles.
RECORDS AVAILABLE.--Chemical analyses: January to December 1906, March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 70.6 micromhos Feb. 23, 24; minimum daily, 46.1 micromhos Sept. 4.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 112 micromhos Aug. 28, 1951; minimum daily, 29.1 micromhos June 3, 1952.
Percent sodium (1951-54): Maximum, 28 June 1-10, 1953; minimum, 8 Jan. 21-31, 1953.
REMARKS.--Daily samples for chemical analysis composited by discharge. Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1956 to September 1957 given in WSP 1515.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956 .	82,490		0.30	0.20	0.09		0.57						42	0.06	4,950		0.2	59.7	6.8
Nov. 1-3.....	6,770		.30	.20	.10		.61						44	.06	406		.2	62.7	6.9
Nov. 4-30.....	110,300		.34	.14	.10		.46						42	.06	6,620		.2	62.4	6.7
Dec. 1-15.....	48,140		.34	.16	.10		.48						43	.06	2,890		.2	66.8	6.5
Dec. 16-31.....	51,810		.36	.12	.10		.49						44	.06	3,110		.2	64.6	6.6
Jan. 1-10, 1957..	30,980		.36	.14	.12		.48						41	.06	1,860		.2	63.0	6.6
Jan. 11-20	19,460		.35	.15	.12		.48						42	.06	1,170		.2	66.0	6.6
Jan. 21-31	20,230		.37	.17	.12		.51						44	.06	1,210		.2	67.3	6.8
Feb. 1-24	59,430		.38	.18	.11		.56						46	.06	3,570		.2	70.8	7.8
Feb. 25-Mar. 4..	79,640		.37	.23	.10		.49						50	.07	5,570		.2	65.3	7.1
Mar. 5-9	182,500		.33	.17	.09		.44						44	.06	10,950		.2	58.1	7.1
Mar 10-31	191,200		.33	.17	.09		.43						43	.06	11,470		.2	59.5	7.0
Apr. 1-12	57,140		.34	.13	.12		.46						46	.06	3,430		.2	61.0	7.0
Apr. 13-26	100,400		.32	.13	.10		.44						47	.06	6,020		.2	59.0	7.0
Apr. 27-30	38,640		.33	.11	.10		.43						47	.06	2,320		.2	57.5	7.0
May 1-13.....	49,800		.34	.10	.10		.46						44	.06	2,990		.2	57.5	7.0
May 14-19	49,510		.26	.18	.10		.43						40	.05	2,480		.2	56.4	6.7
May 20-31	221,600		.29	.09	.13		.36						42	.06	13,300		.3	52.3	6.6

SACRAMENTO RIVER BASIN--Continued

AMERICAN RIVER AT FAIR OAKS, CALIF.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 1-11, 1957..	137,600		0.24	0.14	0.10		0.39						34	0.05	6,880		0.2	50.2	7.2
June 12-17	50,680		.24	.15	.11		.41						38	.05	2,530		.2	52.1	6.9
June 18-30	71,980		.25	.14	.10		.39						34	.05	3,600		.2	51.8	6.8
July 1-18.....	104,400		.25	.14	.10		.38						36	.05	5,220		.2	50.9	6.8
July 19-31	82,190		.22	.16	.09		.38						36	.05	4,110		.2	49.7	7.0
Aug. 1-9.....	57,540		.28	.16	.09		.43						42	.06	3,450		.2	48.7	7.0
Aug. 10-20	71,270		.26	.14	.09		.41						34	.05	3,560		.2	47.3	6.7
Aug. 21-31.....	72,460		.32	.14	.11		.39						47	.06	4,350		.2	58.8	6.8
Sept. 1-10	50,540		.24	.16	.10		.36						36	.05	2,530		..2	49.2	6.7
Sept. 11-20	47,130	13	.14	.22	.10	0.03	.36	0.10	0.03	0.01	0.00	0.05	42	.06	2,830	20	.2	49.3	6.5
Sept. 21-30.....	50,180		.26	.14	.09		.39						36	.05	2,510		.2	52.4	6.9
Total or weighted average[a].....	2,196,000	--	0.30	0.15	0.10	--	0.43	--	---	--	--	--	41	0.06	131,800	--	0.2	56.6	--

a Represents 100 percent of runoff for water year October 1956 to September 1957.

PART 12. PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASINS

COLUMBIA RIVER MAIN STEM

COLUMBIA RIVER AT INTERNATIONAL BOUNDARY

LOCATION.--At cableway 2.2 miles downstream from gaging station and international boundary, 2.7 miles downstream from Pend Oreille River, and about 10 miles upstream from Northport, Stevens County, Wash.
DRAINAGE AREA.--59,700 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: February 1910 to January 1911, November 1951 to September 1957.
Water temperatures: November 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 181 micromhos Jan. 15, Feb. 22; minimum daily, 126 micromhos June 21.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 192 micromhos Dec. 3, 1955; minimum daily, 126 micromhos June 21, 1957.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1956 to September 1957 given in WSP 1516. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956...	3,670,000		--	--	0.08	--	1.33	--	0.01	--	--	--	90	0.12	440,400	--	--	157	7.1
Nov. 1-30.....	3,123,000		--	--	.10	--	1.43	--	.01	--	--	--	95	.13	406,000	--	--	168	7.2
Dec. 1-31.....	2,648,000		--	--	.10	--	1.46	--	.01	--	--	--	103	.14	370,700	--	--	179	7.2
Jan. 1-31, 1957...	2,264,000		1.30	0.44	.09	0.02	1.44	0.35	.01	0.01	0.01	0.02	102	.14	317,000	5	0.1	178	7.6
Feb. 1-28.....	2,083,000		--	--	.09	--	1.44	--	.01	--	--	--	103	.14	291,600	--	--	178	7.2
Mar. 1-31.....	2,554,000		--	--	.09	--	1.38	--	.01	--	--	--	95	.13	332,000	--	--	164	7.4
Apr. 1-30.....	3,160,000		1.05	.41	.07	.02	1.23	.27	.01	.01	.01	.02	87	.12	379,200	5	.1	151	7.8
May 1-31.....	15,860,000		--	--	.07	--	1.18	--	.01	--	--	--	82	.11	1,745,000	--	--	136	7.1
June 1-30	16,540,000		--	--	.07	--	1.15	--	.01	--	--	--	78	.11	1,819,000	--	--	135	--
July 1-5	1,766,000		.95	.34	.06	.02	1.11	.25	.01	.01	.01	.01	75	.10	176,600	4	.1	133	7.4
Aug. 12-31.....	3,053,000		--	--	.06	--	1.05	--	--	--	--	--	72	.10	305,300	--	--	131	7.5
Sept. 1-4	447,500		--	--	.07	--	1.13	--	--	--	--	--	80	.11	49,220	--	--	142	7.6
Total or weighted average[a].....	57,170,000		--	--	0.08	--	1.23	--	0.01	--	--	--	85	0.12	6,860,000	--	--	146	--
Total or weighted average[b].....	69,420,000		--	--	0.07	--	1.21	--	0.01	--	--	--	83	0.11	7,636,000	--	--	144	--

a Represents 82 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT GRAND COULEE DAM, WASH.

LOCATION.--At Grand Coulee Dam, 1½ miles north of Grand Coulee, Grant County, 2,500 feet upstream from gaging station, and 14.5 miles upstream from Nespelem River.
DRAINAGE AREA.--74,100 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1957.
Water temperatures: November 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 180 micromhos Apr. 9; minimum daily, 122 micromhos June 1.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 193 micromhos Apr. 24-25, 1955; minimum daily, 122 micromhos June 1, 1957.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1956 to September 1957 given in WSP 1516.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1956...	3,948,000	5.4	0.95	0.35	0.07	0.02	1.16	0.21	0.01	0.01	0.01	0.02	77	0.10	394,800	5	0.1	138	7.4
Nov. 1-30.....	3,654,000	--	--	--	--	--	--	--	--	--	--	--	84	.11	401,900	--	--	148	--
Dec. 1-31.....	3,347,000	--	--	--	--	--	--	--	--	--	--	--	87	.12	401,600	--	--	153	--
Jan. 1-31, 1957...	4,506,000	6.4	1.10	.40	.08	.03	1.29	.25	.01	.01	.01	.05	88	.12	540,700	5	.1	156	7.4
Feb. 1-28.....	3,597,000	--	--	--	--	--	--	--	--	--	--	--	97	.13	467,600	--	--	166	--
Mar. 1-31.....	3,027,000	--	--	--	--	--	--	--	--	--	--	--	102	.14	423,800	--	--	173	--
Apr. 1-30.....	4,133,000	7.5	1.15	.47	.11	.03	1.36	.33	.03	.01	.02	.01	101	.14	578,600	6	.1	170	7.2
May 1-18	7,771,000	--	--	--	--	--	--	--	--	--	--	--	94	.13	1,010,000	--	--	156	--
May 19-31.....	9,106,000	--	--	--	--	--	--	--	--	--	--	--	78	.11	1,002,000	--	--	128	--
June 1-30	17,220,000	--	--	--	--	--	--	--	--	--	--	--	76	.10	1,722,000	--	--	130	--
July 1-31	8,838,000	7.7	.95	.31	.06	.03	1.10	.21	.01	.01	.01	.04	77	.10	883,800	5	.1	129	7.1
Aug. 1-31.....	5,699,000	--	--	--	--	--	--	--	--	--	--	--	75	.10	569,900	--	--	134	--
Sept. 1-30.....	3,580,000	--	--	--	--	--	--	--	--	--	--	--	71	.10	358,000	--	--	134	--
Total or weighted average	78,430,000	--	--	--	--	--	--	--	--	--	--	--	83	0.11	8,627,000	--	--	142	--

YAKIMA RIVER BASIN

YAKIMA RIVER AT KIONA, WASH.

LOCATION.--At highway bridge just downstream from gaging station at Kiona, Benton County, 3½ miles downstream from intake of Kiona Canal and 25 miles upstream from mouth.
DRAINAGE AREA.--5,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1952 to September 1957.
Water temperatures: December 1952 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 381 micromhos Aug. 20; minimum daily, 101 micromhos May 9, 10.
EXTREMES, 1952-57.--Specific conductance: Maximum daily, 387 micromhos Sept. 29, 1955; minimum daily, 101 micromhos May 9, 10, 1957.
Percent sodium (1952-56): Maximum 30 Jan. 22-31, 1956; minimum, 21 Apr. 11-30, 1956.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1956 to September 1957 given in WSP 1516.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-13, 1956...	62,020	31	1.65	0.90	0.91	0.09	2.79	0.48	0.20	0.02	0.06	0.05	216	0.29	17,990	26	0.8	331	7.9
Oct. 14-31	111,600	--	--	--	.83	--	2.46	--	.18	--	--	--	188	.26	29,020	--	--	295	7.6
Nov. 1-15.....	85,590	--	--	--	.78	--	2.39	--	.18	--	--	--	183	.25	21,400	--	--	288	7.5
Nov. 16-30.....	90,840	--	--	--	.65	--	2.07	--	.16	--	--	--	159	.22	19,980	--	--	249	7.4
Dec. 1-11.....	65,510	--	--	--	.70	--	2.20	--	.16	--	--	--	169	.23	15,070	--	--	263	7.5
Dec. 12-31.....	304,400	--	--	--	.34	--	1.08	--	.09	--	--	--	88	.12	36,530	--	--	135	7.2
Jan. 1-11, 1957...	108,300	17	.70	.37	.44	.05	1.16	.17	.16	.01	.03	.01	96	.13	14,080	28	.6	155	7.2
Feb. 5-28.....	124,100	--	--	--	.65	--	1.98	--	.16	--	--	--	158	.21	26,060	--	--	244	7.4
Mar. 1-31.....	237,100	--	--	--	.57	--	1.75	--	.14	--	--	--	142	.19	45,050	--	--	214	7.7
Apr. 1-15.....	170,800	23	.85	.44	.40	.05	1.44	.17	.08	.02	.02	.01	113	.15	25,620	23	.5	167	7.5
Apr. 16-30.....	166,100	--	--	--	.39	--	1.38	--	.08	--	--	--	107	.15	24,920	--	--	159	7.4
May 1-23.....	596,400	--	--	--	.24	--	.93	--	.04	--	--	--	76	.10	59,640	--	--	109	7.1
May 24-31.....	91,500	--	--	--	.39	--	1.34	--	.08	--	--	--	103	.14	12,810	--	--	159	7.4
June 1-13	131,500	--	--	--	.41	--	1.36	--	.08	--	--	--	104	.14	18,410	--	--	162	7.3
June 14-18	23,010	--	--	--	.65	--	2.07	--	.16	--	--	--	153	.21	4,830	--	--	246	7.7

YAKIMA RIVER BASIN--Continued

YAKIMA RIVER AT KIONA, WASH.--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 19-30, 1957..	31,200	--	--	--	0.87	--	2.72	--	0.20	--	--	--	203	0.28	8,740	--	--	326	7.9
July 1-31.....	87,170	23	1.60	0.90	.87	0.09	2.75	0.50	.20	0.01	0.04	0.04	210	.29	25,280	25	0.8	301	7.8
Aug. 1-31.....	97,790	--	--	--	.91	--	2.90	--	.20	--	--	--	220	.30	29,340	--	--	341	7.8
Sept. 1-15.....	54,570	--	--	--	.91	--	2.77	--	--	--	--	--	212	.29	15,830	--	--	332	7.7
Sept. 16-30.....	57,640	--	--	--	.96	--	2.84	--	--	--	--	--	220	.30	17,290	--	--	345	7.7
Total or weighted average [a].....	2,697,000	--	--	--	0.52	--	1.64	--	0.11	--	--	--	128	0.17	458,500	--	--	195	--
Total or weighted average [b].....	2,798,000	--	--	--	0.52	--	1.64	--	0.11	--	--	--	129	0.18	503,600	--	--	196	--

a Represents 96 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

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PART 13. SNAKE RIVER BASIN

SNAKE RIVER MAIN STEM

SNAKE RIVER NEAR HEISE, IDAHO

LOCATION.--At Eagle Rock Canal headgate, 1¼ mile upstream from Heise, Bonneville County, 1 5/8 mile downstream from Anderson Canal headgate 1¾ mile downstream from gaging station, about 4¾ miles east of Ririe and about 21 miles upstream from Henrys Fork.
DRAINAGE AREA.--5,752 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: January 1953 to September 1957.
Water temperatures: January 1953 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 791 micromhos Nov. 13; minimum daily, 285 micromhos July 26.
Percent sodium: Maximum, 17 Nov. 1-10, Dec. 1-10, 11-20, Jan. 1-10, 21-31; minimum, 9 June 11-20, 21-30, July 1-10, 11-20.
EXTREMES, 1953-57.--Specific conductance: Maximum daily, 791 micromhos Nov. 13, 1956; minimum daily, 240 micromhos June 27, 1954.
Percent sodium: Maximum, 19 Sept. 1-10, 1955; minimum, 7 June 11-20, 1953, May 1-10, June 1-10, 1955.
REMARKS.--Values reported for dissolved solids are residues on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1956 to September 1957 given in WSP 1517.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1956	71,210	11	3.36	1.32	0.61	0.06	3.34	1.54	0.51		0.02	--	308	0.42	29,910	11	0.4	501	7.9
Oct. 11-20	68,950	11	3.28	1.40	.61	.06	3.25	1.54	.51		.02	0.04	307	.42	28,960	11	.4	498	7.9
Oct. 21-31.....	74,410	11	3.28	1.42	.61	.06	3.31	1.54	.54		.02	--	306	.42	31,710	11	.4	502	7.8
Nov. 1-10	26,460	11	3.64	1.68	1.09	.07	3.61	1.92	1.02		.01	--	375	.51	13,490	17	.7	609	7.9
Nov. 11-20	34,340	11	3.80	1.68	1.00	.07	3.84	1.83	.96		.02	.06	378	.51	17,510	15	.6	610	7.8
Nov. 21-30	39,810	12	3.00	1.22	.78	.07	3.08	1.33	.62		.02	--	294	.40	15,920	15	.5	479	7.7
Dec. 1-10	46,180	14	2.44	.94	.70	.07	2.62	1.00	.56		.01	--	248	.34	15,700	17	.5	404	7.7
Dec. 11-20	42,620	13	2.44	.96	.70	.07	2.61	1.00	.56		.01	.06	244	.33	14,060	17	.5	400	7.6
Dec. 21-31	44,990	14	2.56	1.00	.70	.07	2.72	1.04	.62		.00	--	258	.35	15,750	16	.6	421	7.7
Jan. 1-10, 1957	40,240	13	2.52	1.02	.74	.06	2.72	1,08	.54		.01	--	251	.34	13,680	17	.6	408	7.7
Jan. 11-20.....	37,940	13	2.74	.98	.74	.06	2.79	1,10	.59		.02	.09	268	.36	13,660	16	.5	431	7.6
Jan. 21-31	44,050	15	2.72	1.02	.78	.06	2.88	1.14	.54		.01	--	271	.37	16,300	17	.6	430	7.7
Feb. 1-10	40,220	13	2.88	.98	.70	.06	2.82	1.21	.54		.02	--	272	.37	14,880	15	.5	438	7.3
Feb. 11-20	40,840	13	2.94	1.12	.70	.06	2.98	1.27	.54		.01	.07	283	.38	15,520	14	.5	451	7.4
Feb. 21-30	33,860	13	2.92	1.14	.70	.06	2.95	1.27	.54		.01	--	284	.39	13,210	14	.5	450	7.3

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR HEISE, IDAHO--Continued

Chemical analyses, water year October 1956 to September 1957--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons				
Mar. 1-10, 1957.	41,850	12	3.16	1.24	0.70	0.06	3.21	1.40	0.54		0.01	--	299	0.41	17,160	13	0.5	479	7.7
Mar. 11-20	78,600	12	3.02	1.10	.70	.06	2.98	1.31	.51		.01	0.06	281	.38	29,870	14	.5	450	7.4
Mar. 21-31	108,700	13	2.90	1.00	.61	.06	2.88	1.23	.40		.01	--	270	.37	40,220	13	.4	429	7.0
Apr. 1-10	80,730	12	2.90	1.20	.61	.06	2.93	1.25	.42		.01	--	271	.37	29,870	13	.4	436	7.4
Apr. 11-20	107,300	12	2.82	1.14	.57	.06	2.93	1.19	.42		.01	.09	267	.36	38,630	12	.4	433	7.1
Apr. 21-30	138,800	12	2.86	1.02	.57	.05	2.92	1.19	.34		.01	--	266	.36	49,970	13	.4	424	7.4
May 1-10	213,400	11	2.60	1.00	.48	.05	2.79	.98	.37		.02	--	240	.33	70,420	12	.4	394	7.1
May 11-20.....	298,700	9.8	2.48	.88	.43	.05	2.70	.81	.23		.02	.07	221	.30	89,610	11	.3	367	7.0
May 21-31	319,700	9.0	2.38	.86	.39	.05	2.70	.71	.20		.02	--	210	.29	92,710	11	.3	352	7.1
June 1-10	247,500	8.4	2.40	.78	.34	.04	2.70	.58	.19		.01	--	202	.27	66,820	10	.3	338	7.2
June 11-20	256,300	9.1	2.20	.76	.33	.04	2.54	.54	.17		.01	.03	188	.26	66,640	9	.2	313	7.1
June 21-30.....	225,700	8.1	2.18	.70	.29	.05	2.49	.54	.18		.01	--	185	.25	56,420	9	.2	311	7.2
July 1-10	244,800	8.7	2.22	.67	.30	.04	2.49	.54	.21		.04	--	184	.25	61,200	9	.2	313	7.6
July 11-20	268,600	8.8	2.06	.71	.28	.05	2.38	.58	.17		.02	.06	176	.24	64,460	9	.2	295	7.5
July 21-31	287,400	9.7	2.02	.68	.30	.05	2.36	.60	.16		.02	--	173	.24	68,980	10	.3	290	7.7
Aug. 1-10	237,800	9.6	1.98	.74	.32	.05	2.31	.56	.18		.02	--	176	.24	57,070	10	.3	296	7.6
Aug. 11-20.....	193,800	9.6	2.08	.73	.33	.05	2.39	.69	.19		.01	.06	180	.24	46,510	10	.3	305	7.7
Aug. 21-31	182,700	11	2.10	.84	.38	.05	2.41	.83	.18		.01	--	192	.26	47,500	11	.3	321	7.0
Sept. 1-10	149,900	11	2.22	.86	.42	.05	2.49	.79	.21		.01	--	203	.28	41,970	12	.3	334	7.2
Sept. 11-20	159,400	9.9	2.20	.86	.44	.05	2.49	.83	.23		.01	.06	204	.28	44,630	12	.4	349	7.1
Sept. 21-30	122,100	10	2.36	.92	.48	.04	2.62	.96	.25		.01	--	220	.30	36,630	13	.4	365	7.3
Total or weighted average.....	4,651,000	10	2.44	0.90	0.44	0.05	2.66	0.85	0.28		0.02	--	219	0.30	1,395,000	11	0.3	362	--

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER AT KING HILL, IDAHO

LOCATION.--At county highway bridge about 400 yards downstream from gaging station, at King Hill, Elmore County, and 20 miles downstream from Malad River.
DRAINAGE AREA.--35,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1957.
Water temperatures: March 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 571 micromhos Oct. 10; minimum daily, 423 micromhos June 6.
Percent sodium: Maximum, 28 Sept. 1-30; minimum, 23 Apr. 1 to May 31.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 594 micromhos Oct. 3, 1952; minimum daily, 394 micromhos May 7, 1952.
Percent sodium: Maximum, 29 July 21-31, 1951; minimum, 17 Apr. 1-10, 1951.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180 °C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1956 to September 1957 given in WSP 1517.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 1956...	319,000		2.40	1.73	1.57		3.70	1.29	0.73		0.07	--	348	0.47	149,900	27	1.1	551	8.1
Oct. 16-31	351,500		2.40	1.64	1.52		3.67	1.19	.70		.07	0.04	341	.46	161,700	27	1.1	540	7.8
Nov. 1-30.....	632,700		2.45	1.64	1.48		3.67	1.19	.70		.05	.02	339	.46	291,000	26	1.0	542	7.7
Dec. 1-31.....	650,200		2.45	1.56	1.48		3.61	1.17	.70		.05	.04	337	.46	299,100	27	1.0	530	7.7
Jan. 1-31, 1957...	666,600		2.45	1.64	1.44		3.54	1.17	.73		.05	.02	330	.45	300,000	26	1.0	529	7.7
Feb. 1-28.....	605,200		2.35	1.48	1.35		3.38	1.08	.68		.05	.06	315	.43	260,200	26	1.0	505	7.6
Mar. 1-31.....	763,400		2.40	1.48	1.26		3.43	1.08	.68		.05	.12	308	.42	320,600	24	.9	497	7.9
Apr. 1-30.....	827,900		2.40	1.48	1.17		3.33	1.06	.65		.04	.10	292	.40	331,200	23	.8	484	7.9
May 1-31	1,120,000		2.40	1.32	1.13		3.26	1.04	.59		.04	.05	280	.38	425,600	23	.8	472	7.8
June 1-30	585,800		2.20	1.48	1.22		3.29	1.12	.59		.03	.10	300	.41	240,200	24	.9	477	8.0
July 1-31.....	475,700		2.30	1.56	1.44		3.47	1.17	.68		.07	.06	322	.44	209,300	27	1.0	516	7.9
Aug. 1-31.....	517,500		2.40	1.56	1.44		3.57	1.21	.68		.07	.09	329	.45	232,900	26	1.0	528	8.0
Sept. 1-30.....	548,300		2.40	1.81	1.61		3.70	1.21	.73		.06	.04	344	.47	257,700	28	1.1	545	8.1
Total or weighted average	8,064,000		2.40	1.56	1.35		3.47	1.12	.68		.05	--	317	.43	3,468,000	25	1.0	511	--

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER AT CENTRAL FERRY, NEAR POMEROY, WASH.

LOCATION.--At bridge on U. S. Highway 295 at Central Ferry, Garfield County, 14 miles northwest of Pomeroy and about 36 miles downstream from gaging station near Clarkston.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 449 micromhos Oct. 18; minimum daily, 93 micromhos June 6.
Percent sodium: Maximum, 36 Aug. 1-31, Sept. 16-30; minimum, 25 May 22-31.
EXTREMES, 1955-57.--Specific conductance: Maximum daily, 449 micromhos Oct. 18, 1956; minimum daily, 73 micromhos May 25, 27, 1956.
Percent sodium: Maximum, 36 Sept. 1-19, 30, 1956, Aug. 1-31, Sept. 16-30, 1957; minimum, 25 Mar. 20-24, 26-29, Apr. 2-7, 9-14, 16-21, 23-26, 30, 1956, May 22-31, 1957.
REMARKS.--Samples were collected at station near Clarkston, Wash. (1 mile downstream from gaging station) from November 1951 to September 1955. Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for gaging station near Clarkston for water year October 1956 to September 1957 given in WSP 1517. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 1956...	767,000		1.80	1.07	1.52		2.75	1.12	0.51		0.04	--	269	0.37	283,800	34	1.3	432	7.7
Oct. 16-31	918,000		1.80	.99	1.48		2.69	1.12	.51		.04	0.05	268	.36	330,500	34	1.3	428	7.6
Nov. 1-30.....	1,672,000		1.75	.99	1.35		2.59	1.02	.45		.04	--	254	.35	585,200	33	1.2	406	7.5
Dec. 1-4, 31	256,300		1.85	.99	1.35		2.66	.98	.45		.03	.01	256	.35	89,700	33	1.1	405	7.6
Jan. 1-31, 1957...	1,474,000		1.85	1.15	1.35		2.75	1.06	.51		.04	.01	266	.36	530,600	31	1.1	425	7.7
Feb. 1-25.....	1,314,000		1.70	.99	1.13		2.51	.92	.45		.04	.04	237	.32	420,500	29	1.0	382	7.5
Feb. 26-28.....	713,100		.85	.45	.57		1.28	.37	.16		.07	--	160	.22	156,900	30	.7	190	7.5
Mar. 1-21.....	2,957,000		1.05	.57	.70		1.61	.50	.24		.03	.06	166	.23	680,100	29	.8	237	7.7
Mar. 22-31.....	1,141,000		.85	.49	.52		1.31	.35	.18		.02	--	132	.18	205,400	28	.6	190	7.6
Apr. 1-26.....	4,479,000		.85	.41	.52		1.28	.35	.17		.02	.05	126	.17	761,400	29	.7	180	7.5
Apr. 27-30.....	648,400		.30	.13	.31		.82	.20	.10		.01	--	80	.11	71,320	27	.7	115	7.1
May 1-21.....	8,224,000		.55	.16	.28		.74	.18	.07		.01	.04	78	.11	904,600	28	.5	103	7.1
May 22-31.....	4,034,000		.65	.30	.34		.97	.27	.14		.01	--	91	.12	484,100	25	.5	134	7.3
June 1-15	5,348,000		.50	.21	.29		.79	.20	.09		.01	--	69	.09	481,300	26	.5	106	7.0
June 16-30	2,243,000		.70	.29	.44		1.05	.29	.12		.01	.05	92	.13	291,600	30	.6	149	7.1

July 1-17, 1957...	1,432,000		.95	.51	.74		1.49	.52	.23		.01	.08	139	.19	272,100	33	.9	224	7.4
July 18-31.....	777,300		1.25	.64	1.09		1.98	.77	.31		.02	--	185	.25	194,300	35	1.1	303	7.7
Aug. 1-14.....	647,400		1.45	.82	1.30		2.29	.92	.42		.02	--	218	.30	194,200	36	1.2	353	8.0
Aug. 15-31.....	696,800		1.55	.90	1.44		2.52	1.02	.45		.02	.02	242	.33	229,900	36	1.3	395	8.0
Sept. 1-15.....	647,600		1.65	.99	1.52		2.66	1.12	.51		.03	--	255	.35	226,700	35	1.3	423	7.9
Sept. 16-30.....	668,800		1.75	.99	1.57		2.70	1.10	.51		.03	.03	262	.36	240,800	36	1.3	426	8.0
Total or weighted average[a].....	41,570,000		0.95	0.47	0.65		1.39	0.46	0.21		0.02	--	136	0.18	7,483,000	31	0.8	206	--
Total or weighted average[b].....	42,700,000		0.95	0.49	0.65		1.44	0.48	0.22		0.02	--	141	0.19	8,113,000	30	0.8	214	--

a Represents 96 percent of runoff for water year October 1956 to September 1957.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1956 to September 1957.

BOISE RIVER BASIN

BOISE RIVER AT NOTUS, IDAHO

LOCATION.--At steel highway bridge 1,100 feet downstream from gaging station, a quarter of a mile southeast of Notus, Canyon County, and 7 miles northwest of Caldwell.
DRAINAGE AREA.--3,820 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1939 to January 1940, November 1950 to September 1957.
Water temperatures: November 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 825 micromhos Jan. 27; minimum daily, 103 micromhos May 25.
Percent sodium: Maximum, 49 June 23-30; minimum, 32 Apr. 12-30.
EXTREMES, 1939-40, 1950-57.--Specific conductance: Maximum daily, 1,470 micromhos July 30, Aug. 26, 1939; minimum daily, 82 micromhos Apr. 27, 1952.
Percent sodium: Maximum, 64 Sept. 1-10, 1939; minimum, 25 Apr. 11-20, 1951.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1956 to September 1957 given in WSP 1517.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-16, 1956...	23,950		2.00	0.90	2.61		3.74	1.48	0.42		0.06	--	349	0.47	11,260	46	2.2	534	8.0
Oct. 17-31.....	29,590		2.54	1.23	3.22		4.52	1.94	.56		.09	0.06	438	.60	17,750	45	2.3	660	8.1
Nov. 1-30.....	45,270		2.74	1.32	3.35		4.80	2.02	.56		.10	.05	460	.63	28,520	45	2.3	701	8.2
Dec. 1-31.....	37,990		2.89	1.32	3.26		4.87	2.04	.59		.10	.05	464	.63	23,930	43	2.2	715	7.9
Jan. 1-31, 1957...	32,140		3.44	1.40	3.35		5.51	2.08	.62		.05	.09	509	.69	22,180	41	2.2	752	7.8
Feb. 1-23.....	27,390		3.39	1.07	2.91		5.08	1.83	.56		.07	.02	463	.63	17,260	39	1.9	694	7.6
Feb. 24-28.....	21,940		1.75	.43	1.52		2.43	.94	.31		.10	--	256	.35	7,680	40	1.5	256	7.4
Mar. 1-17.....	197,500		.85	.28	.57		1.26	.31	.10		.04	.04	115	.16	31,600	33	.8	173	7.4
Mar. 18-23.....	13,670		2.00	.82	2.18		3.18	1.37	.42		.09	--	314	.43	5,880	43	1.8	490	7.9
Mar. 24-31.....	79,160		.80	.29	.57		1.23	.37	.09		.03	--	110	.15	11,870	33	.8	169	7.3
Apr. 1-6.....	59,210		.80	.27	.57		1.21	.37	.10		.03	--	111	.15	8,880	33	.8	165	7.3
Apr. 7-11.....	15,600		1.80	.82	2.04		2.97	1.35	.39		.07	--	294	.40	6,240	43	1.8	462	7.8
Apr. 12-30.....	250,800		.65	.20	.40		.98	.19	.06		.02	.04	88	.12	30,100	32	.6	127	7.2
May 1-31	353,000		.65	.14	.42		.95	.19	.07		.01	.06	86	.12	42,360	34	.7	124	7.1
June 1-13	126,400		.65	.22	.48		1.02	.23	.11		.01	--	94	.13	16,430	35	.7	135	7.3

June 14-18, 1957..	20,550		.95	.31	.87		1.54	.44	.17		.03	--	144	.20	4,110	40	1.1	213	7.6
June 19-22	4,930		1.50	.59	1.74		2.59	1.00	.34		.03	--	250	.34	1,680	44	1.7	385	8.0
June 23-30	3,020		2.05	.90	2.96		3.67	1.79	.59		.04	0.10	381	.52	1,570	49	2.4	582	8.1
July 1-31	21,070		1.80	.77	2.26		3.24	1.27	.42		.06	.11	308	.42	8,850	45	2.0	480	7.7
Aug. 1-31.....	18,480		2.00	.99	2.70		3.79	1.48	.51		.05	.08	366	.50	9,240	46	2.2	560	7.9
Sept. 1-30.....	28,750		2.05	.99	2.70		3.75	1.46	.45		.05	.05	548	.49	14,090	47	2.2	548	8.0
Total or weighted average	1,410,000		1.10	0.40	1.00		1.79	0.58	0.18		0.03	--	166	0.23	324,300	39	1.2	249	--

PART 14. PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN

COLUMBIA RIVER MAIN STEM

COLUMBIA RIVER AT MARYHILL FERRY, NEAR RUFUS, OREG.

LOCATION.--At Maryhill Ferry about 2½ miles downstream from Rufus, Sherman County, about 9 miles upstream from gaging station near The Dalles, Wasco County, and 3.4 miles upstream from the Deschutes River.
DRAINAGE AREA.--237,000 square miles, approximately (above gaging station near The Dalles).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1957.
Water temperatures: December 1950 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 242 micromhos Oct. 24; minimum daily, 116 micromhos June 3.
EXTREMES, 1950-57.--Specific conductance: Maximum daily, 324 micromhos Dec. 7, 1955; minimum daily, 102 micromhos May 27, 1956.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for gaging station near the Dalles for water year October 1956 to September 1957 given in WSP 1518. Discharge records include the flow of the Deschutes River, which on the average amounts to less than 5 percent of the flow at the gaging station.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 1956	3,217,000	11	1.25	0.45	0.48	0.04	1.59	0.44	0.14	0.01	0.02	0.04	129	0.18	579,100	22	0.5	216	7.2
Oct. 16-31	3,507,000	--	--	--	.57	--	1.67	--	.16	--	--	--	137	.19	666,300	--	--	232	7.3
Nov. 1-30	6,508,000	--	--	--	.52	--	1.67	--	.16	--	--	--	134	.18	1,171,000	--	--	226	7.4
Dec. 1-31	6,946,000	--	--	--	.48	--	1.61	--	.14	--	--	--	129	.18	1,250,000	--	--	215	7.3
Jan. 1-31, 1957..	6,921,000	13	1.25	.53	.41	.04	1.64	.44	.14	.02	.02	.01	126	.17	1,177,000	19	.4	218	7.4
Feb. 1-28.....	6,681,000	--	--	--	.48	--	1.70	--	.15	--	--	--	138	.19	1,269,000	--	--	228	7.6
Mar. 1-31.....	9,189,000	--	--	--	.44	--	1.46	--	.14	--	--	--	137	.19	1,746,000	--	--	198	7.5
Apr. 1-30.....	11,240,000	19	1.00	.30	.36	.05	1.33	.29	.10	.02	.01	.06	115	.16	1,798,000	21	.4	171	7.5
May 1-31	31,830,000	--	--	--	.19	--	1.00	--	.05	--	--	--	84	.11	3,501,000	--	--	129	7.1
June 1-30	28,530,000	--	--	--	.17	--	1.05	--	.03	--	--	--	79	.11	3,138,000	--	--	128	7.2
July 1-31	12,500,000	7.2	.95	.37	.23	.03	1.23	.29	.06	.01	.00	.05	90	.12	1,500,000	15	.3	151	7.4
Aug. 1-31.....	7,740,000	--	--	--	.34	--	1.44	--	.10	--	--	--	107	.15	1,161,000	--	--	183	7.5
Sept. 1-13.....	2,547,000	--	--	--	.42	--	1.52	--	.10	--	--	--	117	.16	407,500	--	--	199	7.6
Sept. 14-30.....	3,180,000	--	--	--	.48	--	1.64	--	.14	--	--	--	129	.18	572,400	--	--	219	--
Total or weighted average.....	140,500,000	--	--	--	0.31	--	1.29	--	0.08	--	--	--	104	0.14	19,670,000	--	--	167	--

WILLAMETTE RIVER BASIN

WILLAMETTE RIVER AT SALEM, OREG.

LOCATION.--At bridge on Oregon Highway 22, 300 feet downstream from gaging station at Salem, Marion County.
DRAINAGE AREA.--7,280 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August to December 1910, August 1911 to August 1912, February 1951 to September 1957. Water temperatures: February 1951 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 73 micromhos July 27; minimum daily, 37 micromhos Feb. 16.
EXTREMES, 1951-57.--Specific conductance: Maximum daily, 133 micromhos Nov. 7, 1954; minimum daily, 35 (revised) micromhos Jan. 20, 1953.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1956 to September 1957 given in WSP 1518.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-18, 25, 1956	263,400	18	0.26	0.13	0.20	0.03	0.49	0.05	0.07	0.01	0.01	0.02	53	0.07	18,440	32	0.4	64	6.9
Oct. 19-24, 26-31	493,300	--	--	--	.15	--	.41	--	.06	--	--	--	49	.07	34,530	--	--	55	6.5
Nov. 1-30	1,440,000	--	--	--	.16	--	.43	--	.06	--	--	--	48	.07	100,800	--	--	58	6.8
Dec. 1-31	2,722,000	--	--	--	.17	--	.41	--	.07	--	--	--	53	.07	190,500	--	--	58	6.7
Jan. 1-15, 1957...	597,600	17	.26	.12	.15	.02	.43	.06	.07	.01	.02	.04	53	.07	41,830	28	.4	59	6.9
Jan. 16-31	618,000	--	--	--	.16	--	.41	--	.07	--	--	--	52	.07	43,260	--	--	58	6.7
Feb. 1-12	444,100	--	--	--	.15	--	.39	--	.07	--	--	--	51	.07	31,090	--	--	57	6.6
Feb. 13-28	1,405,000	--	--	--	.11	--	.33	--	.04	--	--	--	49	.07	98,350	--	--	43	6.5
Mar. 1-31.....	4,028,000	--	--	--	.13	--	.38	--	.06	--	--	--	46	.06	241,700	--	--	50	6.5
Apr. 1-14.....	1,075,000	13	.23	.11	.12	.02	.38	.05	.06	.02	.01	.10	44	.06	64,500	26	.3	49	6.6
Apr. 15-30.....	641,500	--	--	--	.14	--	.41	--	.06	--	--	--	49	.07	44,900	--	--	57	6.6
May 1-31	1,120,000	--	--	--	.14	--	.41	--	.06	--	--	--	48	.07	78,400	--	--	54	6.6
June 1-30	631,900	--	--	--	.17	--	.49	--	.06	--	--	--	52	.07	44,230	--	--	63	6.7
July 1-31	372,100	15	.28	.13	.19	.03	.49	.07	.08	.01	.02	.05	54	.07	26,050	30	.4	67	6.7
Aug. 1-31.....	359,700	--	--	--	.20	--	.49	--	.08	--	--	--	50	.07	25,180	--	--	69	6.8
Sept. 1-30	416,000	--	--	--	.19	--	.46	--	--	--	--	--	51	.07	29,120	--	--	65	7.2
Total or weighted average.....	16,630,000	--	--	--	0.15	--	0.41	--	0.06	--	--	---	49	0.07	1,164,000	--	--	55	--

ROGUE RIVER BASIN

ROGUE RIVER AT GRANTS PASS, OREG.

LOCATION.--At bridge on U. S. Highway 99 at Grants Pass, Josephine County, and 0.6 mile downstream from gaging station.
DRAINAGE AREA.--2,420 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1953 to September 1957.
Water temperatures: January 1953 to September 1957.
EXTREMES, 1956-57.--Specific conductance: Maximum daily, 206 micromhos Oct. 18; minimum daily, 62 micromhos Dec. 12.
Percent sodium: Maximum, 26 Oct. 17, 19-26, 30-31, Aug. 1 to Sept. 30; minimum, 20 Mar. 1-20.
EXTREMES, 1953-57.--Specific conductance: Maximum daily, 251 micromhos Feb. 21, 1954; minimum daily, 58 micromhos Jan. 19, 1953.
Percent sodium: Maximum, 35 Oct. 11-20, 1953; minimum, 11 Feb. 16-22, 1954.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation at 180°C and for concentrations more than 1,000 ppm are calculated from determined constituents. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1956 to September 1957 given in WSP 1518.

Chemical analyses, water year October 1956 to September 1957

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 1956...	53,610		0.41	0.21	0.23		0.82	0.03	0.07		0.00	--	75	0.10	5,360	25	0.4	89	7.1
Oct. 16, 18.....	7,140		.85	.57	.44		1.16	--	.18		.00	--	--	--	--	24	--	181	8.0
Oct. 17, 19-26, 30-31.....	85,920		.45	.25	.25		.85	.05	.07		.00	0.02	82	.11	9,450	26	.4	96	7.2
Oct. 27-29	20,110		.90	.60	.48		1.70	--	.21		.00	--	--	--	--	24	--	193	8.2
Nov. 1-30.....	173,500		.55	.16	.23		.85	.06	.07		.00	.01	82	.11	19,080	24	.4	96	7.2
Dec. 1-11.....	84,340		.47	.25	.25		.89	.05	.08		.01	--	80	.11	9,280	24	.4	99	7.3
Dec. 12-31.....	300,900		.39	.18	.17		.69	.04	.05		.00	.02	76	.10	30,090	22	.3	76	6.9
Jan. 1-31, 1957...	203,400		.49	.27	.23		.89	.06	.07		.01	.02	82	.11	22,370	23	.4	104	7.0
Feb. 1-15.....	89,320		.50	.31	.25		.93	.06	.07		.01	.04	83	.11	9,830	23	.4	106	7.0
Feb. 16-28.....	299,200		.45	.20	.19		.77	.05	.06		.01	--	76	.10	29,920	21	.3	86	6.9
Mar. 1-20.....	504,200		.41	.20	.17		.72	.04	.03		.01	.06	76	.10	50,420	20	.3	80	7.1
Mar. 21-31.....	197,300		.47	.27	.21		.87	.06	.03		.00	--	82	.11	21,700	22	.3	94	7.1
Apr. 1-30.....	348,000		.47	.27	.21		.87	.05	.04		.01	.01	80	.11	38,280	22	.3	94	7.2
May 1-31	227,500		.39	.20	.20		.74	.04	.04		.01	.04	67	.09	20,480	24	.4	83	6.8

June 1-30, 1957...	121,300		.39	.18	.20		.74	.04	.04		.00	.02	67	.09	10,920	24	.4	80	7.0
July 1-31.....	82,930		.39	.21	.22		.79	.04	.05		.02	.01	72	.10	8,290	24	.4	87	6.9
Aug. 1-31.....	72,890		.41	.21	.23		.80	.02	.06		.01	.01	75	.10	7,290	26	.4	87	7.2
Sept. 1-30.....	76,700		.41	.20	.23		.79	.03	.06		.01	.03	74	.10	7,670	26	.4	88	7.0
Total or weighted average	2,948,000		0.45	0.22	0.20		0.80	0.05	0.05		0.01	--	77	0.10	294,800	22	0.3	89	--

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