Quality of Surface Waters for Irrigation Western United States 1953

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:

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QUALITY OF SURFACE WATERS FOR IRRIGATION, WESTERN UNITED STATES, 1953

INTRODUCTION

The records of chemical analyses, other physical measurements, and discharge given in this report comprise the third annual compilation of data for 84 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, 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 stream-flow gaging stations and that the program of collecting and analyzing the samples and reporting the findings would be the responsibility of the Geological Survey. The scope of the chemical analyses would provide for the calculation of the salt burden

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	
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
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	near Wakpala, S. Dak	Jan. 17, 1951
12		Moreau River	at Promise, S. Dak	
13		Cheyenne River	near Eagle Butte, S. Dak	Jan. 17, 1951
14		White River	near Oacoma, S. Dak	
15		James River	near Huron, S. Dak	
16		N. Platte River	below Alcova 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	
22		Smoky Hill River	near Langley, Kans	
23		Saline River[b]	near Wilson (or Russell), Kans.	
			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[c]	at Mannford, Okla	Oct. 1, 1949
			at Perkins, Okla	Oct. 1, 1952
29		Canadian River	near Tascosa, Tex	June 2, 1948
30		Canadian River	near Whitefield, Okla	Sept. 1, 1946
31		Red River	at Denison Dam, near Denison, Tex.	May 1, 1944
32		Washita River[d]	near Tabler, Okla	Sept. 10, 1946
33		Sabine River	near Ruliff, Tex	Oct. 1, 1947
34		Neches River	at Evadale, Tex	Oct. 1, 1947
35	8	Trinity River	at Romayor, Tex	Sept. 1, 1945
36		San Jacinto River[e]	near Huffman, Tex	Sept. 1, 1945
37		Brazos River	at Richmond, Tex	Sept. 1, 1945
38		Colorado River[f]	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 Cr. nr. Lobatos, Colo.	Oct. 11, 1946
44		Rio Grande	at Otowi Bridge nr. San Ildefonso, N. Mex.	Oct. 23, 1947
45		Rio Grande	at San Marcial, N. Mex	July 1, 1948
46		Rio Grande	below Elephant Butte Outlet, N. Mex.	1933
47		Rio Grande[g]	near El Paso, Tex	1930
48		Rio Grande[g]	below Old Fort Quitman, Tex	1930
49		Rio Grande[g]	at Upper Presidio, Tex	1935
50		Rio Grande[g]	at Langtry, Tex	1945
51		Rio Grande[g]	at Eagle Pass, Tex	1938
52		Rio Grande[g]	at Roma, Tex	1944
53		Pecos River	below Alamorgordo Dam, N. Mex.	June 26, 1937
54		Pecos River	near Artesia, N. Mex	July 1, 1937

Irrigation-Quality Network Stations in Western United States— Continued

No.	Geological Survey Part no.	Stream	Location	Date established
55	8	Pecos River	near Orla, Tex	July 1, 1937
56		Pecos River[a]	near Comstock, Tex	1935
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. 1939
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	near Blanco, N. Mex	Oct. 1, 1945
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 Gillespie 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)[b].	at Stockton, Calif	Mar. 1, 1951
84a		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	near Clarkston, Wash	Nov. 14, 1951
100		Boise River	near Arrowrock, Idaho	
101		Boise River	at Notus, Idaho	Nov. 21, 1950
102	14	Columbia River	at Maryhill, Ferry nr. Rufus, Oreg.	Dec. 1, 1950
103		Deschutes River	at Moody nr. Biggs, Oreg	Dec. 1952
104		Willamette River	at Salem, Oreg	Feb. 1, 1951
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 Little field, Ariz	July 1949

[a] Dropped from list Jan. 21, 1954. Replaced by station Wind River below Boysen Dam.
[b] Dropped from list Oct. 3, 1952. Replaced by station at Tescott.

[c] Discontinued Sept. 30, 1952. Replaced by station at Perkins.
[d] Dropped from list Oct. 3, 1952. Replaced by station at Pauls Valley.
[e] Dropped from list Apr. 5, 1954.
[f] Discontinued Sept. 30, 1951.
[g] Operated by International Boundary and Water Commission.
[h] Dropped from list Oct. 3, 1952. Replaced by station San Joaquin River near Biola.

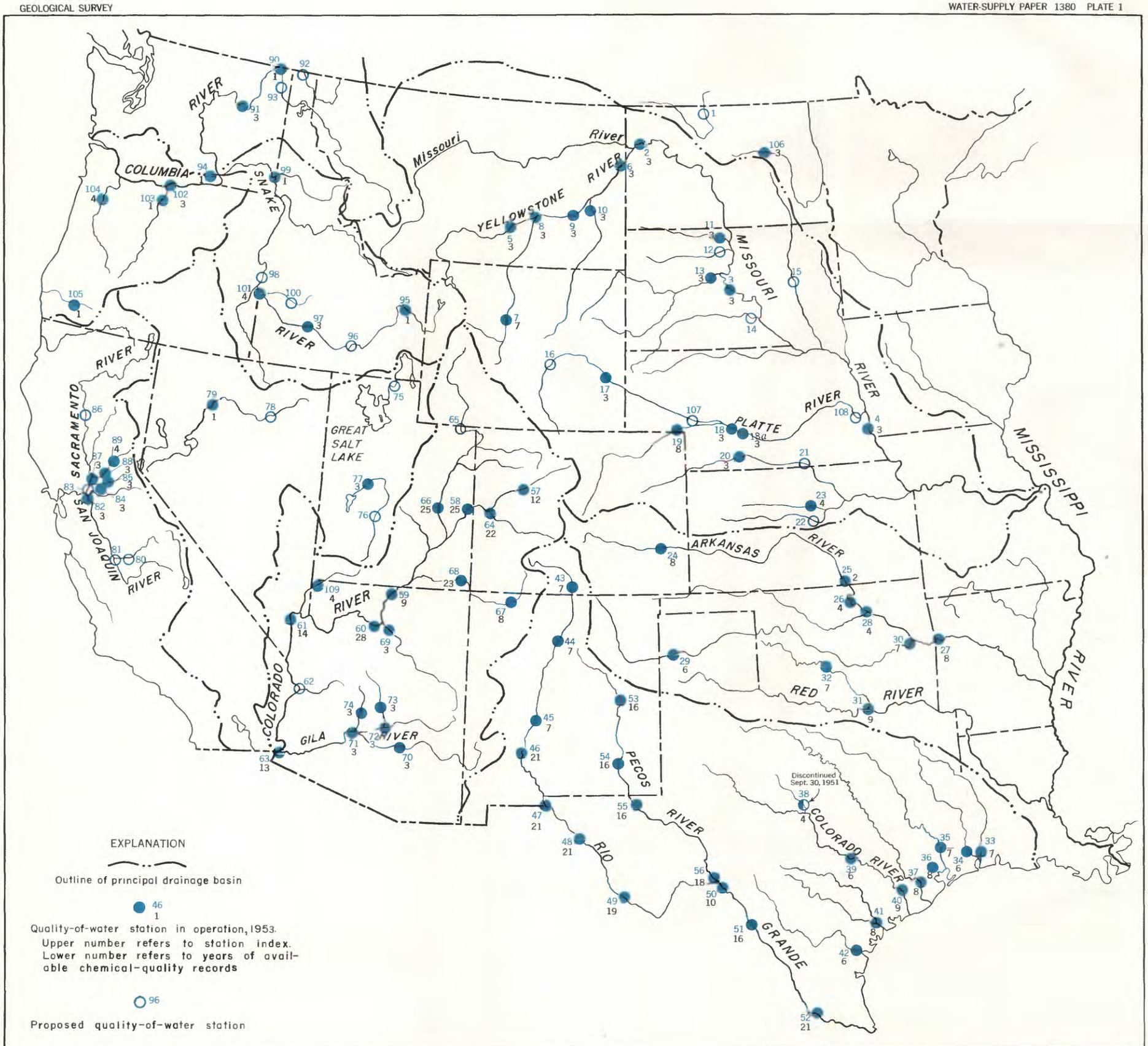
of streams and in general would conform with the current Geological Survey standards for the comprehensive investigation of the chemical quality of surface waters.

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.
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 84 stations in operation in 1953 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.

Ten network stations were activated including Cimarron River at Perkins, Okla., Humbolt River near Rye Patch, Nev., San Joaquin River near Biola, Calif., Yakima River at Kiona, Wash., Snake River near Heise, Idaho, Deschutes River at Moody near Biggs, Oreg., and Rogue River at Grants Pass, Oreg. Two network stations Cimarron River at Mannford, and Washita River near Tabler were discontinued during the water year. As in 1952 the record for the Rio Grande Tiffany Channel at San Marcial, is included



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RECOMMENDED STATIONS FOR IRRIGATION-QUALITY NETWORK IN WESTERN UNITED STATES

although this station is not a part of the network list. The record at this station represents sampling of an artificial channel which bypasses the regular gaging station. During low flow the Tiffany Channel carries drainage water differing decidedly in quality from that in the main channel. Both channels carry water from flood flows at which times the quality in the two channels is about the same.

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 1953, 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, and Langtry; it operated the station Pecos River near Comstock, also. The Mexican Section operated the stream gaging stations on the main stem at Eagle Pass and Roma. 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 22 and 23 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 1952 and 1953. Analyses for seven Rio Grande main stem stations and for the Pecos River near Comstock, 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, sodium, 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.

For the 1953 data there were notable exceptions to the recommended schedules as outlined above. At some stations, where more complete data were needed for other uses, the number of constituents determined was increased. Conversely, some stations that had been in operation for several years prior to this project, during which time at least the minimum determinations in schedule 1 were completed, were immediately placed on a reduced analytical schedule.

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 16 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-sample analysis.

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

Discharge 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, that will react with another 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 20.

DISCUSSION OF RESULTS

Discharge data and dissolved-solids loads for stations operated in 1952 are summarized in the following table.

HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

Red River of the North basin.—Runoff in the upper Sheyenne River basin was less in 1953 than in the preceding 2 years. In the 1951 and 1952 water years runoff was relatively high in April, May, and June. However, in the 1953 water year the runoff near Warwick for April through July was only about 2,000 to 4,000 acre-feet per month.

Percentage composition of the dissolved constituents was relatively constant for the 3 years except that percentage of sodium was a little lower in 1953 as compared to 1951 and 1952.

MISSOURI RIVER BASIN

Missouri River-main stem.—Flow in the Missouri River in 1953 was regulated by Ft. Peck and Ft. Randall Reservoirs. Impounding of water in Ft. Randall Reservoir began in December 1952.

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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	15,720	0.75
Missouri River main stem		
Missouri River near Williston, N. Dak	15,790,000	.58
Missouri River at Pierre, S. Dak	18,610,000	.64
Missouri River at Nebraska City, Nebr	28,500,000	.63
Yellowstone River basin		
Yellowstone River at Billings, Mont	4,353,000	.26
Yellowstone River near Sidney, Mont	6,843,000	.61
Bighorn River at Thermopolis, Wyo	876,000	.66
Bighorn River at Bighorn, Mont	2,030,000	1.01
Tongue River at Miles City, Mont	234,800	.60
Powder River near Locate, Mont	278,100	1.62
Grand River basin		
Grand River near Wakpala, S. Dak	342,300	.61
Cheyenne River basin		
Cheyenne River near Eagle Butte, S. Dak	731,200	1.48
Platte River basin		
North Platte River below Guernsey Reservoir, Wyo	1,051,000	.52
Platte River at Brady, Nebr	233,800	.61
Supply Canal (Tri-County Diversion) near Maxwell, Nebr	1,150,000	.74
South Platte River at Julesburg, Colo	148,100	1.97
Kansas River basin		
Republican River above Medicine Creek at Cambridge, Nebr	125,700	.50
Saline River at Tescott, Kans	58,390	2.43
Arkansas River basin		
Arkansas River below John Martin Reservoir, Colo	158,600	2.16
Arkansas River at Arkansas City, Kans	470,600	1.65
Arkansas River at Ralston, Okla	918,300	1.70
Cimarron River at Perkins, Okla	169,800	6.50
Arkansas River at Van Buren, Ark	9,365,650	.81
Canadian River near Tascosa, Tex	80,400	.76
Canadian River near Whitefield, Okla	2,363,000	1.44
Red River basin		
Red River at Denison Dam near Denison, Tex	1,341,700	1.28
Sabine River basin		
Sabine River near Ruliff, Tex	8,930,000	.11
Neches River basin		
Neches River at Evadale, Tex	5,919,000	.09
Trinity River basin		
Trinity River at Romayor, Tex	[a]2,621,000	.24
San Jacinto River basin		
San Jacinto River near Huffman, Tex	993,400	.14
Brazos River basin		
Brazos River at Richmond, Tex	2,972,000	.29
Colorado River basin		
Colorado River at Austin, Tex	667,000	.31
Colorado River at Wharton, Tex	973,800	.29
Guadalupe River basin		
Guadalupe River at Victoria, Tex	777,400	.43
Nueces River basin		
Nueces River near Mathis, Tex	536,500	.33
Rio Grande basin		
Rio Grande above Culebra Creek near Lobatos, Colo	134,600	.34
Rio Grande at Otowi Bridge near San Ildefonso, N. Mex	548,600	.32
Rio Grande Tiffany Channel near San Marcial, N. Mex	31,100	1.20
Rio Grande at San Marcial, N. Mex	255,700	.76
Rio Grande below Elephant Butte Outlet, N. Mex	553,700	.....
Rio Grande near El Paso, Tex	268,500	.....
Rio Grande below Old Fort Quitman, Tex	25,000	.....
Rio Grande at Upper Presidio, Tex	8,926	.....
Rio Grande at Langtry, Tex	336,400	.....
Rio Grande at Eagle Pass, Tex	669,300	.....
Rio Grande at Roma, Tex	925,200	.....
Pecos River below Alamogordo Dam, N. Mex	97,960	2.57
Pecos River near Artesia, N. Mex	80,040	4.81

Summary of water discharge, and tonnages of dissolved solids—Continued

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Rio Grande basin—Continued		
Pecos River below Red Bluff Dam near Orla, Tex	[a]7,430	13.3
Pecos River near Comstock, Tex	85,360	.....
Colorado River main stem		
Colorado River near Glenwood Springs, Colo	1,589,000	.39
Colorado River near Cisco, Utah	[a]1,829,000	.....
Colorado River at Lees Ferry, Ariz	8,787,000	.85
Colorado River near Grand Canyon, Ariz	8,879,000	.98
Colorado River below Hoover Dam, Ariz.-Nev	[a]9,448,000	.86
Diversions and Return Flows at and below Imperial Dam		
Yuma Main Canal below Colorado River siphon at Yuma, Ariz	365,800	.92
Gunnison River basin		
Gunnison River near Grand Junction, Colo	[a]1,254,000	1.03
Green River basin		
Green River at Green River, Utah	3,395,000	.67
San Juan River basin		
San Juan River near Blanco, N. Mex	509,900	.25
San Juan River near Bluff, Utah	945,500	.71
Little Colorado River basin		
Little Colorado River at Cameron, Ariz	.....	.....
Virgin River basin		
Virgin River at Littlefield, Ariz	99,470	.....
Gila River basin		
Gila River at Kelvin, Ariz	75,970	1.37
Gila River below Gillespie Dam, Ariz	29,610	7.10
Salt River at Stewart Mountain Dam, Ariz	543,900	.55
Verde River below Bartlet Dam, Ariz	232,600	.45
Aqua Fria River below Lake Pleasant Dam, Ariz	51,070	.31
Sevier Lake basin		
Sevier River near Lynndyl, Utah	167,800	2.03
Humboldt River basin		
Humboldt River near Rye Patch, Nev	[a]135,400	.85
San Joaquin River basin		
San Joaquin River near Biola, Calif	[a]230,100	[a].07
San Joaquin River near Vernalis, Calif	1,891,000	.31
Mokelumne River at Woodbridge, Calif	357,097	[a].06
Sacramento River basin		
Sacramento River at Knights Landing, Calif	8,021,000	.17
Feather River at Nicolaus, Calif	7,144,000	[a].08
American River at Fair Oaks, Calif	2,706,000	[a].06
Columbia River main stem		
Columbia River ta International Boundary	67,560,000	.12
Columbia River at Grand Coulee, Dam, Wash	[a]76,000,000	.12
Yakima River basin		
Yakima River at Kiona, Wash	[a]1,865,000	.20
Snake River main stem		
Snake River near Heise, Idaho	[a]4,066,000	.29
Snake River at King Hill, Idaho	7,481,000	.45
Snake River near Clarkston, Wash	37,710,000	.23
Boise River basin		
Boise River at Notus, Idaho	1,015,000	.26
Deschutes River basin		
Deschutes River at Moody near Biggs, Oreg	[a]3,831,000	.13
Columbia River main stem		
Columbia River at Maryhill Ferry near Rufus, Oreg	129,800,000	.16
Willamette River basin		
Willamette River at Salem, Oreg	19,380,000	.07
Rogue River Basin		
Rogue River at Grants Pass, Oreg	[a]2,730,000	.10

[a] For period of sampling only. See individual station records and footnotes for additional description of discharge data used in computations of weighted averages.

In 1951 the runoff was about average in the upper reaches of the river basin but was above average in the lower reaches. In 1952 the runoff was above average as a result of heavy snowpack in the Dakotas and Montana. In 1953 the runoff was about average for the entire reach of the river.

Flows greater than 100,000 cfs occurred at Nebraska City, Nebr. during March to August 1951, April 1952, and May to June 1953; at Pierre, S. Dak. in April 1951, April 1952, and June 1953; at Williston, N. Dak. in April 1952.

The quality of the water is similar at the three stations. A comparison of the weighted-average values for dissolved solids and specific conductance shows a slight increase in mineralization of the water between Williston and Pierre and a decrease between Pierre and Nebraska City. The increase in mineralization is due to the influence of tributary streams in the Dakotas. The slight decrease in mineralization between Pierre and Nebraska City results from dilution by the Niobrara, Platte, and possibly the Big Sioux River. Of the dissolved-solids load at Nebraska City during 1952 and 1953, about 20 percent was contributed by the Yellowstone basin, about 30 percent by the upper Missouri basin, about 15 percent by the drainage area between Williston and Pierre, and about 35 percent by the drainage area downstream from Pierre.

Yellowstone River basin. —Runoff in the Yellowstone River basin during 1953 was lower than in 1951 and 1952 (years of above-normal runoff) and lower than the average for the period 1934-53.

About 30 percent of the water and 50 percent of the dissolved-solids load of the Yellowstone River near Sidney, Mont. are contributed by the Bighorn River basin. The Powder and Tongue River basins together contribute about 15 percent and the Yellowstone River basin above Billings, Mont., about 30 percent of the dissolved load near Sidney, Mont. Water in the Powder River is more highly mineralized than that in the main stem or in any other major tributary. However, the Powder River basin contributes only about 5 percent of the water of the Yellowstone River near Sidney, and its effect on the quality of the Yellowstone is noticeable, but small, when compared to that of the Bighorn River basin.

Water is diverted for about 1,250,000 acres of irrigated land in the Yellowstone basin above Sidney, Montana. Of this acreage about 35 percent is in the Bighorn basin, about 30 percent in the Yellowstone basin above Billings, about 25 percent along the Yellowstone Valley and in minor basins between Billings and Sidney, and about 10 percent in the Tongue and Powder basins.

Impounding of water behind Boysen Dam on the Wind River upstream from Thermopolis, Wyo., began in October 1951. Major reservoirs in operation in the basin prior to 1951 are Buffalo Bill Reservoir on the Shoshone River and Bull Lake and Pilot Butte Reservoirs in the Wind River basin.

Grand River basin. —Runoff in the Grand River basin during 1953 was much lower than in 1952 and much higher than in 1951. Shadehill Reservoir, which began impounding water in July 1949 (no regulation October 1949 to June 1950) stored much of the record flood of April 1952. During 1951 only 373 acre-feet of water passed the gaging station below Shadehill Reservoir. In 1952, however, 275,700 acre-feet and in 1953, 82,900 acre-feet of water was released from the reservoir. These releases represent about 50 percent and 25 percent, respectively, of the measured flow near Wakpala, S. Dak. Thus weighted-average concentrations for the Grand River near Wakpala for 1951 represent drainage from the area below Shadehill Reservoir; those for 1952 represent spring (April and May) releases from the reservoir and drainage of the area below the reservoir; and those for 1953 represent summer (June and July) releases from the reservoir and drainage of the area below the reservoir.

Runoff from snow-melt in April 1952 accounted for the higher relative concentrations of calcium and bicarbonate in the average analysis than in the preceding or following year.

Of the dissolved load at the station Wakpala, S. Dak., about 43 percent in 1952 and 30 percent in 1953 was contributed by that part of the basin above Shadehill dam.

Cheyenne River basin. —Runoff in the Cheyenne River basin during 1953 was lower than in 1952 but much higher than in 1951. In the spring of 1952 high runoff occurred as a result of melting of a near record blanket of snow; runoff was about four times greater than that in 1951. In 1953 the high runoff occurred over longer periods of time and included more late spring and summer runoff than in 1952. As a result, concentrations of dissolved solids for 1953 for Cheyenne River near Eagle Butte, S. Dak. are higher than would be expected when runoff and weighted-average concentrations for the 3 water years are compared.

Currently, there are diversions for about 70,000 acres of irrigated land in the basin above Eagel Butte, most of which are in the Belle Fourche and Rapid Creek basins. Flow is regulated by Angostura Reservoir (began storage October 1949) on the main stem, Belle Fourche (began storage in 1911) and Keyhole (began storage March 1952). Reservoirs on the Belle Fourche River, and Deerfield Reservoir (began storage December 1945) on Rapid Creek.

Platte River basin.—Runoff in the Platte River basin upstream from Brady, Nebr., during 1953 was about a third of that during 1952. Flow in the North Platte and South Platte Rivers is affected by transbasin diversions, reservoirs (Seminoe, Pathfinder, Alcova, Guernsey, and McConnaughey on the North Platte; Elevenmile Canyon and Cheesman on the South Platte), power developments, ground-water withdrawals, and diversions for and return flow from irrigation developments.

About one-fourth to one-third of the dissolved-solids load of the Platte River (including the Supply Canal) below the confluence of the North and South Platte Rivers was contributed by the South Platte River basin. The load carried by the Supply Canal is about three times that carried by the Platte River at Brady. Much of the flow in the river at Brady is ground-water inflow, and in addition several small creeks draining the area to the north discharge into the river upstream from Brady.

Kansas River basin.—Runoff in the Kansas River basin during 1953 was lower than in either of the preceding 2 years. A record high runoff occurred during 1951, especially in the eastern part of the basin.

Major reservoirs above the station, Republican River above Medicine Creek at Cambridge, Nebr., include Bonny Reservoir on the South Fork Republican (began storage July 1950), Enders Reservoir on Frenchman Creek (began storage October 1950), and Swanson Lake (Trenton Dam) on the main stem (began storage May 1953). The quality of the river water of Cambridge in 1953 was better than in 1952, although runoff in 1953 was only about one-half that in 1952, because very little water was released from Swanson Lake from May to September 1953 and during that period water passing Cambridge was chiefly from Frenchman and Red Willow Creeks.

Runoff during 1953 in the Saline River was much less than in 1951 and 1952. Thus, in 1953, ground-water accretion to the stream accounted for a larger proportion of the total runoff and, as a result, concentrations of sodium chloride at the Tescott, Kans., station were much higher. There is little or no irrigation development on the Saline River.

LOWER MISSISSIPPI RIVER BASIN

Arkansas River basin.—At the station on the Arkansas River below John Martin Reservoir, Colo., the weighted average for dissolved solids is slightly lower than for the preceding water year, notwithstanding a decrease in release of about 18,300 acre-feet.

This anomaly is due to a release of water of better-than-average quality during the month of July.

There was considerable decrease in runoff from the previous year for stations in the upper Arkansas basin of Oklahoma. Runoff for the Arkansas River at Ralston, Okla. decreased from more than 3 million acre-feet in 1952 to less than 1 million acre-feet in 1953. These decreases in flow are reflected in generally higher mineral concentrations as well as values for sodium-adsorption-ratio (SAR) which range up to 82 for the Cimarron River at Perkins as compared to a high of 44 for the Cimarron River at Mannford the previous year. This flow pattern for the upper Arkansas is reversed at the Canadian River near Whitefield, which shows an increase of 461,000 acre-feet runoff over the previous year. This increase in flow is reflected by a decrease in the weighted-average dissolved solids from 1,420 ppm in 1952 to 1,060 ppm in 1953.

For the entire Arkansas River drainage basin in Oklahoma, there was a decrease in runoff from 1952 to 1953 of about 10 million acre-feet as shown by the runoff figures for the Arkansas River at Sallisaw, Okla., and at Van Buren, Ark. The unusual thing about the increase in runoff on the Canadian River near Whitefield is the decrease in runoff of its principal tributary, the North Canadian River. Most of the increase came about through local runoff between Bridgeport and Whitefield. An example is Gaines Creek near Krebs, having a drainage area of only 588 square miles showing an increase of 260,000 acre-feet from 1952 to 1953. This local runoff is also reflected by the decrease in total load at Whitefield in spite of the increase in runoff.

Runoff of the Arkansas River at Van Buren during 1953 was 9.4 million acre-feet as compared to 19.4 million acre-feet in 1952 and to 33.3 million acre-feet in 1951. This decrease in runoff was due to deficient rainfall in the basin above Van Buren. A slight increase in dissolved-solids concentration occurred in 1951 and 1952. In 1952 this increase was due to increases in concentration of all major constituents. In 1953 the increase in load was due to significant increases in sodium and chloride concentrations whereas all other major constituents decreased. This change in character is attributed to the low runoff from streams in eastern Oklahoma which have a diluting effect on water of the Arkansas River. Runoff from these streams was less due to the drought and impoundment for power generation.

WESTERN GULF OF MEXICO BASIN

In the western Gulf of Mexico basin, from the Sabine River to the Nueces River, increased rainfall caused runoff in 1953

considerably in excess of that in 1952. As a result the dissolved-solids concentrations of streams in that area show decreases.

Rio Grande basin.—In the Rio Grande basin, the runoff at San Marcial for 1953 was approximately twice that for 1951, but the dissolved-solids concentration was about the same. However, the distribution of the water between the Rio Puerco, which contributes flow to the San Marcial station, and the main stem of the Rio Grande was approximately the same. In 1952 the runoff at the San Marcial station was much higher and the dissolved-solids concentration was much lower. In 1952 a much larger percentage than in 1951 and 1953 of the runoff was contributed by the main stem which is of a better quality of water than the Rio Puerco.

Continued drouth conditions in the Pecos River basin resulted in extremely low flows in the Pecos River below Red Bluff Dam near Orla and new highs in dissolved-solids concentrations. An increase from 9.22 tons per acre-foot in 1952 to 13.3 tons per acre-foot was observed.

COLORADO RIVER BASIN

The quality of surface water supplies for irrigation in New Mexico and Arizona generally was poorer than in the preceding year. This was due to lower spring runoff which usually contributes water of better quality over most of the two State area.

Generally, most of the changes in water quality at network stations were due to fluctuations in stream runoff and irrigation practices. Runoff for most of the stations in the basin was less than for the 1952 water year. Dissolved-solids load in water year 1952 in the basin was among the highest of record. The increased concentration of dissolved solids was probably due to deficient runoff and some increased irrigation activity.

Colorado River main stem.—Runoff in the main stem of the Colorado River was deficient above Lake Mead but about normal below Hoover Dam. Owing to the deficient runoff the concentration of mineral constituents was somewhat higher for the stations near Glenwood Springs, Colo. and near Cisco, Utah. Analytical data representing 100 percent of the runoff for the station near Glenwood Springs was obtained; however, only 45 percent of the annual runoff was sampled at the station near Cisco. The concentration of dissolved constituents for the station below Hoover Dam remains relatively constant due to the leveling effect of Lake Mead.

Gunnison River basin.—Average concentration of dissolved solids in the Gunnison River near Grand Junction, Colo. was considerably

higher than for 1952 reflecting annual runoff of approximately one-half that in the previous year.

Green River basin. —Annual runoff of about one-half that in 1952 resulted in a moderate increase in the average concentration of dissolved solids and 50 percent decrease in total load for Green River at Green River, Utah.

San Juan River basin. —A considerable increase in the average concentration of dissolved constituents accompanied a annual runoff amounting to less than one-half of a 39-year average for the San Juan River near Bluff, Utah.

Little Colorado River basin. —Weighted averages were not computed for the Little Colorado River at Cameron, Ariz., because of the difficulty of correlating surface water and quality of water records. Moenkopi Wash enters the river between the sampling and gaging stations and has considerable flows at times.

Virgin River basin. —The station Virgin River at Littlefield, Ariz. is downstream from an area of intensive irrigation around St. George and Washington, Utah. The average annual runoff at this station was much less than half the runoff in the previous year, and the average concentration of dissolved solids increased about two-fold over that in 1952.

Gila River basin. —The weighted-average analyses of water in the Gila River below Gillespie Dam, Ariz. was higher for the 1952 and 1953 water years than for the preceding water year. This difference is due largely to abnormally high storm runoff during August and September of 1951. The schedule of analyses for this station was not changed to conform with other irrigation network stations because of high values for dissolved solids and boron.

The improved quality during (the 1953 year) of the Salt River at Stewart Mountain Dam, Ariz., is probably due to high winter and spring runoff during the 1951 water year. The full effect of this inflow was not noticed until the 1953 water year because of the chain of storage reservoirs above Stewart Mountain Dam.

THE GREAT BASIN

Sevier Lake basin. —Runoff in the Sevier Lake basin was above normal in 1953. At the station Sevier River near Lynndyl, located in a heavily irrigated area, the dissolved-solids concentrations were higher than for the previous years. A considerable increase in the sodium content may be due to increased irrigation activities.

Humboldt River basin.—The runoff from the Humboldt River near Rye Patch, Nev. just below the Rye Patch Reservoir was only about one third that for the previous year. The average dissolved solids increased somewhat, over that in 1952 but the most considerable change in the chemical data was the presence of carbonate in more than one-half of the analyses. Records for both 1952 and 1953 are published in this report.

PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

Columbia River main stem.—Runoff for the Columbia River was slightly less than for the 1952 water year. Three stations on the main stem are represented, namely, at International Boundary, at Grande Coulee Dam Wash., and at Maryhill Ferry near Rufus, Oreg. Dissolved solids at the three stations were low and differed very little from the 1952 water year. Analyses for the station at Maryhill Ferry near Rufus, Oreg. also were similar to results obtained in the 1951 water year. The leveling effect of Franklin D. Roosevelt Lake prevents large fluctuations in dissolved solids for the two downstream stations, especially for the station at the dam.

SNAKE RIVER BASIN

Snake River main stem.—Three stations were operated on the main stem of the Snake River during the year. This was the first year of record for the station near Heise, Idaho and the second year of record for the stations at King Hill, Idaho and near Clarkston, Wash. Runoff was deficient in the main stem, and this factor together with increased irrigation activity in the basin accounts for the slight increase in the concentration of dissolved solids.

Boise River basin.—The runoff at the station Boise River at Notus, Idaho, was above normal but only about one-half the runoff for the 1952 water year and somewhat less than that for 1951. Water from the Boise River is used extensively for irrigation above this station. Owing to a decrease in runoff and possibly increased irrigation activity there was a considerable increase in dissolved solids concentration in the 1953 water year.

PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN

Willamette River basin.—Runoff for the station Willamette River at Salem, Oreg. was greater than the 33-year average and slightly greater than in the 1952 water year. The concentration of dissolved solids was low and practically no change was observed during the period of record.

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 resumé of these early developments is given in Water-Supply 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 designated categories by a series of two numbers: 1A, 1B, 1C, 1E, to increasing concentrations of dissolved solids and the letters to increasing proportions of sodium in the water or to different sodium percentages. In the number classification, Class 1 water in which specific conductance ranges from 0 to 750 micromhos, can be used safely on all soils. Class 5 waters, those having specific conductance greater than 5,000 micromhos, are generally unsuitable and should be used for irrigation only under special situations.

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 introduces the term sodium-adsorption-ratio (SAR), which is the relative proportion of sodium to other cations in an irrigation water and is defined by the equation:

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

where the concentrations of the constituents are expressed in milliequivalents per liter (or equivalents per million for most irrigation waters). It is reported that the sodium-adsorption-ratio is more significant for interpreting water quality than percent sodium by the soil.

Waters are divided into four classes with respect to sodium hazard, the dividing points being at SAR values of 10, 18, and 26. They range from low-sodium water that can be used for irrigation on almost all soils to very high-sodium water which is 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 bridge on county road, 3.3 miles south of Warwick, Benson County.
DRAINAGE AREA.--2,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1953.
Water temperatures: January 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,130 micromhos June 12; minimum daily, 373 micromhos Oct. 15.
Percent sodium: Maximum, 56 July 12-25; minimum, 16 Oct. 1-31.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 1,170 micromhos July 11, 1952; minimum daily, 244 micromhos Mar. 29, 1951.
Percent sodium: Maximum, 56 July 12-25, 1953; minimum, 16 Oct. 1-31, 1952.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1278.

Chemical analyses, water year October 1952-1953

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, 1952..	71		2.69	1.31	0.78		3.82	0.92	0.11		0.02	0.06	270	0.37	26	16	0.6	440	8.2
Nov. 1-30.....	474		2.59	1.59	1.70		4.59	1.25	.18		.02	.09	336	.46	218	28	1.2	528	8.2
Dec. 1-31.....	161		2.99	1.91	3.09		6.23	1.62	.34		.03	.17	469	.64	103	38	2.0	715	8.2
Jan. 1-4.....	24		3.09	1.83	2.22		5.72	1.29	.27		.03	.11	419	.57	14	30	1.4	658	--
Jan. 5-9.....	24		2.99	2.09	2.83		--	1.56	--		--	.14	--	--	--	36	1.8	--	--
Jan. 10-Feb. 22.	212		3.24	2.36	2.52		6.54	1.58	.34		.04	.13	473	.64	136	30	1.5	742	8.1
Feb. 23-Mar. 22	186		4.24	2.48	2.57		7.47	1.56	.37		.05	.14	530	.72	134	27	1.4	840	8.1
Mar. 23-27.....	77		4.04	2.38	2.17		6.85	1.54	.37		.04	.14	486	.66	51	25	1.2	787	7.8
Mar. 28-Apr. 2..	853		2.99	2.47	3.48		6.47	2.33	.45		.04	.19	530	.72	614	37	2.1	838	7.9
Apr. 3-30.....	2,020		1.70	1.30	2.13		3.28	1.75	.28		.04	.12	330	.45	909	40	1.7	515	7.5
May 1-4.....	357		2.30	1.80	2.78		4.29	2.19	.48		.02	.16	430	.58	207	40	1.9	669	7.3
May 5-30.....	3,210		2.69	2.37	5.61		6.34	3.77	.65		.03	.31	652	.89	2,860	52	3.5	976	7.6
May 31-June 30..	3,780		2.99	2.49	5.35		6.98	3.44	.48		.04	.31	670	.91	3,440	49	3.2	973	7.8
July 1-11	2,960		1.55	2.53	4.52		5.98	2.60	.31		.03	.22	536	.73	2,160	52	3.2	787	8.2
July 12-25.....	889		2.05	2.11	5.22		6.67	2.35	.28		.03	.16	566	.77	685	56	3.5	831	8.1

July 26-Aug. 13..	260		2.69	1.15	3.39		5.64	1.62	.23		.04	.23	438	.60	156	45	2.4	672	7.9
Aug. 14-31.....	44		2.50	1.54	2.65		5.28	1.42	.18		.03	.21	396	.54	24	38	1.9	618	8.0
Sept. 1-30	125		2.84	1.38	1.78		4.90	1.15	.16		.02	.12	360	.49	61	29	1.2	555	7.8
Total or weighted average [a]	15,720		2.45	2.22	4.35		5.93	2.77	0.42		0.03	0.23	552	0.75	11,810	48	2.8	823	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: May 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 832 micromhos Apr. 17; minimum daily, 375 micromhos June 24.
Percent sodium: Maximum, 41 May 26 to June 9; minimum, 33 Nov. 1-8, Jan. 7-31.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 864 micromhos Mar. 20, 1951; minimum daily, 320 micromhos June 24, 1951.
Percent sodium: Maximum, 41 May 26 to June 9, 1953; minimum, 31 Jan. 30, 1952.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	1,695,000		2.84	1.72	2.44		3.11	3.73	0.25		0.02	0.12	444	0.60	1,017,000	34	1.6	669	8.0
Nov. 1-8.....	402,800		2.89	1.83	2.39		3.20	3.79	.25		.01	.11	456	.62	249,700	33	1.6	688	7.9
Nov. 9-26.....	582,100		3.14	2.02	2.78		3.41	4.37	.31		.02	.13	508	.69	401,600	34	1.7	756	7.8
Nov. 27.....	25,390		3.54	2.14	3.00		3.70	4.77	.31		.04	.15	544	.74	18,790	34	1.8	808	7.3
Dec. 20-Jan. 6, 1953	370,600		3.39	2.09	2.87		3.59	4.52	.31		.02	.13	526	.72	266,800	34	1.7	781	7.9
Jan. 7-11	111,700		3.54	2.06	2.83		3.61	4.58	.31		.04	.16	528	.72	80,420	33	1.7	792	8.1
Jan. 12-31	464,100		3.24	1.96	2.65		3.39	4.27	.31		.03	.15	494	.67	310,900	33	1.6	745	7.7
Feb. 1-15.....	327,500		3.24	1.94	2.78		3.28	4.43	.34		.04	.15	514	.70	229,300	34	1.7	767	7.6
Feb. 16-Mar. 11.	457,800		3.34	2.02	2.96		3.36	4.66	.37		.03	.15	530	.72	329,600	35	1.8	798	8.0
Apr. 7-22	434,600		3.19	1.91	3.04		3.24	4.60	.34		.02	.14	528	.72	312,900	37	1.9	787	8.1
Apr. 7, sta. 860a	27,970		--	--	--		--	--	--		--	--	--	--	--	--	--	768	--
Apr. 7, sta. 900a	27,970		--	--	--		--	--	--		--	--	--	--	--	--	--	765	--
Apr. 7, sta. 910a	27,970		--	--	--		--	--	--		--	--	--	--	--	--	--	766	--
Apr. 7, sta. 990a	27,970		--	--	--		--	--	--		--	--	--	--	--	--	--	767	--
Apr. 23-May 25..	1,355,000		2.79	1.59	2.83		3.03	3.96	.28		.02	.12	464	.63	853,700	39	1.9	700	7.8

a Not included in total or weighted average.

May 26-June 9...	1,035,000		2.59	1.29	2.87		2.72	3.98	.20		.06	.11	456	.62	641,700	41	2.1	671	7.1
June 10-30	2,148,000		2.00	.96	1.78		2.16	2.46	.11		.04	.07	310	.42	902,200	37	1.5	468	7.3
July 1-31	1,721,000		1.95	1.07	1.87		2.43	2.46	.17		.02	.09	318	.43	740,000	37	1.5	487	7.8
July 2, sta. 440 a	64,660		--	--	--		--	--	--		--	--	--	--	--	--	--	507	--
July 2, sta. 700 a	64,660		--	--	--		--	--	--		--	--	--	--	--	--	--	508	--
July 2, sta. 970 a	64,660		--	--	--		--	--	--		--	--	--	--	--	--	--	505	--
Aug. 1-25, 1953 .	1,363,000		2.94	1.30	2.57		2.97	3.71	0.25		0.01	0.14	430	0.58	790,500	37	1.8	651	7.7
Aug. 26-Sept. 23.	1,689,000		2.84	1.60	2.39		2.97	3.75	.24		.01	.14	422	.57	962,700	34	1.6	649	7.7
Sept. 24-30	427,000		3.04	1.46	2.39		3.02	3.85	.25		.01	.15	436	.59	251,900	34	1.6	661	7.8
Total or weighted average [b]	14,610,000		2.69	1.48	2.44		2.88	3.58	0.23		0.02	0.12	422	0.57	8,360,000	36	1.7	637	--
Total or weighted average [c]	15,790,000		2.74	1.56	2.44		2.93	3.64	0.24		0.02	0.12	430	0.58	9,158,000	36	1.7	647	--

a Not included in total or weighted average.
b Represents 93 percent of runoff for water year October 1952 to September 1953.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1952 to September 1953.

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MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.

LOCATION.--At bridge on U. S. Highway 14 at Pierre, Hughes County, 0.3 mile upstream from gaging station (revised) and 1.5 miles upstream from Bad River.
DRAINAGE AREA.--243,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1953.
Water temperatures: March 1951 (revised) to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 991 micromhos Dec. 17; minimum daily, 464 micromhos July 2.
Percent sodium: Maximum, 45 May 1-3; minimum, 35 Jan. 1-31.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 991 micromhos Dec. 17, 1952; minimum daily, 394 micromhos July 3, 1951.
Percent sodium: Maximum, 45 May 1-3, 1953; minimum, 27 Jan. 24-27, 1952.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	1,623,000		2.89	1.59	2.57		3.10	3.83	0.27		0.02	0.31	436	0.59	957,600	36	1.7	676	7.6
Oct. 30-Nov. 22 .	1,119,000		2.94	1.82	2.70		3.18	4.02	.31		.02	.30	454	.62	693,800	36	1.7	699	7.7
Nov. 23-26	130,100		3.24	2.00	3.04		3.43	4.56	.34		.02	.18	512	.70	91,070	36	1.9	776	8.1
Nov. 27-Dec. 13 .	278,700		3.64	2.19	3.48		3.87	5.25	.37		.02	.16	574	.78	217,400	37	2.0	867	7.9
Dec. 14-17.....	48,200		4.09	2.61	3.96		4.25	6.04	.42		.02	.16	646	.88	42,420	37	2.2	962	7.8
Dec. 18-23	133,900		3.99	2.57	3.96		4.33	5.75	.40		.02	.31	652	.89	119,200	37	2.2	950	7.7
Dec. 24-25	85,290		3.69	2.39	3.52		a4.18	5.25	.37		.02	.12	602	.82	69,940	36	2.0	883	8.6
Dec. 27-31	116,400		3.84	2.30	3.65		4.10	5.31	.40		.02	.17	598	.81	94,280	37	2.1	910	7.8
Jan. 1-31, 1953	735,500		3.69	2.23	3.35		3.90	5.27	.37		.02	.14	596	.81	595,800	35	2.0	866	7.8
Feb. 1-28	680,300		3.34	2.01	3.09		3.54	4.60	.34		.02	.14	540	.73	496,600	35	1.9	758	7.7
Mar. 1-14	304,500		3.29	2.04	3.26		3.31	5.04	.37		.02	.12	548	.75	228,400	37	2.0	805	7.3
Mar. 15-16.....	70,810		3.94	1.70	4.26		2.79	7.00	.37		.04	.21	666	.91	64,440	42	2.5	938	7.3
Mar. 17-23.....	378,600		3.59	1.73	3.65		2.72	6.31	.31		.04	.10	594	.81	306,700	39	2.2	840	7.4
Mar. 24-25.....	145,400		3.09	1.15	3.04		b2.37	4.41	.14		.04	.15	474	.64	93,060	42	2.1	694	8.4
Mar. 26-31.....	334,600		2.50	1.30	2.83		2.89	3.81	.22		.04	.10	414	.56	187,400	42	2.1	652	7.5

a Includes 0.57 equivalents per million of carbonate (CO_3).
b Includes 0.33 equivalents per million of carbonate (CO_3).

Apr. 1-30, 1953..	1,190,000	3.09	1.65	3.26	3.16	4.68	0.31	0.03	0.09	512	0.70	833,000	40	2.1	771	7.9
May 1-3	224,100	4.09	1.37	4.74	3.11	7.14	.28	.05	.22	704	.96	215,100	45	2.8	994	7.8
May 4-31	1,495,000	2.84	1.60	3.74	3.26	4.85	.28	.04	.16	530	.72	1,076,000	44	2.5	790	7.4
June 1-15	1,383,000	2.79	1.47	3.57	3.29	4.48	.21	.07	.17	526	.72	995,800	44	2.4	768	7.7
June 16	175,500	4.24	1.80	4.39	3.54	6.72	.23	.11	.22	688	.94	165,000	41	2.5	955	7.4
June 17-21	908,200	2.79	1.17	2.87	3.02	3.96	.11	.06	.17	454	.62	563,100	42	2.0	673	7.6
June 22-23	422,500	3.14	1.30	2.91	3.28	4.27	.11	.06	.12	486	.66	278,900	38	2.0	720	8.1
June 24-30	1,068,000	2.30	1.04	2.26	2.70	2.87	.11	.05	.05	368	.50	534,000	39	1.7	557	7.6
July 1-18.....	1,354,000	1.90	1.06	2.26	2.43	2.81	.13	.10	.17	340	.46	622,800	41	1.9	524	7.4
July 19-25	372,900	1.85	1.03	2.13	2.41	2.66	.16	.01	.10	332	.32	119,300	41	1.8	502	7.9
July 26-Aug. 12..	1,054,000	2.99	.61	2.48	2.62	3.44	.20	.01	.18	394	.54	569,200	39	1.8	598	8.0
Aug. 13-31	1,056,000	2.69	1.43	2.87	2.98	3.81	.24	.01	.16	456	.62	654,700	41	2.0	677	7.7
Sept. 1-30	1,725,000	3.04	1.32	2.61	2.98	3.96	.25	.01	.14	448	.61	1,052,000	36	1.8	672	7.5
Total or weighted average[c].....	18,310,000	2.89	1.48	2.96	3.08	4.18	0.24	0.04	0.17	473	0.34	11,940,000	39	2.0	706	--

c Represents 100 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: May 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 936 micromhos Jan. 6; minimum daily, 517 micromhos Aug. 9.
Percent sodium: Maximum, 43 June 20-25; minimum, 30 Mar. 1-23, May 1-5.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 936 micromhos Jan. 6, 1953; minimum daily, 361 micromhos Mar. 29, 1951.
Percent sodium: Maximum, 43 June 20-25, 1953; minimum, 18 Mar. 27-29, 1951.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1280.

Chemical analyses, water year October 1952 to September 1953

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, 1952 .	2,109,000		2.89	1.75	2.44		3.21	3.52	0.48		0.04	0.12	452	0.61	1,286,000	34	1.6	687	7.7
Nov. 1-28.....	1,744,000		3.04	1.64	2.44		3.31	3.48	.48		.04	.09	450	.61	1,064,000	33	1.6	690	7.9
Nov. 29-Dec. 1..	80,730		3.39	1.79	2.61		3.75	3.54	.68		.05	.11	494	.67	54,090	33	1.6	748	7.8
Dec. 2-7.....	168,000		3.69	2.03	2.87		4.23	3.71	.87		.05	.11	534	.73	122,600	32	1.7	814	7.8
Dec. 8-20.....	478,500		3.49	1.85	2.52		4.00	3.27	.71		.06	.10	496	.67	302,300	31	1.5	750	7.7
Dec. 21-31	278,500		3.19	2.89	2.78		4.59	3.60	.85		.06	.11	558	.76	211,700	31	1.6	838	8.0
Jan. 1-3, 1953...	100,600		4.04	2.10	2.91		4.49	3.96	.76		.07	.12	577	.78	78,470	31	1.7	863	7.9
Jan. 4-14	453,400		3.09	2.13	3.17		4.34	4.39	.73		.06	.11	589	.80	362,700	33	1.8	878	7.9
Jan. 15-30	570,000		3.89	2.05	3.09		4.26	4.18	.73		.07	.13	572	.78	444,600	33	1.8	860	7.9
Jan. 31-Feb. 22 .	1,184,000		3.19	1.65	2.35		3.54	3.29	.56		.06	.10	465	.63	745,900	32	1.5	704	7.8
Feb. 23-28.....	263,400		3.44	1.68	2.44		3.79	3.44	.62		.07	.13	482	.66	173,800	31	1.5	736	7.9
Mar. 1-13	774,100		3.24	1.64	2.17		3.54	3.00	.54		.08	.06	445	.61	472,200	30	1.4	686	7.8
Mar. 14-23	1,287,000		3.14	1.52	2.00		3.06	3.16	.37		.08	.07	434	.59	759,300	30	1.3	639	8.1
Mar. 24-31.....	1,074,000		3.34	1.58	2.52		2.82	4.37	.37		.07	.08	490	.67	719,600	33	1.6	728	8.0
Apr. 1-18	1,689,000		3.14	1.38	2.48		2.95	3.75	.42		.06	.06	454	.62	1,047,000	35	1.7	691	7.7
Apr. 19-30.....	792,800		3.34	1.62	2.48		3.26	3.81	.51		.05	.06	486	.66	523,200	33	1.6	725	8.0

May 1-5, 1953 ...	535,300		3.59	1.57	2.26		3.36	3.73	0.45		0.08	0.10	438	0.66	353,300	30	1.4	716	7.4
May 6-7	434,400		3.84	1.68	2.91		3.20	5.02	.37		.05	.12	570	.78	338,800	34	1.8	816	7.7
May 8-11.....	585,300		3.79	1.63	3.30		3.08	5.35	.37		.08	.14	586	.80	468,200	37	2.0	844	7.6
May 12-31	1,812,000		3.44	1.48	2.74		3.23	4.04	.45		.07	.11	498	.68	1,232,000	35	1.8	749	7.4
June 1-9	791,200		3.29	1.45	2.91		3.24	4.02	.48		.05	.10	496	.67	530,100	37	1.9	748	7.5
June 10-13	713,100		2.79	.99	1.70		2.74	2.48	.27		.06	.09	348	.47	335,200	31	1.2	538	7.4
June 14-19	976,300		2.94	1.32	2.70		2.85	3.83	.34		.06	.12	452	.61	595,500	38	1.8	682	7.2
June 20-25	1,208,000		3.04	1.36	3.35		2.77	4.68	.28		.06	.15	510	.69	833,500	43	2.3	759	7.5
June 26-July 4 ...	1,781,000		2.84	1.12	2.74		2.85	3.77	.25		.07	.14	444	.60	1,069,000	39	1.9	663	7.6
July 5-31.....	2,292,000		2.50	1.10	2.35		2.72	2.98	.37		.05	.11	386	.52	1,192,000	38	1.8	591	7.8
Aug. 1-31	2,269,000		2.54	1.16	2.39		2.75	3.04	.48		.04	.14	396	.54	1,225,000	38	1.8	609	7.7
Sept. 1-30	2,085,000		3.09	1.39	2.91		3.02	4.16	.48		.02	.13	474	.64	1,334,000	38	1.9	722	7.5
Total or weighted average[a]	28,500,000		3.09	1.48	2.57		3.13	3.68	0.45		0.05	0.11	462	0.63	17,870,000	35	1.7	697	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 613 micromhos Dec. 28; minimum daily, 132 micromhos June 19.
Percent sodium: Maximum, 33 Sept. 1-30; minimum, 18 June 13-14.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 1,210 micromhos Feb. 2, 1951; minimum daily, 132 micromhos June 19, 1953.
Percent sodium: Maximum 37 Dec. 1, 1950; minimum, 16 May 20, 1951.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples and periodic phenolic material determinations available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952	188,500		2.20	1.38	1.57		2.85	2.12	0.23		0.03	0.21	314	0.43	81,060	30	1.2	498	7.9
Nov. 1-30	174,800		2.35	1.35	1.48		2.95	2.12	.23		.03	.21	325	.44	76,910	28	1.1	499	7.9
Dec. 1-2	9,520		2.84	1.66	1.70		3.43	2.56	.31		.04	.25	382	.52	4,950	27	1.1	596	7.9
Dec. 3-26	128,900		2.40	1.34	1.43		2.90	2.14	.27		.04	.23	320	.44	56,720	27	1.0	505	7.9
Dec. 27-29	12,870		2.74	1.72	1.74		3.33	2.71	.31		.04	.27	384	.52	6,690	27	1.2	596	7.9
Dec. 30-Jan. 6, 1953	46,040		2.25	1.25	1.35		2.72	2.08	.25		.03	.24	304	.41	18,880	27	1.0	493	8.0
Jan. 7-8	7,990		2.59	1.49	1.57		3.05	2.48	.28		.04	.24	350	.48	3,840	27	1.1	553	7.9
Jan. 9-14	37,840		2.10	1.28	1.26		2.56	1.92	.23		.04	.23	286	.39	14,760	27	1.0	457	7.7
Jan. 15-31	90,980		2.25	1.23	1.35		2.62	2.04	.24		.03	.23	298	.41	37,300	27	1.0	479	7.8
Feb. 1-28	139,500		2.20	1.32	1.52		2.62	2.10	.27		.03	.23	304	.41	57.200	30	1.1	485	8.0
Mar. 1-31	148,800		2.20	1.22	1.43		2.59	2.06	.27		.03	.23	302	.41	61,010	29	1.1	490	7.7
Mar. 31a	4,760		2.25	1.11	1.33		2.57	1.87	.25		--	--	--	--	--	28	1.0	468	7.5
Apr. 1-22	102,400		2.10	1.24	1.39		2.57	1.98	.27		.02	.24	294	.40	40,960	29	1.1	471	7.8
Apr. 23-28	45,220		1.95	.99	1.09		2.47	1.44	.20		.05	.17	250	.34	15,370	26	.9	405	7.6
Apr. 29-30	19,280		1.90	.80	.91		2.29	1.19	.17		.05	.15	226	.31	5,980	25	.8	362	7.5

a Not included in total or weighted average.

May 1-20, 1953	176,500		1.65	0.79	0.91		2.05	1.19	0.17		0.02	0.13	220	0.30	52,950	27	.8	336	7.5
May 4a	6,860		1.80	.90		.96	2.21	1.27	.18		--	--	--	--	--	26	.8	363	7.6
May 21-28	90,490		1.40	.60	.74		1.72	.92	.13		.02	.15	186	.25	22,620	27	.7	277	7.5
May 29	21,220		2.00	.66	.87		2.26	1.21	.08		.05	.12	242	.33	7,000	24	.8	354	7.5
May 30-31	58,310		1.35	.47	.48		1.64	.60	.06		.03	.07	158	.21	12,250	21	.5	233	7.8
June 1-12	420,500		1.20	.46	.48		1.51	.52	.08		.02	.06	144	.20	84,100	22	.5	217	7.3
June 2a	27,970		1.20	.48		.41	1.47	.54	.08		--	--	--	--	--	20	.4	216	7.7
June 13-14	154,500		1.15	.31	.31		1.38	.31	.03		.03	.07	124	.17	26,270	18	.4	179	7.5
June 15-21	530,600		.85	.25	.29		1.03	.27	.04		.01	.03	100	.14	74,280	21	.4	143	6.9
June 22-30	376,300		.85	.37	.42		1.13	.37	.08		.01	.03	112	.15	56,450	26	.5	169	6.7
July 1-17	608,500		.85	.39	.43		1.15	.46	.11		.02	.03	104	.14	85,190	25	.5	170	7.0
July 6a	40,460		1.30	.72		.87	1.46	1.23	.20		--	--	--	--	--	30	.9	295	6.8
July 18-31	249,600		1.15	.65	.74		1.59	.83	.14		.01	.06	156	.21	52,420	29	.8	253	7.0
Aug. 1-8	116,800		1.45	.79	1.00		1.97	1.15	.16		.01	.11	204	.28	32,700	30	.9	317	7.7
Aug. 9-19	117,600		1.55	.89	1.04		2.15	1.25	.16		.01	.13	220	.30	35,280	29	.9	347	7.9
Aug. 20-31	89,570		1.75	1.07	1.26		2.38	1.58	.20		.02	.18	250	.34	30,450	30	1.1	402	7.7
Sept. 1-30	189,800		2.05	1.27	1.61		2.67	2.04	.21		.02	.26	294	.40	75,920	33	1.2	473	7.7
Total or weighted average [b]	4,353,000		1.45	0.72	0.83		1.82	1.04	0.14		0.02	0.11	190	0.26	1,130,000	27	0.8	298	--

a Not included in total or weighted average.
b Represents 100 percent of runoff for water year October 1952 to September 1953.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Highway 23, 2 miles south of Sidney, Richland County, 4.5 miles downstream from gaging station, 2 miles downstream from Fox Creek, (revised) and 30 miles upstream from mouth.
DRAINAGE AREA.--69,450 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1953.
Water temperatures: January 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,160 micromhos Dec. 7; minimum daily, 294 micromhos June 22.
Percent sodium: Maximum, 48 May 1-30; minimum, 28 June 15-21.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 284 micromhos June 14, 1952.
Percent sodium: Maximum, 48 May 1-30, 1953; minimum, 26 June 11-13, 1952.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. No appreciable inflow between gaging station and sampling station. Records of discharge for gaging station near Sidney for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	382,500		3.39	2.35	3.74		3.51	5.89	0.34		0.03	0.20	604	0.82	313,700	38	2.2	893	8.1
Nov. 1-30	349,900		4.04	2.26	3.78		3.75	6.16	.39		.02	.20	650	.88	207,900	37	2.1	950	8.2
Dec. 1-7	49,590		4.64	2.94	4.70		4.54	7.25	.48		.04	.23	776	1.06	52,570	38	2.4	1,110	7.9
Dec. 8-11	49,590		4.59	2.93	4.30		4.44	6.97	.48		.05	.23	764	1.04	51,570	36	2.2	1,090	8.0
Dec. 12-26	166,600		3.99	2.45	3.52		3.93	5.93	.39		.04	.19	644	.88	146,600	34	2.0	936	8.1
Dec. 27-31	39,870		3.44	3.54	4.00		4.15	6.41	.42		.04	.27	694	.94	39,480	36	2.1	1,000	8.2
Jan. 1-8, 1953...	69,620		4.39	2.73	3.96		4.26	6.66	.45		.04	.22	714	.97	67,530	35	2.1	1,030	8.0
Jan. 9-23	161,900		3.94	2.52	3.44		3.87	5.83	.39		.04	.23	638	.87	140,900	34	1.9	933	8.0
Jan. 24-Feb. 23..	401,500		3.64	2.18	3.22		3.41	5.52	.39		.03	.19	590	.80	321,200	34	1.9	867	7.9
Feb. 24-Mar. 6..	97,190		3.84	2.42	3.57		3.92	5.87	.42		.03	.21	637	.87	84,560	35	2.0	916	8.1
Mar. 7-29.....	324,900		3.49	2.17	3.57		3.10	5.87	.39		.03	.15	648	.83	269,700	38	2.1	884	8.0
Mar. 30-Apr. 18.	242,700		3.84	2.30	3.83		3.41	6.29	.48		.02	.18	668	.91	220,900	38	2.2	952	8.0
Apr. 19-30.....	135,500		3.69	2.35	3.96		3.52	6.04	.48		.06	.19	648	.88	119,200	39	2.3	954	7.5

May 1-30, 1953 ..	537,400		2.64	1.44	3.87		2.92	4.81	0.28		0.05	0.17	517	0.70	376,200	48	2.7	780	7.6
May 31-June 2 ..	130,300		2.99	1.53	3.17		2.87	4.60	.24		.04	.12	504	.69	89,910	41	2.1	750	7.4
June 3-6	225,500		2.35	1.13	2.30		2.47	3.16	.14		.05	.09	390	.53	119,500	40	1.7	581	7.3
June 7-14	467,700		2.05	1.03	1.61		2.13	2.33	.14		.04	.09	312	.42	196,400	34	1.3	467	7.3
June 15-21	756,100		2.10	.78	1.13		1.98	1.94	.06		.04	.04	264	.36	272,200	28	.9	403	7.1
June 22-30	634,100		1.60	.68	1.04		1.69	1.52	.08		.02	.03	218	.30	190,200	31	1.0	337	7.4
July 1-22	800,100		1.45	.79	1.22		1.64	1.67	.12		.01	.03	224	.30	240,000	35	1.2	343	7.4
July 23-31	156,600		1.80	1.10	2.00		2.08	2.73	.17		.01	.07	316	.43	67,300	40	1.7	490	7.1
Aug. 1-5	84,200		2.25	1.29	2.91		2.57	3.73	.24		.03	.14	414	.56	47,150	44	2.2	632	7.6
Aug. 6-10	102,400		3.34	1.82	3.04		2.80	5.20	.28		.05	.14	538	.73	74,750	36	1.9	793	7.5
Aug. 11-31	235,000		2.89	1.67	3.17		2.84	4.73	.31		.02	.16	502	.68	159,800	40	2.1	754	7.6
Sept. 1-30	241,600		3.19	2.21	4.09		3.21	6.00	.37		.01	.24	598	.81	195,700	43	2.5	897	7.7
Total or weighted average [a]	6,843,000		2.74	1.56	2.61		2.70	4.00	0.25		0.03	0.12	448	0.61	4,163,000	37	1.8	665	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT THERMOPOLIS, WYO.

LOCATION (revised).--At Broadway Street Bridge at Thermopolis, Hot Springs County, just downstream from Thermopolis Creek, and about a quarter of a mile upstream from gaging station, which is upstream from principal hot spring inflow.
DRAINAGE AREA.--8,080 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April 1947 to September 1953.
Water temperatures: April 1947 to September 1953.
Sediment records: March 1946 to September 1952.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,070 micromhos Mar. 30; minimum daily, 589 micromhos Oct. 3.
Percent sodium: Maximum, 45 Mar. 30; minimum, 36 Oct. 1-31, July 15-31.
EXTREMES, 1947-49, 1951-53.--Specific conductance: Maximum daily, 1,270 micromhos Apr. 26, 1947; minimum daily, 245 micromhos June 10, 1948.
Percent sodium: Maximum, 47 Aug. 1-31, Sept. 1-30, 1948; minimum, 13 May 21-30, 1947.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples and periodic phenolic material determinations available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	70,920	--	4.04		2.30	--	--	--	--	--	--	--	410	0.56	39,720	36	1.6	623	8.0
Oct. 31 a.....	1,960	--	2.89	1.43	2.83		2.49	4.29	0.37	--	--	--	--	--	--	40	1.9	677	7.9
Nov. 1-24.....	46,460	11	2.84	1.44	2.61	0.09	2.69	4.04	.34	0.04	0.01	0.07	454	.62	28,810	37	1.8	671	7.7
Nov. 25-Dec. 1..	14,200	--	4.24		2.61	--	--	--	--	--	--	--	446	.61	8,660	38	1.8	658	--
Dec. 1 a.....	2,100	--	2.94	1.32	2.80		2.61	4.08	.37	--	--	--	--	--	--	40	1.9	668	7.7
Dec. 2-25.....	47,510	--	4.42		2.61	--	--	--	--	--	--	--	460	.63	29,930	37	1.8	671	--
Dec. 26-29.....			4.40		2.78	--	--	--	--	--	--	--	480	.65	5,380	39	1.9	685	--
Dec. 30-Jan. 2, 1953.....	8,530	--	4.60		2.78	--	--	--	--	--	--	--	478	.65	5,540	38	1.8	709	--
Jan. 3-16.....	31,000	--	4.52		2.83	--	--	--	--	--	--	--	468	.64	19,840	39	1.9	699	--
Jan. 6 a.....	2,240	--	2.94	1.50	3.02		2.74	4.33	.39	--	--	--	462	.63	1,410	40	2.0	710	8.0
Jan. 17-31.....	30,200	--	4.62		2.78	--	--	--	--	--	--	--	474	.64	19,330	38	1.8	713	--
Feb. 1-28.....	78,050	11	3.09	1.51	2.78	.09	2.84	4.35	.37	.02	.01	.08	477	.65	50,730	37	1.8	725	7.5
Feb. 6 a.....	3,230	--	2.94	1.46	3.02		2.74	4.37	.31	--	--	--	--	--	--	41	2.0	688	7.8
Mar. 1-29.....	81,680	--	4.70		2.87	--	--	--	--	--	--	--	492	.67	54,730	38	1.9	738	--
Mar. 3 a.....	2,920	--	3.04	1.54	2.86		2.80	4.33	.31	--	--	--	--	--	--	38	1.9	724	7.7

a Not included in total or weighted average.

Mar. 30, 1953...	2,820	--	6.22	5.00	--	--	--	--	--	--	--	--	756	1.03	2,900	45	2.8	1,070	--
Mar. 31-Apr. 30.	88,260	--	5.12	3.22	--	--	--	--	--	--	--	--	558	.76	67,080	39	2.0	815	--
Mar. 31 a.....	2,860	--	3.39 | 1.63	3.26		3.00	4.89	0.39	--	--	--	--	--	--	--	39	2.1	792	7.2
May 1-31.....	85,190	--	5.16	3.13	--	--	--	--	--	--	--	--	538	.73	62,190	38	1.9	809	--
June 1-15	40,800	--	5.40	3.35	--	--	--	--	--	--	--	--	556	.76	31,010	38	2.0	825	--
June 5 a	2,600	--	3.39 | 1.91	3.40		3.08	5.20	42	--	--	--	--	--	--	--	39	2.1	821	7.9
June 16-July 1...	36,360	--	5.14	3.09	--	--	--	--	--	--	--	--	516	.70	25,450	38	1.9	777	--
July 2	2,100	--	4.82	2.83	--	--	--	--	--	--	--	--	490	.67	1,410	37	1.8	725	--
July 3-14	24,730	--	4.66	2.70	--	--	--	--	--	--	--	--	474	.64	15,830	37	1.8	713	--
July 15-31.....	39,610	--	4.70	2.61	--	--	--	--	--	--	--	--	468	.64	25,350	36	1.7	694	--
Aug. 1-31	69,460	8.9	2.99 | 1.37	2.61	0.08	2.65	4.02	.34	0.02	0.01	0.09		440	.60	41,680	37	1.8	670	7.3
Sept. 1-30.....	69,860	--	4.38	2.74	--	--	--	--	--	--	--	--	478	.65	45,410	38	1.8	688	--
Total or weighted average b	876,000	--	4.66	2.83	--	--	--	--	--	--	--	--	487	0.66	582,400	38	1.8	725	--

a Not included in total or weighted average.
b Represents 100 percent of runoff for water year October 1952 to September 1953.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At bridge on U. S. Highways 10 and 12, 1 mile (revised) upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 3½ miles downstream from gaging station near Custer.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1953.
Water temperatures: April 1949 to September 1951, October 1952 to September 1953.
Sediment records: July 1947 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,300 micromhos Sept. 21, 22; minimum daily, 515 micromhos June 15.
Percent sodium: Maximum, 44 Aug. 1 to Sept. 30; minimum, 30 June 13-20.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 1,300 micromhos Sept. 21, 22, 1953; minimum daily, 235 micromhos Feb. 11, 1951.
Percent sodium: Maximum, 49 May 23-28, 1952; minimum, 29 Feb. 11, 1951.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. No appreciable inflow between gaging station and sampling point except small amounts of irrigation waste water. Records of discharge for gaging station near Custer for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952.	177,400		4.49	2.61	4.91		3.57	8.18	0.42		0.03	0.15	778	1.06	188,000	40	2.6	1,100	7.9
Nov. 1-30.....	170,200		4.94	2.78	4.96		3.93	8.60	.48		.03	.16	846	1.15	195,700	38	2.5	1,170	7.8
Jan. 3-9, 1953..	37,290		5.19	2.91	4.70		4.29	8.08	.51		.04	.18	830	1.13	42,140	36	2.3	1,150	7.9
Jan. 10-12	19,830		4.54	2.42	3.83		3.67	6.93	.42		.04	.13	710	.97	19,240	36	2.0	1,000	7.9
Jan. 13-19	42,150		4.59	2.77	4.30		3.92	7.39	.45		.05	.16	770	1.05	44,260	37	2.2	1,080	7.7
Jan. 20-Feb. 4 .	86,780		4.54	2.62	4.17		3.80	7.14	.42		.05	.14	744	1.01	87,650	37	2.2	1,050	7.9
Feb. 5-28.....	137,400		4.64	2.60	4.44		3.83	7.60	.48		.05	.14	768	1.04	142,900	37	2.3	1,080	7.9
Mar. 1-31	176,300		4.49	2.65	4.61		3.61	7.81	.48		.04	.14	800	1.09	192,500	39	2.4	1,090	7.9
Apr. 1-30.....	154,600		4.64	2.62	4.70		3.74	7.91	.51		.05	.16	802	1.09	168,500	38	2.5	1,130	7.9
May 1-31	160,800		4.34	2.68	4.87		3.54	8.02	.45		.04	.16	786	1.07	172,100	40	2.6	1,110	7.7
June 1-12	131,700		3.74	2.00	3.61		3.10	5.79	.28		.05	.06	604	.82	108,000	39	2.1	868	7.1
June 13-20	153,500		2.89	1.29	1.83		2.44	3.31	.16		.05	.03	390	.53	81,360	30	1.3	574	7.3
June 21-July 9..	130,300		3.09	1.79	2.57		2.57	4.68	.24		.03	.06	504	.69	89,910	37	1.8	744	7.4

July 10-31, 1953	60,180		3.99	2.89	5.31		2.84	9.16	0.42		0.02	0.14	814	1.11	66,800	43	2.9	1,140	7.2
Aug. 1-31.....	115,500		4.79	2.49	5.91		3.34	9.58	.48		.04	.20	874	1.19	137,400	44	3.1	1,230	7.5
Sept. 1-30	119,800		4.84	2.76	6.00		3.47	9.78	.51		.02	.22	908	1.23	147,400	44	3.1	1,260	7.6
Total or weighted average[a]	1,874,000		4.29	2.47	4.44		3.43	7.43	0.42		0.04	0.14	739	1.01	1,884,000	39	2.4	1,040	--
Total or weighted average[b]	2,030,000		4.39	2.47	4.44		3.49	7.47	0.42		0.04	0.14	746	1.01	2,050,000	39	2.4	1,050	--

a Represents 92 percent of runoff for water year October 1952 to September 1953.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: April 1949 to September 1953.
Sediment records: June 1946 to September 1951.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 2,280 micromhos July 24; minimum daily, 288 Micromhos June 21.
Percent sodium: Maximum, 65 May 10-11; minimum, 19 June 2-3.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 2,280 micromhos July 24, 1953; minimum daily, 288 micromhos June 21, 1953.
Percent sodium: Maximum, 65 May 10-11, 1953; minimum, 19 June 8-11, 1951, June 1-15, 1952, June 2-3, 1953.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	20,580		3.14	3.92	2.30		4.57	4.79	0.11		0.01	0.12	566	0.77	15,850	24	1.2	852	7.5
Nov. 1-25.....	11,730		3.74	4.36	3.00		5.10	5.79	.14		.02	.14	672	.91	10,670	27	1.5	982	8.0
Nov. 26-Dec. 5..	3,530		4.89	6.23	4.22		7.05	8.39	.21		.01	.18	934	1.27	4,480	27	1.8	1,310	8.0
Dec. 6-31.....	10,660		4.44	5.12	3.04		6.06	6.77	.18		.01	--	766	1.04	11,090	23	1.4	1,100	8.2
Jan. 1-31, 1953..	11,100		4.24	4.68	2.91		5.80	6.20	.16		.03	.13	718	.98	10,880	24	1.4	1,050	8.1
Feb. 1-28.....	9,250		3.74	4.14	2.87		5.21	5.79	.14		.01	.11	648	.88	8,140	26	1.4	965	8.2
Mar. 1-8	2,380		2.94	3.86	2.87		4.31	5.33	.16		.00	.11	586	.80	1,900	29	1.6	883	8.2
Mar. 9-10	1,290		2.50	2.82	3.26		a 3.89	4.81	.08		.01	.12	552	.75	968	37	2.0	810	8.4
Mar. 11-12.....	1,690		2.30	2.38	2.30		3.49	3.58	.08		.00	.09	430	.58	980	32	1.5	671	8.2
Mar. 13-16.....	3,130		2.89	3.39	2.57		4.21	4.60	.13		.01	.09	534	.73	2,280	29	1.4	812	8.2
Mar. 17-28.....	4,180		3.59	4.35	3.61		5.28	6.20	.17		.02	.12	698	.95	3,970	31	1.8	1,040	8.0
Mar. 29-Apr. 27.	9,190		3.34	4.30	3.26		4.93	5.93	.16		.02	.12	670	.91	8,360	30	1.7	987	8.0
Apr. 28-May 9...	2,910		3.14	3.44	4.22		4.75	5.91	.14		.03	.14	662	.90	2,620	39	2.3	987	8.0
May 10-11.....	4,450		1.50	.98	4.96		3.64	3.96	.03		.04	.19	490	.67	2,980	65	4.5	748	8.0
May 12-24.....	11,130		2.74	2.98	2.52		4.00	4.18	.10		.03	.12	496	.67	7,460	30	1.5	767	7.7
May 25-26.....	3,890		1.85	1.15	3.09		a 3.14	3.02	.03		.03	.12	402	.55	2,140	50	2.5	601	8.5
May 27-June 1...	7,780		2.74	2.78	2.00		3.80	3.56	.08		.04	.05	452	.61	4,750	27	1.2	707	7.1

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

June 2-3, 1953...	8,450		2.94	2.28	1.26		3.62	2.54	0.07		0.08	0.04	384	0.52	4,390	19	0.8	603	7.2
June 4-14	35,620		2.00	1.30	1.04		2.56	1.71	.01		.03	.08	264	.36	12,820	24	.8	430	7.0
June 15-22	39,890		1.70	.96	.78		2.20	1.17	.01		.02	.00	212	.29	11,570	23	.7	339	7.3
June 23-27	15,770		1.65	1.03	.70		2.10	1.23	.01		.01	.01	200	.27	4,260	21	.6	334	7.5
June 28-July 2...	6,170		2.10	1.34	1.35		2.79	1.89	.06		.03	.05	294	.40	2,470	28	1.0	459	7.5
July 3-10	4,590		2.15	1.69	1.61		3.02	2.35	.06		.02	.07	332	.45	2,070	30	1.2	519	7.2
July 11-22	1,660		2.69	2.33	2.70		4.00	3.64	.08		.01	.11	462	.63	1,050	35	1.7	720	7.6
July 23-30.....	200		3.99	4.35	7.61		7.05	8.70	.31		.01	.19	968	1.32	264	47	3.7	1,410	7.8
July 31-Aug. 5...	424		3.09	2.63	7.74		5.49	8.02	.16		.03	.20	876	1.19	505	56	4.6	1,260	7.6
Aug. 6	309		2.40	1.56	2.91		3.57	3.21	.08		.06	.12	434	.59	182	42	2.1	639	7.6
Aug. 7-9	155		2.79	2.19	5.22		4.69	5.48	.11		.03	.17	648	.88	136	51	3.3	958	7.7
Aug. 10-20.....	974		3.04	2.70	3.57		4.65	4.58	.10		.02	.13	572	.78	760	38	2.1	856	7.4
Aug. 21-30.....	385		3.19	2.81	6.48		5.59	6.77	.14		.04	.22	792	1.08	416	52	3.7	1,150	7.4
Aug. 31-Sept. 30.	1,340		3.34	3.30	4.87		5.39	6.10	.14		.02	.24	706	.96	1,290	42	2.7	1,050	7.7
Total or weighted average [b]	234,800		2.69	2.63	2.04		3.72	3.54	0.08		0.02	0.08	444	0.60	141,700	28	1.3	674	--

b Represents 100 percent of runoff for water year October 1952 to September 1953.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER NEAR LOCATE, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 12, 3 miles upstream from Locate Creek, 5 miles west of former site of Locate, Custer County, and 25 miles east of Miles City.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953.
Water temperatures: February 1951 to September 1953.
Sediment records: March 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 3,290 micromhos Nov. 29; minimum daily, 727 micromhos June 18.
Percent sodium: Maximum, 65 May 10-11; minimum, 19 Aug. 6-7.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 3,290 micromhos Nov. 29, 1952; minimum daily, 407 micromhos Feb. 14, 1952.
Percent sodium: Maximum, 65 May 10-11, 1953; minimum, 19 Aug. 6-7, 1953.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	3,300		8.38	6.62	10.52		4.29	20.51	1.13		0.02	0.17	1,770	2.41	7,950	41	3.8	2,190	8.0
Nov. 1-22.....	4,540		8.93	7.35	10.31		4.38	21.03	1.66		.04	.20	1,850	2.52	11,440	38	3.6	2,210	8.0
Nov. 23-26.....	823		11.68	8.88	11.78		5.48	25.61	2.17		.06	.20	2,300	3.13	2,580	35	3.7	2,650	8.2
Nov. 27-Dec. 7..	2,090		13.42	10.22	15.74		6.77	30.81	2.43		.08	.23	2,750	3.74	7,820	39	4.6	3,140	7.8
Dec. 8-15.....	1,780		12.67	9.73	12.78		7.51	27.06	1.75		.07	.21	2,460	3.35	5,960	35	3.8	2,800	8.0
Dec. 16-31.....	2,980		10.33	8.11	9.74		6.34	21.24	1.58		.07	.19	1,940	2.64	7,870	33	3.2	2,290	8.0
Jan. 1-31, 1953..	7,510		9.88	6.72	8.96		5.67	18.32	1.64		.07	.14	1,780	2.42	18,170	35	3.1	2,160	7.8
Feb. 1-28.....	11,400		8.23	5.13	6.87		4.26	14.99	1.44		.06	.12	1,400	1.90	21,660	33	2.7	1,780	8.0
Mar. 1-8.....	2,630		8.03	5.41	7.48		4.49	15.61	1.58		.06	.14	1,440	1.96	5,150	34	2.9	1,810	8.1
Mar. 9-12.....	2,220		4.29	2.71	4.61		2.98	7.91	.76		.06	.08	769	1.05	2,330	39	2.5	1,090	7.9
Mar. 13-14.....	2,040		6.94	2.66	5.35		3.11	10.72	1.04		.07	.07	1,010	1.37	2,790	36	2.4	1,360	7.7
Mar. 15	3,970		5.99	3.53	5.22		3.41	10.20	.93		.10	.07	984	1.34	5,320	35	2.4	1,310	8.0
Mar. 16	5,100		7.44	3.92	5.70		3.44	12.49	1.35		.05	.08	1,180	1.60	8,160	33	2.4	1,480	7.8
Mar. 17	3,350		8.38	4.50	7.13		3.51	14.57	1.95		.08	.12	1,370	1.86	6,230	35	2.8	1,750	7.9
Mar. 18-31.....	15,940		8.23	4.65	8.26		3.39	16.55	1.49		.07	.13	1,470	2.00	31,880	38	3.3	1,880	8.0
Apr. 1-30.....	20,650		8.23	5.15	8.48		3.95	16.24	1.66		.05	.13	1,510	2.05	42,330	39	3.3	1,920	7.8
May 1-9	7,570		6.59	4.25	7.65		3.82	13.70	1.24		.05	.09	1,280	1.74	13,170	41	3.3	1,680	7.1
May 10-11.....	5,400		2.35	1.35	7.09		3.31	7.04	.42		.09	.16	724	.98	5,290	65	5.2	1,060	7.3
May 12-29.....	13,690		5.59	3.77	7.70		3.44	12.76	1.07		.05	.13	1,180	1.60	21,900	44	3.6	1,580	7.3
May 30-June 2...	10,000		5.04	3.16	5.44		3.41	9.74	.79		.06	.15	908	1.23	12,300	39	2.7	1,260	7.3

June 3-8, 1953...	16,150	3.24	1.70	3.44	2.62	5.31	0.48	0.01	0.13	560	0.76	12,270	41	2.2	813	7.4
June 9-10	8,710	4.04	2.16	3.00	3.08	5.77	.34	.05	.07	608	.83	7,230	32	1.7	868	7.8
June 11-16.....	18,510	6.24	2.94	4.13	2.82	9.99	.48	.04	.08	908	1.23	22,770	31	1.9	1,210	7.6
June 17-20.....	42,780	7.14	3.10	4.13	2.88	10.72	.23	.05	.08	946	1.29	55,190	29	1.8	1,230	7.0
June 21-24	16,720	5.14	2.22	3.78	2.65	8.08	.39	.02	.11	762	1.04	17,390	34	2.0	1,040	7.3
June 25-July 2 ...	10,840	5.14	2.38	4.52	2.69	8.81	.45	.05	.09	820	1.12	12,140	38	2.3	1,120	7.6
July 3-July 14 ...	3,990	7.09	3.91	7.78	3.44	14.57	.90	.02	.07	1,300	1.77	7,060	41	3.3	1,690	7.8
July 15-27.....	1,380	6.49	4.23	10.52	4.10	16.45	.90	.02	.19	1,470	2.00	2,760	49	4.5	1,920	7.8
July 28-30.....	1,340	12.23	5.93	11.83	3.93	24.77	1.52	.02	.31	2,100	2.86	3,830	39	3.9	2,520	7.5
July 31-Aug 1....	420	7.08	3.38	8.74	3.54	15.82	.76	.06	.22	1,350	1.84	773	43	3.7	1,760	7.5
Aug. 2	904	13.12	6.36	14.74	5.54	27.27	1.66	.01	.29	2,340	3.18	2,870	43	4.7	2,770	7.3
Aug. 3-4	2,530	9.43	4.65	6.87	3.64	17.28	.65	.11	.22	1,460	1.99	5,030	32	2.6	1,810	7.2
Aug. 5	4,960	7.19	3.25	4.57	4.49	9.99	.39	.01	.16	1,000	1.36	6,750	30	2.0	1,300	7.3
Aug. 6-7	6,450	17.22	6.78	5.78	3.08	26.02	.54	.12	.18	2,120	2.88	18,580	19	1.7	2,330	6.9
Aug. 8-13	6,480	13.72	4.76	7.91	3.28	22.28	1.16	.05	.17	1,850	2.52	16,330	30	2.6	2,180	7.7
Aug. 14-21	3,500	10.58	4.46	9.96	3.51	20.61	1.13	.05	.27	1,710	2.33	8,160	39	3.6	2,140	7.5
Aug. 22-23	627	7.88	3.32	6.31	2.92	14.26	.65	.04	.24	1,200	1.63	1,020	36	2.7	1,560	7.6
Aug. 24	571	14.72	4.88	8.61	5.11	23.32	.76	.01	.15	1,970	2.68	1,530	29	2.8	2,230	7.2
Aug. 25	286	5.39	2.17	6.57	3.41	10.72	.34	.01	.14	962	1.31	375	45	3.4	1,270	7.6
Aug. 26-29	932	10.73	4.95	10.09	3.34	21.24	.71	.06	.20	1,700	2.31	2,150	39	3.6	2,030	7.6
Aug. 30	1,190	6.69	2.59	6.17	a 3.67	11.97	.45	.01	.15	1,050	1.43	1,700	38	2.9	1,400	8.3
Aug. 31	502	4.34	1.26	5.83	3.80	7.18	.20	.01	.15	732	1.00	502	51	3.5	988	7.6
Sept. 1-4.....	468	6.19	2.61	6.78	3.11	12.18	.51	.03	.16	1,070	1.46	683	43	3.2	1,430	7.7
Sept. 5-30.....	929	8.63	5.05	12.05	4.36	20.82	.93	.01	.20	1,780	2.42	2,250	46	4.6	2,240	7.8
Total or weighted average b	278,100	7.24	3.87	6.22	3.46	13.07	0.87	0.05	0.14	1,190	1.62	449,600	36	2.6	1,520	--

a Includes 0.33 equivalent per million of carbonate (CO_3).
b Represents 100 percent of runoff for water year October 1952 to September 1953.

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GRAND RIVER BASIN

GRAND RIVER NEAR WAKPALA, S. DAK.

LOCATION.--At gaging station at bridge on U. S. Highway 12, 5 miles west of Wakpala, Corson County, 8 miles upstream from Deep Bank Creek, and 21 miles upstream from mouth.
DRAINAGE AREA.--5,510 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 3,530 micromhos Nov. 20; minimum daily, 294 micromhos Mar. 23.
Percent sodium: Maximum, 72 Aug. 24-31; minimum, 54 June 15-17.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 3,530 micromhos Nov. 20, 1952; minimum daily, 181 micromhos Mar. 24, 1951.
Percent sodium: Maximum, 82 Aug. 22-29, 1952; minimum, 41 Mar. 24-25, 1951.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952	96		3.99	2.97	12.13		6.77	12.39	0.31		0.01	0.21	1,260	1.71	164	62	6.5	1,750	8.1
Oct. 13-Nov. 15	366		3.94	2.61	12.18		6.47	12.58	.34		.01	.18	1,250	1.70	622	63	6.7	1,700	8.0
Nov. 16-19	51		3.14	2.12	9.74		4.69	10.31	.34		.02	.16	996	1.35	69	63	6.0	1,420	8.0
Nov. 20-30	87		9.93	6.11	25.66		14.88	27.27	.68		.02	.37	2,740	3.73	325	60	9.1	3,440	7.8
Dec. 1-12	12		7.69	4.19	15.44		10.31	17.38	.42		.02	.21	1,770	2.41	29	55	6.3	2,350	7.7
Mar. 14-21, 1953	10,290		1.30	.50	4.91		2.16	2.52	.10		.04	.07	321	.44	4,530	60	3.1	481	7.1
Mar. 22-24	22,750		.60	.44	1.91		1.97	1.04	.06		.01	.07	198	.27	6,140	62	2.6	301	7.5
Mar. 25-Apr. 2	7,720		1.40	.52	4.30		3.11	3.19	.11		.03	.14	405	.55	4,250	67	4.4	624	7.5
Apr. 3-19	6,190		2.15	1.07	6.61		4.67	5.16	.18		.03	.38	642	.87	5,390	66	5.2	955	7.8
Apr. 20-28	3,130		2.50	1.28	7.96		5.20	6.31	.24		.16	.24	752	1.02	3,190	67	5.8	1,130	7.7
Apr. 29-30	2,240		1.70	.68	4.65		3.15	3.85	.06		.02	.16	460	.63	1,410	66	4.3	702	7.4
May 1-3	15,450		1.45	.44	3.30		3.02	2.29	.03		.01	.16	342	.47	7,260	62	3.4	518	8.0
May 4-10	10,000		1.10	.42	3.30		2.65	2.21	.04		.03	.24	328	.45	4,500	67	3.8	496	7.6
May 11-23	8,230		2.15	.97	6.52		4.47	4.89	.16		.02	.20	638	.87	7,160	68	5.2	939	7.7
May 25-June 1	6,990		1.35	.47	4.96		3.38	3.48	.07		.02	.25	464	.63	4,400	71	5.2	680	7.5

June 2-13, 1953..	12,130		2.25	0.79	6.65		4.00	5.73	0.13		0.04	0.26	658	0.69	10,800	67	5.4	963	7.6
June 15-17.....	84,580		1.55	.51	2.65		2.72	2.08	.03		.04	.44	314	.43	36,370	54	2.6	478	7.7
June 18-20	22,470		2.00	.70	4.57		3.29	3.98	.08		.04	.20	476	.65	14,610	62	3.9	728	7.4
June 22-30	55,930		1.90	.76	5.31		3.46	4.25	.18		.21	.31	530	.72	40,270	66	4.6	797	7.7
July 1-5.....	8,560		2.20	1.08	6.74		4.16	5.37	.34		.32	.30	656	.89	7,620	66	5.3	986	7.3
July 6-25.....	12,640		2.50	1.36	8.00		5.16	6.62	.24		.07	.28	744	1.01	12,770	66	5.8	1,140	7.8
July 26-Aug. 19..	13,780		2.15	1.17	8.00		5.05	6.25	.21		.03	.38	728	.99	13,640	69	6.2	1,090	7.9
Aug. 20	1,460		2.54	1.10	7.26		4.98	5.93	.17		.09	.24	706	.96	1,400	65	5.4	1,050	7.5
Aug. 21-23	4,320		1.25	.59	4.48		3.33	2.96	.08		.06	.20	408	.55	2,380	70	4.7	634	7.7
Aug. 24-31	3,710		1.60	.68	6.04		3.90	4.33	.13		.03	.22	556	.76	2,820	72	5.7	824	7.8
Sept. 1-30.....	2,600		2.79	1.57	9.57		5.59	8.29	.25		.03	.30	912	1.24	3,220	68	6.5	1,330	8.0
Total or weighted average [a].....	315,800		1.70	0.70	4.48		3.33	3.52	0.11		0.07	0.29	454	0.62	195,300	64	4.1	684	--
Total or weighted average [b].....	342,300		1.70	0.68	4.39		3.29	3.46	0.10		0.07	0.30	447	0.61	208,800	63	4.0	674	--

a Represents 92 percent of runoff for water year October 1952 to September 1953.
b Includes estimated data for missing periods. Represents 100 percent runoff for water year October 1952 to September 1953.

CHEYENNE RIVER BASIN

CHEYENNE RIVER NEAR EAGLE BUTTE, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 63, 0.5 mile upstream from Hermaphrodite Creek and 21 miles south of Eagle Butte, Dewey County.
DRAINAGE AREA.--24,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: October 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 3,240 micromhos Dec. 8.
Percent sodium: Maximum, 47 May 2-6; minimum, 29 Dec. 12 to Jan. 17, Sept. 1-30.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 3,240 micromhos Dec. 8, 1952; minimum daily (1950-52), 701 micromhos Apr. 4, 1952.
Percent sodium (revised): Maximum, 55 June 25-26, 1951; minimum, 25 Mar. 1-20, 1951.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1279.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	14,260		10.58	6.46	7.61		2.43	21.03	1.30		0.01	0.22	1,730	2.35	33,510	31	2.6	1,990	7.5
Oct. 31-Nov. 24 .	8,090		11.58	7.22	8.70		3.02	22.28	1.33		.04	.24	1,900	2.58	20,870	32	2.8	2,220	7.3
Nov. 25-Dec. 11 .	4,450		15.52	9.48	11.78		4.54	30.40	1.95		.08	.31	2,570	3.50	15,580	32	3.3	2,820	7.5
Dec. 12-Jan. 17, 1953	12,850		12.48	6.52	7.78		4.23	21.03	1.61		.04	.25	1,860	2.53	32,510	29	2.5	2,110	7.4
Jan. 18-31	5,870		10.88	5.26	6.83		3.67	17.38	1.41		.04	.19	1,570	2.14	12,560	30	2.4	1,910	7.4
Feb. 1-14.....	8,450		8.08	3.80	6.31		3.21	13.89	1.02		--	.16	1,250	1.70	14,370	35	2.6	1,580	7.4
Feb. 15-28.....	6,290		11.03	5.69	7.78		3.77	18.84	1.47		.06	.18	1,700	2.31	14,530	32	2.7	2,010	7.3
Mar. 1-11.....	6,190		9.88	5.00	6.52		3.87	16.86	1.35		.07	.19	1,490	2.03	12,570	30	2.4	1,840	7.5
Mar. 12-14	24,380		5.19	2.13	5.65		3.11	9.26	.82		.05	.21	870	1.18	28,770	43	3.0	1,210	7.7
Mar. 15-20.....	27,070		6.59	2.73	5.96		2.77	12.49	.54		.10	.19	1,050	1.43	38,710	37	2.8	1,400	7.3
Mar. 21-24	63,250		4.79	1.13	4.00		3.24	6.66	.20		.10	.18	664	.90	56,930	39	2.3	945	7.4
Mar. 25-Apr 1...	27,490		5.69	2.39	5.13		2.67	10.58	.48		.05	.14	902	1.23	33,810	37	2.5	1,220	7.2
Apr. 2-8.....	10,040		7.63	3.69	7.26		2.93	15.09	.90		.04	.21	1,360	1.85	18,570	38	3.1	1,650	7.3
Apr. 9-13.....	17,200		5.54	2.18	7.04		3.23	11.55	.51		.09	.17	1,000	1.36	23,390	46	3.6	1,370	7.4
Apr. 14-29.....	15,900		8.13	4.19	8.35		3.10	17.18	.99		.02	.20	1,450	1.97	31,320	39	3.4	1,840	7.3
Apr. 30-May 1 ..	13,800		7.78	2.98	7.48		3.18	15.30	.59		.06	.25	1,270	1.73	23,870	39	3.2	1,650	7.6

May 2-6, 1953...	81,860		4.89	1.47	5.91		3.31	8.95	0.28		0.03	0.18	830	1.13	92,500	47	3.3	1,150	7.5
May 7-30.....	45,190		7.53	4.11	7.44		2.88	15.72	.85		.04	.19	1,330	1.81	81,790	38	3.1	1,700	7.4
May 31-June 1...	8,150		8.88	4.36	8.26		4.26	17.28	.62		.02	.31	1,490	2.03	16,540	37	3.2	1,880	7.6
June 2-10.....	16,280		6.59	3.09	7.09		2.87	13.74	.62		.06	.19	1,170	1.59	25,890	41	3.2	1,540	7.3
June 11-12	5,330		4.54	1.82	5.35		2.98	8.54	.39		.06	.17	808	1.10	5,860	45	3.0	1,120	7.7
June 13-20	77,160		6.39	2.17	6.00		3.31	11.45	.31		.01	.26	990	1.35	104,200	40	2.9	1,330	7.4
June 21-25	87,970		5.09	1.71	4.65		2.98	8.70	.18		.01	.20	776	1.06	93,250	39	2.5	1,070	7.8
June 26-29	15,910		6.84	2.92	6.26		2.54	13.43	.48		.05	.18	1,120	1.52	24,180	38	2.8	1,450	7.2
June 30	2,660		5.49	1.71	4.35		3.28	8.39	.20		.07	.18	778	1.06	2,820	36	2.3	1,080	7.5
July 1-25	22,150		8.63	4.57	8.48		2.72	18.63	.87		.05	.29	1,540	2.09	46,290	38	3.3	1,920	7.2
July 26-Aug. 3 ..	21,880		8.83	3.41	7.87		2.67	17.28	.79		.04	.26	1,410	1.92	42,010	38	3.2	1,790	7.4
Aug. 4-11.....	39,190		5.89	1.87	6.00		3.02	10.72	.34		.04	.28	936	1.27	49,770	42	3.0	1,270	7.4
Aug. 12-31.....	21,730		8.28	4.32	7.09		2.36	16.66	.87		.03	.31	1,370	1.86	40,420	36	2.8	1,710	7.5
Sept. 1-30	20,260		10.78	6.38	7.00		2.29	21.03	.85		.02	.33	1,710	2.33	47,210	29	2.4	2,020	7.3
Total or weighted average [a].....	731,200		6.74	2.88	6.22		3.06	12.55	0.56		0.04	0.22	1,090	1.48	1,085,000	38	2.8	1,420	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.

PLATTE RIVER BASIN

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.

LOCATION.--Three hundred feet downstream from gaging station, 1.1 miles downstream from Guernsey Dam and 1 mile northwest of Guernsey, Platte County.
DRAINAGE AREA.--16,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: April 1952 to September 1953.
Sediment records: April 1947 to June 1953.
EXTREMES, 1952-53.--Specific conductance: Minimum daily, 429 micromhos May 21.
Percent sodium: Maximum, 38 Mar. 27 to Apr. 15; minimum, 25 June 1-7.
EXTREMES, 1951-53.--Specific conductance: Minimum daily, 429 micromhos May 21, 1953.
Percent sodium: Maximum, 39 Oct. 1-23, 1951, Apr. 17-24, 1952; minimum, 25 June 1-7, 1953.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1280.

Chemical analyses, water year October 1952 to September 1953

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. 1-5, 1952 ..	13,610	15	2.50	1.38	1.61	0.10	2.49	2.66	0.28	0.02	0.01	0.09	352	0.46	6,530	29	1.2	524	7.9
Oct. 29-Nov. 1...	482	9.9	3.44	1.88	2.78	.12	3.16	4.39	.51	.02	.02	.08	504	.69	333	34	1.7	762	7.7
Nov. 5-10	1,040	9.6	3.29	1.83	2.61	.12	3.10	4.19	.45	.02	.02	.08	476	.65	676	33	1.6	729	7.6
Nov. 21-22	60	9.9	3.44	2.00	2.78	.12	3.15	4.66	.51	.02	.02	.08	524	.71	43	34	1.7	781	7.6
Dec. 1-4	119	10	3.94	2.44	3.48	.14	3.41	5.64	.62	.02	.02	.09	604	.82	98	35	1.9	895	7.6
Dec. 5-8	119	12	3.99	2.35	3.65	.14	3.57	5.85	.65	.02	.03	.10	628	.85	101	36	2.1	916	7.7
Jan. 1-9, 1953...	2,850	16	5.49	2.81	4.83	.17	4.29	7.97	.87	.03	.08	.11	858	1.17	3,330	36	2.4	1,190	7.4
Jan. 10-16	1,930	18	5.39	2.81	4.70	.16	4.29	7.81	.82	.02	.07	.19	858	1.17	2,260	36	2.3	1,170	7.8
Jan. 26-31	1,920	14	4.54	2.66	4.13	.14	3.74	6.97	.76	.02	.05	.09	766	1.04	2,000	36	2.2	1,060	7.4
Feb. 1-6.....	1,870	15	4.34	2.58	4.09	.15	a3.59	6.83	.87	.03	.06	.11	754	1.03	1,930	37	2.2	1,020	8.4
Mar. 1-6	1,810	16	4.84	2.68	4.48	.15	3.79	7.49	.65	.02	.05	.11	792	1.08	1,950	37	2.3	1,110	7.4
Mar. 20-26	6,970	22	4.49	2.73	4.35	.15	3.72	7.08	.76	.02	.04	.16	756	1.03	7,180	37	2.3	1,070	7.7
Mar. 27-Apr. 15.	41,870	22	4.14	2.44	4.17	.17	3.29	6.97	.73	.02	.00	.08	718	.98	41,030	38	2.3	1,010	7.7
Apr. 16-24.....	15,210	20	3.64	2.12	3.39	.13	2.92	5.68	.59	.02	.02	.14	620	.84	12,780	37	2.0	876	7.6
Apr. 25-May 7 ..	10,620	17	2.79	1.41	2.13	.10	2.33	3.83	.42	.02	.04	.14	418	.57	6,050	33	1.5	625	7.4

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

May 8-16, 1953..	23,020	17	2.54	1.12	1.61	0.08	2.29	2.81	0.31	0.02	0.02	0.09	344	0.47	10,820	30	1.2	517	7.4
May 17-31.....	84,420	17	2.25	.99	1.39	.07	2.06	2.39	.24	.02	.00	.07	300	.41	34,610	30	1.1	456	7.7
June 1-7	47,170	21	3.79	1.29	1.70	.11	2.56	4.06	.25	.02	.05	.08	442	.60	28,300	25	1.1	652	7.5
June 8-14	12,540	22	2.64	1.28	1.43	.09	2.39	2.75	.25	.02	.02	.14	344	.47	5,890	26	1.0	518	7.8
June 15-19	28,660	21	2.74	1.26	1.52	.09	2.51	2.83	.25	.02	.02	.08	354	.48	13,760	27	1.1	535	7.8
June 20-30	58,690	21	2.79	1.25	1.74	.09	2.59	2.94	.31	.02	.02	.06	368	.50	29,350	30	1.2	564	7.7
July 1-31	274,200	16	2.45	1.23	1.48	.08	2.47	2.52	.25	.02	.01	.08	328	.45	123,400	28	1.1	499	7.5
Aug. 1-31.....	220,600	16	2.59	1.25	1.52	.09	2.52	2.62	.27	.02	.01	.08	342	.47	103,700	28	1.1	518	8.0
Sept. 1-26.....	156,100	15	2.64	1.28	1.61	.08	2.57	2.75	.28	.02	.01	.08	360	.49	76,490	29	1.2	539	7.9
Sept. 27-30	3,200	12	3.04	1.52	2.00	.11	2.92	3.33	.37	.02	.03	.08	404	.55	1,760	30	1.3	624	8.1
Total or weighted average [b].....	1,009,000	17	2.74	1.32	1.74	0.09	2.62	3.02	0.31	0.02	0.01	0.08	373	0.51	514,400	30	1.2	558	--
Total or weighted average [c].....	1,051,000	17	2.79	1.40	1.78	0.09	2.65	3.12	0.31	0.02	0.02	0.08	383	0.52	546,500	29	1.2	570	--

b Represents 96 percent of runoff for water year October 1952 to September 1953.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1952 to September 1953.

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging stations at highway bridges, ½ mile and 2½ miles (revised) 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 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,070 micromhos Feb. 19 (chan. 1); minimum daily, 345 micromhos Nov. 26(chan. 1).
Percent sodium: Maximum, 42 Aug. 1-11; minimum, 22 Nov. 26.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 1,070 micromhos Feb. 19, 1953 (chan. 1); minimum daily, 345 micromhos Nov. 26, 1952 (chan. 1).
Percent sodium: Maximum, 43 July 31 to Aug. 29, 1952; minimum, 22 Nov. 26, 1952.
REMARKS.--Daily samples for chemical analysis from each of two major channels composited by discharge. Composite periods 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 regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1280.

Chemical analyses, water year October 1952 to September 1953

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, 1952	7,200		2.64	1.08	2.44		3.33	2.60	0.45		0.01	0.11	411	0.56	4,030	38	1.8	603	8.2
Oct. 31-Nov. 25	6,620		2.59	1.05	2.13		3.24	2.37	.42		.02	.10	386	.52	3,440	35	1.6	575	8.2
Nov. 26	194		2.50	.54	.91		a3.09	.83	.17		.06	.08	278	.38	74	22	.7	390	8.3
Nov. 27	198		3.79	1.57	3.35		4.52	4.04	.65		.05	.14	574	.78	154	36	2.0	842	8.1
Nov. 28-30	754		3.49	1.41	2.61		4.15	3.14	.56		.03	.16	504	.69	520	33	1.7	739	7.6
Dec. 1-26	10,060		2.74	1.00	2.04		3.36	2.31	.37		.02	.10	402	.55	5,530	34	1.5	574	7.9
Dec. 27-28	1,530		3.59	1.49	3.09		3.97	3.81	.59		.04	.12	542	.74	11,130	37	1.9	792	7.8
Dec. 29-Jan. 15, 1953	12,200		2.69	1.03	2.00		3.23	2.29	.39		.03	.08	404	.55	6,710	34	1.5	568	7.9
Jan. 16-18	2,410		3.79	1.65	3.26		4.23	4.02	.65		.04	.12	578	.79	1,900	36	2.0	834	8.0
Jan. 19-20	2,210		3.04	1.32	2.48		3.51	3.02	.48		.04	.10	462	.63	1,390	35	1.7	674	8.0
Jan. 21-28	5,310		2.54	.90	1.79		3.03	2.02	.34		.03	.08	358	.49	2,600	33	1.4	527	7.7
Jan. 29-Feb. 18	7,930		2.74	1.02	1.87		3.28	2.21	.37		.03	.09	380	.52	4,120	32	1.4	560	8.2
Feb. 19-22	1,590		4.44	2.22	4.17		4.23	5.95	.87		.05	.16	896	1.22	1,940	38	2.3	1,030	8.2

a Includes 0.27 equivalent per million carbonate (CO_3).

Feb. 23-26, 1953.	3,370		3.59	1.49	3.00		3.65	4.02	0.62		0.04	0.11	540	0.73	2,460	36	1.9	788	8.0
Feb. 27-Mar. 31.	15,520		2.79	1.07	1.78		3.23	2.12	.37		.03	.10	380	.52	8,070	31	1.3	556	8.1
Apr. 1-28.....	8,680		2.64	1.08	1.83		3.11	2.25	.37		.02	.09	378	.51	4,430	32	1.3	551	7.8
Apr. 29-May 29..	9,560		2.64	1.04	1.87		3.11	2.29	.37		.01	.10	380	.52	4,970	32	1.4	555	8.0
May 30-June 12 ..	4,280		2.79	1.09	2.17		3.16	2.69	.42		.02	.11	432	.59	2,530	34	1.6	605	7.7
June 13-23.....	2,040		2.60	.99	2.17		3.08	2.58	.42		.01	.10	404	.55	1,120	36	1.6	585	7.7
June 24-July 2 ...	3,480		3.09	1.33	2.74		3.49	3.39	.54		.02	.11	500	.68	2,370	37	1.8	712	7.8
July 3-31.....	74,020		2.94	1.36	3.04		3.75	3.27	.56		.02	.11	502	.68	50,300	40	2.1	727	7.8
Aug. 1-11.....	24,930		2.84	1.20	3.22		3.90	3.12	.54		.02	.18	460	.63	15,700	42	2.3	710	7.7
Aug. 12-24.....	6,750		2.79	1.21	2.96		3.80	3.02	.48		.01	.19	443	.60	4,050	40	2.1	673	7.7
Aug. 25-28.....	4,720		2.84	1.14	2.87		3.64	3.02	.48		.02	.15	449	.61	2,880	40	2.0	667	7.9
Aug. 29-Sept. 17.	13,180		2.79	1.17	2.96		3.74	3.02	.51		.02	.16	459	.62	8,170	41	2.1	679	8.1
Sept. 13-30.....	5,020		2.79	1.05	2.74		3.54	2.91	.56		.01	.21	432	.59	2,960	40	2.0	646	8.0
Total or weighted average[b].....	233,800		2.84	1.23	2.61		3.56	2.89	0.48		0.02	0.12	452	0.61	143,500	38	1.8	660	--

b Represents 100 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,070 micromhos Feb. 20; minimum daily, 661 micromhos Nov. 16.
Percent sodium: Maximum, 45 Aug. 1-11; minimum, 36 Jan. 29 to Feb. 18.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 1,210 micromhos Mar. 26, Apr. 6, 14, 15, 1952; minimum daily, 661 micromhos Nov. 16, 1952.
Percent sodium: Maximum, 45 Aug. 1-11, 1953; minimum, 36 Mar. 27 to Apr. 14, May 26 to June 8, 1952, Jan. 29 to Feb. 18, 1953.
REMARKS.--Daily samples for chemical analyses composited by discharge. Composite periods identical to Platte River at Brady, Nebr. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in reports of State Engineer.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	93,820		2.69	1.19	3.04		3.61	3.19	0.56		0.03	0.12	455	0.62	58,170	41	2.2	693	8.0
Oct. 31-Nov. 25..	66,530		2.84	1.30	2.91		3.57	3.14	.56		.03	.13	460	.63	41,910	40	2.0	692	8.1
Nov. 26	2,020		3.19	1.53	3.44		3.93	3.87	.65		.04	.13	524	.71	1,430	41	2.2	777	8.2
Nov. 27	2,380		3.49	1.35	3.52		4.00	4.00	.68		.04	.13	536	.73	1,740	40	2.3	796	8.2
Nov. 28-30	7,760		3.44	1.28	3.30		3.90	3.77	.65		.04	.11	526	.72	5,590	39	2.2	786	8.1
Dec. 1-26	66,720		3.29	1.51	3.13		3.82	3.85	.62		.04	.12	524	.71	47,370	38	2.0	795	7.8
Dec. 27-28	4,680		3.94	1.80	3.87		4.11	5.02	.79		.04	.15	630	.86	4,020	39	2.3	941	7.8
Dec. 29-Jan. 15, 1953	45,040		3.84	1.74	3.61		4.00	4.81	.73		.04	.13	608	.83	37,380	38	2.2	897	8.0
Jan. 16-18	6,920		4.14	1.92	4.04		4.21	5.35	.79		.04	.15	660	.90	6,230	39	2.3	976	8.0
Jan. 19-20	5,200		4.19	1.73	3.78		4.03	5.20	.79		.04	.26	650	.88	4,580	38	2.2	941	8.1
Jan. 21-28.....	27,510		3.74	1.66	3.35		3.83	4.50	.68		.03	.12	586	.80	22,010	37	2.0	857	8.0
Jan. 29-Feb. 18 .	64,500		3.84	1.80	3.44		3.75	4.98	.71		.04	.14	612	.83	53,540	36	2.1	895	8.1
Feb. 19-22	8,830		4.14	2.06	4.13		3.70	6.14	.87		.03	.13	696	.95	8,390	38	2.3	1,020	8.0
Feb. 23-26	9,400		4.04	1.90	3.87		3.75	5.62	.82		.03	.13	664	.90	8,460	38	2.3	968	7.8
Feb. 27-Mar. 31.	102,300		3.89	1.83	3.48		3.62	5.12	.73		.05	.13	630	.86	87,980	37	2.1	904	7.7

Apr. 1-28, 1953..	81,960		3.79	1.75	3.52		3.54	5.14	0.76		0.03	0.12	616	0.84	68,850	37	2.1	898	8.2
Apr. 29-May 29..	94,190		3.54	1.74	3.57		3.38	5.08	.73		.03	.14	596	.81	76,290	39	2.2	882	8.1
May 30-June 12..	46,180		3.69	1.97	4.00		3.28	5.70	.82		.02	.14	644	.88	40,640	41	2.4	943	7.3
June 13-23	32,490		3.19	1.77	3.76		3.26	4.95	.73		.03	.14	578	.79	25,670	42	2.4	860	7.5
June 24-July 2 ...	32,870		2.79	1.59	3.61		3.41	4.18	.65		.03	.14	522	.71	23,340	44	2.4	788	7.8
July 3-31.....	116,900		2.64	1.34	3.35		3.57	3.50	.59		.03	.13	488	.66	77,150	44	2.4	738	7.4
Aug. 1-11	44,110		2.64	1.38	3.39		3.79	3.23	.56		.03	.17	472	.64	28,230	45	2.4	736	7.6
Aug. 12-24	49,490		2.69	1.27	3.30		3.77	3.19	.56		.03	.16	480	.65	32,170	44	2.3	724	7.5
Aug. 25-28	15,730		2.69	1.37	3.26		3.70	3.23	.56		.03	.17	470	.64	10,070	43	2.3	721	7.9
Aug. 29-Sept. 12.	59,370		2.59	1.29	3.30		3.64	3.23	.56		.03	.15	466	.63	37,400	44	2.4	718	7.7
Sept. 13-30.....	63,000		2.54	1.88	3.26		3.61	3.21	.54		.03	.18	462	.63	39,690	44	2.3	714	7.5
Total or weighted average a.....	1,150,000		3.19	1.56	3.39		3.62	4.18	0.65		0.03	0.14	542	0.74	848,300	40	2.2	808	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on State Highway 51, 0.5 mile east of Julesburg, Sedgwick County, 4 miles upstream from Colorado-Nebraska State line, and 8 miles downstream from Lodgepole Creek (revised).
DRAINAGE AREA.--22,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1953.
Water temperatures: October 1945 to September 1953.
EXTREMES, 1952-53. --Specific conductance: Maximum daily, 2,110 micromhos Dec. 25; minimum daily, 617 micromhos Aug. 19.
Percent sodium: Maximum, 38 July 1; minimum, 29 Aug. 19.
EXTREMES, 1945-53.--Specific conductance: Maximum daily, 2,140 micromhos Dec. 30, 1946; minimum daily, 617 micromhos Aug. 19, 1953.
Percent sodium: Maximum, 82 Mar. 1-12, 1947; minimum (revised), 29 Aug. 6-10, 1951, Aug. 19, 1953.
REMARKS.--Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1280.

Chemical analyses, water year October 1952 to September 1953

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. 1-6, 1952...	736		11.96		6.65	--	3.77	13.64	1.75	--	--	--	1,300	1.77	1,300	35	2.7	1,700	8.0
Oct. 7-Nov. 11...	8,790		9.73	3.93	7.22	0.67	6.05	14.26	1.97	0.03	0.01	0.23	1,430	1.94	17,050	34	2.8	1,910	7.5
Nov. 12-30	9,990		14.92		7.83	--	5.98	15.82	1.95	--	--	--	1,560	2.12	21,180	33	2.9	2,030	7.6
Dec. 1-31	18,940		15.14		7.78	--	6.52	15.41	2.00	--	--	--	--	--	--	33	2.8	1,990	7.4
Jan. 1-31, 1953..	23,460		14.24		7.48	--	5.34	15.20	1.81	--	--	--	1,490	2.03	47,620	33	2.8	1,920	7.7
Feb. 1-28	17,780		9.88	4.04	7.48	.41	4.92	14.68	1.78	.04	.08	.22	1,470	2.00	35,560	34	2.8	1,880	8.0
Mar. 1-31.....	20,100		9.28	4.44	7.48	--	4.70	14.89	1.81	--	--	--	1,460	1.99	40,000	35	2.9	1,870	8.1
Apr. 1-30	24,500		13.48		7.44	--	4.49	15.20	1.78	--	--	--	1,460	1.99	48,760	35	2.9	1,870	8.1
May 1-31.....	11,780		12.80		7.09	--	3.98	14.68	1.75	--	--	--	1,380	1.88	22,150	35	2.8	1,780	7.3
June 1-30	2,990		8.53	3.73	6.74	.43	4.16	13.43	1.72	.04	.06	.18	1,310	1.78	5,320	35	2.7	1,700	7.8
July 1.....	460		6.76		4.22	--	2.65	7.49	1.02	--	--	--	768	1.04	478	38	2.3	1,050	7.6
July 2-31.....	2,320		11.28		6.44	--	3.64	12.91	1.66	--	--	--	1,240	1.69	3,920	35	2.7	1,620	7.9
Aug. 1-18	1,650		11.00		6.00	--	4.06	11.66	1.55	--	--	--	1,180	1.60	2,640	35	2.6	1,550	7.8
Aug. 19	391		4.56		1.91	--	2.88	3.21	.51	--	--	--	446	.61	239	29	1.3	617	7.3
Aug. 20-31	1,910		10.10		5.35	--	4.13	10.26	1.41	--	--	--	1,070	1.46	2,790	34	2.4	1,420	7.8
Sept. 1-30.....	2,290		8.08	3.00	6.35	.46	3.95	12.91	1.61	.03	.04	.24	1,200	1.63	3,730	35	2.7	1,580	7.8
Total or weighted average a	148,100		13.74		7.35	--	5.06	14.78	1.81	--	--	--	1,450	1.97	292,100	34	2.8	1,870	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1952 to September 1953.

REPUBLICAN RIVER ABOVE MEDICINE CREEK AT CAMBRIDGE, NEBR.
(Formerly published as Republican River at Cambridge, Nebr.)

LOCATION.--At bridge south of Cambridge, Furnas County, on State Highway 47, 1 mile upstream from gaging station at Cambridge, a quarter of a mile upstream from confluence with Medicine Creek, and 2.3 miles upstream from Cambridge Diversion Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 760 micromhos Dec. 3; minimum daily, 273 micromhos July 14.
Percent sodium: Maximum, 27 June 14 to July 4; minimum, 9 July 11-14.
EXTREMES, 1950-53.--Specific conductance: Maximum daily (1951-53 revised), 830 micromhos Aug. 21, 1952; minimum daily, 273 micromhos July 14, 1953.
Percent sodium: Maximum, 29 Apr. 15-27, 1951, June 25 to July 4, Aug. 5-29, 1952; minimum, 9 July 11-14, 1953.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Water discharge computed by subtracting the discharge of Medicine Creek at Cambridge from that of the Republican River at Cambridge. Records of discharge for the Republican River at Cambridge and Medicine Creek at Cambridge for water year October 1952 to September 1953 given in Water-Supply Paper 1280.

Chemical analyses, water year October 1952 to September 1953

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. 8-31, 1952..	3,360	41	2.59	1.43	1.17	0.38	4.41	0.81	0.27	0.05	0.06	0.13	338	0.46	1,550	21	0.8	518	7.9
Nov. 1-25	7,050	45	2.94	1.54	1.26	.36	4.79	.96	.27	.04	.07	.10	372	.51	3,600	21	.8	556	8.0
Nov. 10 a	--	38	2.84	1.40	1.17	--	4.51	.87	.24	--	--	--	--	--	--	21	.8	517	7.6
Nov. 26-Dec. 3 ..	942	50	3.64	1.80	1.48	.41	5.80	1.12	.31	.05	.06	.14	444	.60	565	20	.9	658	8.2
Dec. 4-23	7,630	48	2.99	1.53	1.26	.36	4.75	1.04	.24	.05	.06	.09	378	.51	3,890	21	.8	557	8.1
Dec. 24-30	2,270	51	3.44	1.72	1.43	.38	5.36	1.19	.27	.05	.06	.09	431	.59	1,340	21	.9	622	8.2
Dec. 31-Jan. 5, 1953	2,170	44	2.99	1.41	1.17	.36	4.69	.92	.21	.05	.06	.09	363	.49	1,060	20	.8	539	8.2
Jan. 6-15.....	5,500	40	2.59	1.27	1.04	.31	4.03	.87	.20	.05	.06	.07	322	.44	2,420	20	.7	478	8.0
Jan. 16-20	2,340	44	2.99	1.51	1.26	.36	4.65	1.15	.23	.05	.06	.10	379	.52	1,220	21	.8	554	8.0
Jan. 21-27	5,530	39	2.50	1.24	1.04	.31	3.85	.92	.13	.04	.06	.08	319	.43	2,380	20	.8	472	8.0
Jan. 28-Feb. 28..	18,930	53	3.04	1.44	1.26	.36	4.59	1.08	.24	.05	.07	.09	390	.53	10,030	21	.8	568	7.8
Mar. 1-31.....	22,320	54	3.04	1.30	1.30	.36	4.47	1.15	.23	.05	.07	.09	382	.52	11,610	22	.9	556	8.1
Apr. 1-30	23,340	54	2.89	1.33	1.48	.36	4.47	1.19	.28	.05	.06	.11	382	.52	12,140	24	1.0	568	7.8

a Not included in weighted average.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER ABOVE MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued
(Formerly published as Republican River at Cambridge, Nebr.)

Chemical analyses, water year October 1952 to September 1953--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 1-27, 1953 ..	9,230	48	2.64	1.48	1.52	0.38	4.31	1.27	0.28	0.06	0.04	0.10	384	0.52	4,800	25	1.1	555	7.5
May 28	1,380	26	2.50	.66	.42	.36	3.34	.42	.03	.02	.01	.04	234	.32	442	11	.3	308	7.2
May 29-June 13 ..	4,610	44	2.20	1.28	1.26	.38	3.80	.92	.28	.05	.02	.09	328	.45	2,070	25	1.0	483	7.7
June 14-July 4 ...	631	62	2.25	1.69	1.65	.46	4.49	1.12	.37	.05	.01	.14	392	.53	334	27	1.2	563	7.8
July 11-14	4,820	29	2.05	.59	.30	.31	b 2.92	.06	.06	.02	.03	.05	196	.27	1,300	9	.3	300	8.5
July 15-Aug. 2...	1,900	46	2.64	1.08	1.22	.46	4.10	.87	.27	.04	.03	.11	342	.47	893	23	.9	496	7.8
Aug. 3-4	272	50	1.90	.59	.87	.41	2.93	.50	.08	.03	.12	.14	264	.36	98	23	.8	356	7.8
Aug. 5-6	163	54	2.59	1.07	1.17	.43	4.13	.73	.23	.05	.03	.14	332	.45	73	22	.9	483	7.9
Aug. 7-8	704	31	2.00	.60	.48	.33	2.93	.23	.11	.02	.10	.09	214	.29	204	14	.4	326	7.4
Aug. 9-12	311	50	2.54	1.04	1.13	.46	4.03	.67	.24	.04	.04	.14	328	.45	140	22	.8	474	7.8
Aug. 13-27	194	50	2.79	1.29	1.43	.41	4.52	.96	.31	.04	.03	.14	370	.50	97	24	1.0	547	7.6
Sept. 1-5.....	131	26	1.70	.56	.37	.36	2.59	.21	.06	.02	.03	.10	190	.26	34	12	.3	287	7.6
Total or weighted average[c].....	125,700	49	2.84	1.32	1.26	0.36	4.38	1.02	0.24	0.05	0.06	0.09	364	0.50	62,290	22	0.9	535	--

b Includes 0.27 equivalents per million of carbonate (CO_3).
c Represents 100 percent of runoff for water year October 1952 to September 1953.

SALINE RIVER AT TESCOTT, KANS.

LOCATION.--At gaging station at highway bridge, half a mile upstream from Dry Creek, and half a mile south of Tescott, Ottawa County.
DRAINAGE AREA.--2,820 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953.
Water temperatures: April 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 5,550 micromhos Sept. 30; minimum daily, 631 micromhos Aug. 14.
Percent sodium: Maximum, 76 July 1, Sept. 12-30; minimum, 37 July 18-19, Aug. 13-16.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 5,550 micromhos Sept. 30, 1953; minimum daily, 253 micromhos June 8, 1951.
Percent sodium: Maximum, 76 July 1, Sept. 12-30, 1953; minimum, 11 June 8-10, 1951.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1280.

Chemical analyses, water year October 1952 to September 1953

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, 1952	3,380		7.24	4.44	33.83		5.47	9.99	30.46		0.05	0.33	2,790	3.79	12,810	74	14	4,590	7.6
Nov. 1-16	2,120		8.93	4.11	32.00		6.44	9.99	28.12		.05	.31	2,710	3.69	7,820	71	13	4,420	7.5
Nov. 17-24	1,430		8.73	3.83	27.48		6.15	9.47	24.54		.09	.27	2,450	3.33	4,760	68	11	3,970	7.7
Nov. 25-27	397		8.23	3.45	23.57		5.42	9.01	21.04		.10	.23	2,170	2.95	1,140	66	9.7	3,460	8.0
Nov. 28-Dec. 31	3,960		8.38	4.00	22.09		6.33	8.64	19.86		.16	.23	2,120	2.88	11,400	63	8.9	3,390	7.8
Jan. 1-16, 1953	2,230		9.28	3.84	23.66		6.75	9.58	21.10		.21	.27	2,270	3.09	6,890	63	9.2	3,680	8.0
Jan. 17-Feb. 28	7,050		7.78	3.66	21.31		5.51	8.08	18.28		.14	.22	1,950	2.65	18,680	65	8.9	3,210	7.8
Mar. 1-31	5,510		7.44	3.38	20.00		5.15	8.22	17.91		.11	.19	1,920	2.61	14,380	64	8.6	3,130	7.9
Apr. 1-30	4,410		6.74	3.78	23.31		4.70	8.70	20.36		.09	.21	2,070	2.82	12,440	69	10	3,410	7.9
May 1-26	3,480		6.69	3.33	23.66		4.41	8.54	21.07		.06	.29	2,090	2.84	9,880	69	11	3,440	7.6
May 27	397		5.99	3.27	22.35		4.03	7.74	20.25		.07	.27	1,980	2.69	1,070	70	10	3,300	7.5
May 28-29	579		5.89	2.89	20.44		3.90	7.25	18.22		.09	.28	1,810	2.46	1,420	69	9.7	3,030	7.7
May 30	313		4.29	1.15	8.48		2.98	3.56	7.73		.11	.13	878	1.19	372	59	5.2	1,490	7.6
May 31-June 6	799		5.14	2.42	14.18		4.16	4.79	13.28		.07	.19	1,410	1.92	1,530	64	7.3	2,360	7.7
June 7-30	2,190		5.89	3.79	29.57		4.16	8.54	27.55		.04	.31	2,390	3.25	7,120	73	13	3,990	7.6
July 1	530		5.29	3.63	29.26		4.10	8.47	26.09		.02	.31	2,340	3.18	1,685	76	14	3,720	7.6
July 2-7	1,140		3.39	1.27	10.78		3.02	3.33	9.25		.06	.13	958	1.30	1,480	69	7.0	1,650	7.7
July 8-14	611		5.19	2.33	16.26		3.61	6.31	14.38		.05	.19	1,480	2.01	1,230	67	8.4	2,470	7.6
July 15	563		6.29	2.99	25.13		4.16	7.49	22.73		.06	.24	2,130	2.90	1,630	73	12	3,540	7.4
July 16-17	2,410		4.09	1.25	6.78		2.77	3.79	5.56		.04	.12	760	1.03	2,480	56	4.2	1,260	7.6

KANSAS RIVER BASIN--Continued

SALINE RIVER AT TESCOTT, KANS.--Continued

Chemical analyses, water year October 1952 to September 1953--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 18-19.....	1,220		3.09	1.19	2.52		2.64	1.87	2.06		.08	.10	418	.57	695	37	1.7	670	7.8
July 20-26	3,360		3.84	1.16	5.26		2.70	3.14	4.48		.06	.11	656	.89	2,990	51	3.3	1,070	7.2
July 27-30	1,010		3.19	.83	3.09		2.49	2.17	2.59		.06	.12	476	.65	657	42	2.2	755	7.5
July 31-Aug. 6...	1,050		5.49	1.89	12.96		3.69	5.10	11.68		.05	.18	1,290	1.75	1,840	63	6.7	2,110	7.6
Aug. 7-8, 1953 .	613		4.49	1.79	14.52		2.95	4.79	13.11		0.06	0.26	1,310	1.70	1,090	69	8.2	2,190	7.3
Aug. 9-12.....	3,060		3.44	.90	6.65		2.64	2.73	5.70		.08	.13	698	.95	2,910	60	4.5	1,170	7.4
Aug. 13-16	1,010		3.74	.62	2.74		2.90	1.92	2.43		.09	.10	454	.62	626	37	1.8	749	7.4
Aug. 17-21.....	684		4.64	1.22	7.83		3.59	3.33	7.05		.06	.18	866	1.18	807	56	4.6	1,440	7.6
Aug. 22-27.....	637		6.39	2.45	19.74		4.11	6.52	18.28		.03	.28	1,770	2.41	1,540	68	9.4	2,950	7.5
Aug. 28-Sept. 11	1,210		6.54	3.90	32.18		4.13	9.22	29.61		.03	.38	2,610	3.55	4,300	75	14	4,350	7.5
Sept. 12-30.....	1,030		6.79	4.65	39.66		4.61	10.72	36.95		.03	.46	3,180	4.32	4,450	76	17	5,240	7.6
Total or weighted average a	58,390		6.39	3.04	19.70		4.57	7.14	17.54		0.09	0.22	1,790	2.43	142,100	67	9.1	2,940	--

a Represents 100 percent of runoff for water year October 1952 to September 1953 .

ARKANSAS RIVER BASIN

ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, COLO.

LOCATION.--At gaging station just upstream from Caddoa Creek, and 1½ miles downstream from John Martin Dam, Bent County.
DRAINAGE AREA.--18,935 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1942 to August 1943, October 1945 to July 1949 (intermittent and weekly samples), January 1951 to September 1953 (daily samples).
Water temperatures: January 1951 to September 1953.
EXTREMES, 1952-1953.--Specific conductance: Maximum daily, 4,510 micromhos Feb. 20: minimum daily, 851 microhoms June 24.
Percent sodium: Maximum, 40 several periods during December, January, and February; minimum, 25 June 19-20.
EXTREMES, 1951-1953.--Specific conductance: Maximum daily, 4,620 micromhos Jan. 29, 1952; minimum daily, 830 micromhos June 19, 1952.
Percent sodium: Maximum, 41 Mar. 11-20, 1952; minimum, 25 June 19-20, 1953.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1281.

Chemical analyses, water year October 1952 to September 1953

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, 1952	1,310	20	16.67	11.02	16.13	0.16	5.00	35.60	2.59	0.05	0.13	0.58	2,830	3.85	5,040	37	4.3	3,330	8.0
Oct. 11-20	1,010	18	18.36	12.25	18.05	.16	5.00	39.97	2.93	.05	.11	.65	3,140	4.27	4,310	37	4.6	3,670	8.0
Oct. 21-31	1,280	18	17.96	12.01	17.57	.18	5.18	38.93	2.85	.05	.10	.65	3,070	4.18	5,350	37	4.5	3,610	7.9
Nov. 1-10	1,180	21	18.21	12.17	17.57	--	5.38	39.35	2.99	--	.13	--	3,100	4.22	4,980	37	4.5	3,660	7.8
Nov. 11-20	1,870	17	14.17	9.46	12.26	--	5.21	28.31	2.12	--	.09	--	2,290	3.11	5,820	34	3.6	2,840	7.8
Nov. 21-30	1,020	16	16.07	11.92	16.35	--	5.47	35.39	2.76	--	.09	--	2,830	3.85	3,930	37	4.4	3,400	7.7
Dec. 1-10	54	17	16.67	13.98	20.65	--	5.59	41.43	3.50	--	.08	--	3,280	4.46	241	40	5.3	3,910	7.8
Dec. 11-20	58	16	16.27	14.39	20.22	--	5.90	41.01	3.47	--	.08	--	3,260	4.43	257	40	5.2	3,910	7.8
Dec. 21-31	58	17	17.17	15.21	21.05	--	6.72	42.26	3.50	--	.08	--	3,390	4.61	267	39	5.2	4,040	7.8
Jan. 1-10, 1953	45	24	18.31	14.31	21.31	--	6.16	43.93	3.61	--	.09	--	3,480	4.73	213	40	5.3	4,110	7.7
Jan. 11-20	49	16	16.87	14.47	20.65	--	6.69	41.43	3.33	--	.06	--	3,320	4.52	221	40	5.2	3,920	7.7
Jan. 21-31	93	17	18.21	14.39	21.31	--	6.00	43.72	3.50	--	.08	--	3,460	4.71	438	40	5.3	4,050	7.7
Feb. 1-10	52	20	18.96	14.72	22.61	--	5.93	46.22	3.75	--	.10	--	3,640	4.95	257	40	5.5	4,210	7.7
Feb. 11-20	50	17	17.61	15.13	21.74	--	6.26	44.14	3.55	--	.07	--	3,490	4.75	238	40	5.4	4,080	7.7
Feb. 21-28	42	17	17.27	15.87	20.35	--	6.69	42.89	3.53	--	.05	--	3,410	4.64	195	38	5.0	4,000	7.8
Mar. 1-10	53	18	17.86	15.54	20.79	--	6.23	43.72	3.53	--	.07	--	3,460	4.71	250	38	5.1	4,020	7.8

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ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, COLO.--Continued

Chemical analyses, water year October 1952-September 1953--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, 1953	172	16	17.17	14.72	18.74	--	6.00	41.43	3.24	--	0.07	--	3,260	4.43	762	37	4.7	3,830	7.8
Mar. 21-31	315	16	16.47	13.32	17.39	0.18	4.57	39.35	2.76	--	.08	--	3,040	4.13	1,300	37	4.5	3,600	7.7
Apr. 1-10	12,750	14	15.47	12.50	16.09	.18	3.75	37.27	2.96	--	.08	--	2,870	3.90	49,730	36	4.3	3,400	7.7
Apr. 11-18	10,470	13	16.37	12.58	16.96	.18	4.03	38.93	2.82	--	.08	--	2,990	4.07	42,610	37	4.5	3,530	7.8
Apr. 19-30	1,360	13	17.17	13.90	18.48	.17	4.42	41.85	3.05	--	.08	--	3,210	4.37	5,940	37	4.7	3,750	7.9
May 1-10	1,980	15	16.97	12.99	17.92	--	4.15	40.39	2.90	--	.06	--	3,100	4.22	8,360	37	4.6	3,700	7.8
May 11-17, 19-20	2,060	13	15.47	12.01	16.87	--	4.00	37.06	2.71	--	.05	--	2,860	3.89	8,010	38	4.5	3,430	7.9
May 18	456	18	9.88	6.50	8.70	--	3.34	20.13	1.30	--	.01	--	1,610	2.19	999	35	3.0	2,070	7.6
May 21-30	4,700	12	15.12	12.25	16.61	--	3.44	37.68	2.57	--	.04	--	2,850	3.88	18,240	38	4.5	3,370	7.7
May 31, June 1-2	2,990	19	11.23	6.91	6.74	--	3.41	20.49	.85	--	.06	--	1,600	2.18	6,520	27	2.2	2,020	7.5
June 3-10	7,990	16	6.49	3.70	4.35	--	2.85	11.03	.68	--	.02	--	932	1.27	10,150	30	1.9	1,280	7.8
June 11-17	7,730	16	5.49	3.04	3.44	--	2.80	8.62	.59	--	.05	--	764	1.04	8,040	29	1.7	1,080	7.8
June 18	2,260	16	15.67	10.53	10.09	--	4.69	30.19	1.21	--	.00	--	2,320	3.16	7,140	28	2.8	2,760	7.5
June 19-20	1,880	15	8.68	5.10	4.70	--	2.72	15.07	.54	--	.07	--	1,190	1.62	3,050	25	1.8	1,540	7.7
June 21-30	9,420	15	5.19	2.80	3.17	--	2.54	8.06	.54	--	.07	--	712	.97	9,140	28	1.6	1,010	7.8
July 1-10	9,670	15	6.19	3.45	4.04	--	2.62	10.16	.62	--	.07	--	867	1.18	11,410	30	1.8	1,200	7.7
July 11-20	21,480	14	6.59	3.62	4.09	--	2.49	11.22	.51	--	.07	--	920	1.25	26,850	29	1.8	1,250	7.8
July 21-30	18,050	13	8.73	4.85	5.17	--	2.46	15.36	.68	--	.07	--	1,210	1.65	29,780	28	2.0	1,580	7.9
July 31	131	13	16.67	11.02	15.57	--	4.46	35.81	2.45	--	.14	--	2,790	3.79	496	36	4.2	3,280	7.7
Aug. 1-3	2,430	16	13.12	8.31	10.91	--	4.02	26.65	1.83	--	.03	--	2,100	2.86	6,950	34	3.3	2,600	7.3
Aug. 4-10	8,240	16	7.63	4.03	4.74	--	3.06	12.53	.68	--	.02	--	1,050	1.43	11,780	29	2.0	1,410	7.2
Aug. 11-12, 18-20	9,740	14	7.39	3.54	4.04	--	2.84	11.39	.62	--	.08	--	957	1.30	12,660	27	1.7	1,290	7.3
Aug. 13-17	2,660	17	12.08	7.40	9.44	--	3.70	23.32	1.58	--	.12	--	1,860	2.53	6,730	33	3.0	2,330	7.5
Aug. 21-30	7,130	16	8.28	4.03	5.04	--	2.36	14.05	.82	--	.05	--	1,130	1.54	10,980	29	2.0	1,480	7.4
Aug. 31, Sept. 1-3, 8-10	1,240	20	15.17	9.95	13.48	--	4.59	31.64	2.14	--	.06	--	2,490	3.39	4,200	35	3.8	2,960	7.7
Sept. 4-7	1,720	19	9.98	5.59	6.44	--	3.87	16.45	.90	--	.00	--	1,360	1.85	3,180	31	2.4	1,760	7.8
Sept. 11-20	752	18	17.07	12.17	17.13	--	4.62	38.31	2.76	--	.10	--	2,990	4.07	3,060	37	4.5	3,490	7.7
Sept. 21-30	591	17	17.56	12.91	18.18	--	4.41	40.81	2.99	--	.08	--	3,150	4.28	2,530	37	4.7	3,670	7.6
Weighted average	158,600	15	10.08	6.50	8.09	--	3.16	19.99	1.30	--	0.06	--	1,590	2.16	342,600	33	2.8	1,990	--

ARKANSAS RIVER AT ARKANSAS CITY, KANS.

LOCATION.--At gaging station at Chestnut Avenue highway bridge, 5 miles upstream from Walnut River, and half a mile west of Arkansas City, Cowley County.
DRAINAGE AREA.--43,475 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1953.
Water temperatures: October 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 3,460 micromhos June 20; minimum daily, 483 micromhos Aug. 9.
Percent sodium: Maximum, 75 June 26-30; minimum 45 Aug. 8-10.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 3,460 micromhos June 20, 1953; minimum daily, 483 micromhos Aug. 9, 1953.
Percent sodium: Maximum, 75 Aug. 2-8, 1952, June 26-30, 1953; minimum, 45 Aug. 8-10, 1953.
REMARKS.--Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1281. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla.

Chemical analyses, water year October 1952 to September 1953

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, 1952.	4,180	12	5.79	2.55	17.92	0.20	4.15	3.62	17.91	0.02	0.12	0.28	1,570	2.14	8,940	68	8.8	2,640	7.8
Oct. 11-20.....	5,500	--	4.89	2.47	17.63		4.29	3.54	17.06	--	.10	--	1,460	1.99	10,940	71	9.2	2,550	8.1
Oct. 21-31.....	8,020	13	4.99	2.22	16.52	.20	4.00	3.44	15.93	.02	.12	.21	1,430	1.94	15,610	69	8.7	2,490	7.9
Nov. 1-10	8,100	--	4.49	2.14	16.63		4.11	3.39	15.65	--	.11	--	1,440	1.96	15,870	71	9.2	2,450	7.7
Nov. 11-20	9,030	16	5.09	2.14	16.35	.18	4.06	3.60	15.51	.02	.15	.21	1,390	1.90	17,080	69	8.6	2,470	7.9
Nov. 21, 25-27..	4,450	--	4.34	1.97	14.38		3.70	3.35	13.54	--	.10	--	1,260	1.71	7,630	70	8.1	2,150	7.6
Nov. 22-24, 28-30	5,150	--	5.34	2.30	17.09		4.16	3.96	16.50	--	.11	--	1,510	2.05	10,590	69	8.8	2,570	7.6
Dec. 1-10.....	11,970	13	4.79	1.89	13.83	.16	3.85	3.25	13.40	.02	.16	.19	1,230	1.67	20,050	67	7.6	2,170	7.7
Dec. 11-20	14,310	--	5.09	2.22	13.38		4.00	3.87	12.69	--	.13	--	1,260	1.71	24,550	65	7.0	2,160	7.9
Dec. 21, 24.....	3,270	--	4.74	2.22	11.98		3.64	3.68	11.56	--	.06	--	1,160	1.58	5,160	63	6.4	1,990	7.5
Dec. 22-23, 25-31	12,190	--	5.59	2.38	14.87		4.06	4.08	14.52	--	.18	--	1,400	1.90	23,240	65	7.4	2,380	7.4
Jan. 1-10, 1953 ..	16,040	14	5.34	2.06	14.35	.15	4.11	3.98	13.68	.02	.14	.22	1,300	1.77	28,390	66	7.5	2,280	7.8
Jan. 11-15, 20 ..	10,410	--	5.49	2.30	15.22		4.10	4.83	13.96	--	.12	--	1,350	1.84	19,130	66	7.7	2,280	8.1
Jan. 16-19.....	5,950	--	6.19	2.71	16.73		4.15	6.00	15.37	--	.11	--	1,570	2.14	12,720	65	7.9	2,600	7.9
Jan. 21-31.....	20,900	14	5.89	2.55	14.78	.16	4.13	5.93	13.26	.03	.09	.23	1,420	1.93	40,400	63	7.2	2,360	8.1
Feb. 1-10.....	16,660	--	5.49	2.88	15.42		4.08	5.62	13.96	--	.13	--	1,410	1.92	31,980	65	7.5	2,360	7.7
Feb. 11-20	17,070	12	5.39	2.30	14.18	.16	4.02	5.04	12.69	.03	.08	.21	1,320	1.80	30,680	64	7.2	2,260	7.8
Feb. 21-28.....	12,110	14	5.64	2.30	14.57	.15	4.18	5.10	14.10	.03	.15	.27	1,380	1.88	22,740	64	7.3	2,330	7.8

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT ARKANSAS CITY, KANS.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-8, 1953..	19,300	--	4.39	1.97	11.51		3.56	3.81	10.44	--	0.06	--	1,060	1.47	28,370	64	6.4	1,850	7.8
Mar. 9-10	4,720	--	4.94	2.06	13.47		3.72	4.52	12.13	--	.10	--	1,250	1.70	6,030	66	7.2	2,100	7.9
Mar. 11-20	21,410	17	5.19	2.30	14.09	0.16	3.93	4.46	13.54	0.02	.10	0.36	1,340	1.82	39,050	65	7.3	2,230	8.0
Mar. 21-31	19,030	16	5.44	2.47	15.44	.20	4.02	4.75	14.52	.02	.07	.32	1,420	1.93	36,760	66	7.8	2,390	7.9
Apr. 1.....	8,490	--	2.35	.78	2.87	--	2.90	.71	2.51	--	.02	--	362	.49	4,180	48	2.3	599	7.3
Apr. 2-3.....	5,930	--	3.14	1.23	6.83	--	2.59	2.46	6.26	--	.04	--	674	.92	5,440	61	4.6	1,190	8.0
Apr. 4-5.....	3,870	--	4.04	1.89	10.87	--	3.11	3.62	10.38	--	.06	--	1,010	1.37	5,320	65	6.3	1,750	8.0
Apr. 6-10	8,510	--	4.69	2.22	12.74	--	3.59	4.10	12.27	--	.06	--	1,160	1.58	13,440	65	6.9	2,020	8.0
Apr. 11-20	14,900	12	4.99	2.38	14.63	.17	3.80	4.43	13.96	.02	.05	.37	1,350	1.84	27,380	66	7.7	2,280	7.8
Apr. 21-30	12,950	12	4.99	2.30	15.48	.18	3.75	4.29	15.09	.02	.05	.44	1,410	1.92	24,850	67	8.1	2,430	8.1
May 1, 4-10	10,630	--	4.59	2.55	14.51		3.64	4.14	13.82	--	.05	--	1,290	1.75	16,670	67	7.7	2,280	7.9
May 2-3	3,320	--	3.74	1.89	12.22		3.24	3.62	10.94	--	.05	--	1,050	1.43	4,740	68	7.3	1,820	7.9
May 11	1,280	--	4.69	2.14	15.22	--	3.65	4.10	14.67	--	.11	--	1,390	1.69	2,420	69	8.3	2,360	8.6
May 12-13	3,890	--	3.79	1.64	11.13	--	2.98	3.25	10.58	--	.04	--	1,070	1.46	5,670	67	6.8	1,800	7.9
May 14	3,000	--	2.59	.82	4.65	--	2.28	1.64	4.32	--	.09	--	494	.67	2,010	58	3.6	866	8.2
May 15	1,670	--	3.19	1.23	7.78	--	2.56	2.50	7.33	--	.05	--	806	1.10	1,840	64	5.2	1,320	8.3
May 16-18	5,020	--	3.79	1.64	10.35	--	3.05	3.35	9.59	--	.05	--	998	1.36	6,820	66	6.3	1,720	7.9
May 19	2,020	--	3.09	1.23	7.78	--	2.51	2.37	7.19	--	.10	--	763	1.04	2,100	64	5.3	1,280	8.3
May 20	2,100	--	3.99	1.64	9.87	--	3.23	3.00	9.08	--	.06	--	962	1.31	2,750	64	5.9	1,620	8.2
May 21-22	3,590	--	3.69	1.43	9.26		3.10	2.66	8.60	--	.02	--	866	1.16	4,230	64	5.8	1,520	8.2
May 23-26.....	5,410	--	4.24	1.84	13.35		3.16	3.31	12.92	--	.04	--	1,170	1.59	8,620	69	7.6	2,080	7.7
May 27-31.....	5,400	--	4.74	2.26	16.29		3.61	3.83	15.79	--	.06	--	1,410	1.92	10,370	70	8.7	2,480	8.2
June 1-6.....	5,230	--	5.29	2.41	17.97		4.06	3.79	17.77	--	.05	--	1,550	2.11	11,030	70	9.2	2,690	7.6
June 7.....	625	--	4.69	2.11	15.22		3.67	3.35	14.95	--	.05	--	1,350	1.84	1,520	69	8.3	2,350	8.4
June 8-10	2,030	--	4.89	2.61	19.77		3.03	3.85	20.31	--	.06	--	1,660	2.26	4,580	72	10	2,930	7.2
June 11-20.....	5,320	16	4.74	2.88	21.09	25	2.90	4.10	21.58	.03	.09	.46	1,790	2.43	12,970	73	11	3,100	8.0
June 21-23.....	1,310	--	4.69	2.71	21.35	--	3.06	3.98	21.72	--	.09	--	1,800	2.45	3,210	74	11	3,090	8.2

June 24-25, 1953 .	1,180	--	4.04	1.81	13.83	--	2.57	3.27	13.68	--	0.11	--	1,220	1.66	1,960	70	8.1	2,120	8.0
June 26-30.....	2,440	--	3.89	2.30	18.18	--	2.56	3.73	18.05	--	.15	--	1,530	2.08	5,090	75	10	2,650	8.0
July 1-3	1,600	--	4.19	2.30	17.74	--	2.90	3.66	17.77	--	.18	--	1,540	2.09	3,360	73	9.8	2,640	7.8
July 4-5	1,790	--	4.19	1.61	15.13	--	2.85	3.41	14.52	--	.16	--	1,320	1.80	3,210	72	8.7	2,270	7.9
July 6-7	1,590	--	3.59	1.56	11.96	--	3.06	2.62	11.34	--	.08	--	1,050	1.43	2,280	70	7.4	1,840	8.1
July 8-10	1,930	--	4.09	1.89	15.13	--	3.00	2.89	14.81	--	.09	--	1,300	1.77	3,410	72	8.7	2,240	8.0
July 11-13	2,690	--	3.79	1.81	14.39	--	2.88	2.87	13.96	--	.09	--	1,240	1.69	4,540	72	8.6	2,160	7.8
July 14-18	9,560	--	2.89	1.15	8.22	--	2.75	2.00	7.61	--	.03	--	758	1.03	9,870	67	5.8	1,440	7.7
July 19-20	3,970	--	2.74	.90	4.74	--	2.56	1.48	4.46	--	.09	--	531	.72	2,870	57	3.5	922	8.1
July 21-22	2,950	--	3.49	1.07	8.13	--	2.74	2.04	7.84	--	.06	--	785	1.07	3,150	64	5.4	1,360	8.2
July 23-27	5,680	--	3.99	1.40	12.78	--	3.06	2.87	11.99	--	.05	--	1,130	1.54	8,740	70	7.8	1,920	8.1
July 28-31	2,950	--	4.09	1.89	16.52	--	2.98	3.29	15.93	--	.06	--	1,380	1.88	5,540	73	9.5	2,410	7.7
Aug. 1-4	2,990	--	4.29	2.30	17.96	--	2.97	3.50	17.63	--	.08	--	1,550	2.11	6,300	73	9.9	2,630	7.9
Aug. 5-7.....	4,340	--	2.79	1.07	6.96	--	2.54	1.71	6.63	--	.05	--	674	.92	3,980	64	5.0	1,180	7.6
Aug. 8-10	15,670	--	2.30	.67	2.44	--	2.54	.85	2.06	--	.03	--	338	.46	7,210	45	2.0	569	8.0
Aug. 11-15.....	12,520	--	2.54	.62	3.30	--	2.41	1.10	3.05	--	.06	--	413	.56	7,040	51	2.6	704	7.7
Aug. 16-20.....	7,040	--	3.39	.99	7.61	--	2.80	2.06	7.19	--	.07	--	756	1.03	7,240	63	5.1	1,300	7.9
Aug. 21-23.....	3,230	--	3.89	1.48	11.26	--	3.18	2.77	10.44	--	.06	--	1,010	1.37	4,440	68	6.9	1,820	7.1
Aug. 24-31.....	6,410	--	4.09	1.97	14.96	--	2.92	3.46	14.52	--	.08	--	1,280	1.74	11,170	71	8.6	2,250	7.8
Sept. 1-10	6,090	--	4.69	2.22	17.87	--	3.33	3.71	16.78	--	.08	0.52	1,480	2.01	12,280	72	9.6	2,500	7.7
Sept. 11-20	4,250	13	5.19	2.47	18.70	0.26	3.77	3.93	18.05	0.03	.09	.51	2,590	2.16	9,190	70	9.5	2,740	8.0
Sept. 21-30	3,310	9.6	5.74	2.71	20.13	.26	4.15	4.10	19.88	.03	.10	.52	1,710	2.33	7,710	70	9.8	2,930	8.0
Total or weighted average	470,600	--	4.59	2.06	13.27		3.59	3.75	12.49	--	0.09	--	1,210	1.65	775,200	67	7.3	2,060	--

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.--54,227 square miles.
RECORDS AVAILABLE.--Chemical analyses: January 1950 to September 1953.
Water temperatures: January 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 5,150 micromhos July 29; minimum daily 398 micromhos May 31.
Percent sodium: Maximum, 83 July 19-20; minimum, 39 May 31.
EXTREMES, January 1950 to September 1953.--Specific conductance: Maximum daily, 5,150 micromhos July 29, 1953; minimum daily, 319 micromhos July 16, 1951.
Percent sodium: Maximum, 83 July 19-20, 1953; minimum, 36 July 18-20, 1950.
REMARKS.--Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1281. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	6,740	--	5.39	3.12	19.48		3.38	4.27	20.31	--	0.03	--	1,680	2.28	15,420	70	9.4	2,910	7.6
Oct. 11-20	5,990	7.5	5.79	3.12	20.52	0.19	3.44	4.27	21.58	0.02	.02	0.19	1,800	2.45	14,680	69	9.7	3,100	8.2
Oct. 21-31	8,590	8.0	6.09	3.04	21.22	.25	3.62	4.50	22.56	.03	.02	.22	1,840	2.50	21,520	69	9.9	3,180	8.2
Nov. 1-10	9,030	--	5.19	3.04	20.54		3.64	4.12	21.01	--	.00	--	1,760	2.39	21,630	71	10	2,990	8.1
Nov. 11-20	11,110	5.5	5.39	2.71	19.18	.20	3.59	4.18	19.46	.03	.01	.23	1,650	2.24	24,950	70	9.5	2,860	8.0
Nov. 21-30	16,110	--	5.69	2.47	18.73		3.79	3.91	19.18	--	.01	--	1,630	2.22	35,750	70	9.3	2,800	7.9
Dec. 1-10	14,560	--	5.89	2.80	17.61		3.95	3.96	18.33	--	.06	--	1,610	2.19	31,920	67	8.4	2,760	7.8
Dec. 11-20	17,360	12	5.49	2.38	15.57	.17	3.87	3.71	15.65	.02	.09	.23	1,410	1.92	33,310	66	7.8	2,430	8.0
Dec. 21-31	20,640	10	5.89	2.55	16.35	.19	3.88	4.27	16.64	.02	.11	.22	1,480	2.01	41,590	65	8.0	2,580	8.0
Jan. 1-10, 1953..	17,840	--	5.64	2.80	17.02		3.98	4.16	17.20	--	.12	--	1,500	2.04	36,430	67	8.3	2,650	8.2
Jan. 11-20	19,050	12	5.59	2.55	16.00	.15	3.97	4.52	15.93	.02	.10	.25	1,490	2.03	38,640	66	8.0	2,540	8.0
Jan. 21-31	22,190	--	5.94	2.71	17.11		3.88	5.14	16.64	--	.10	--	1,550	2.11	46,820	66	8.3	2,650	7.6
Feb. 1-10	20,490	10	5.89	2.71	16.35	.18	3.92	5.35	15.09	.03	.04	.27	1,480	2.01	41,290	65	7.9	2,530	8.0
Feb. 11-20	21,380	--	5.59	2.55	16.73		3.79	4.95	16.08	--	.05	--	1,450	1.97	42,200	67	8.3	2,520	7.9
Feb. 21-28	16,910	10	5.79	2.71	16.18	.16	3.87	4.62	16.78	.03	.09	.30	1,500	2.04	34,520	65	7.8	2,540	8.1
Mar. 1-2	5,060	--	5.59	2.55	16.67		3.57	4.23	16.92	--	.09	--	1,520	2.07	10,470	67	8.3	2,540	8.1
Mar. 3-4	7,200	--	5.09	2.14	13.94		3.43	3.56	14.10	--	.08	--	1,300	1.77	12,740	66	7.3	2,170	8.0

Mar. 5-10, 1953.	26,000	--	4.74	1.97	11.94		3.06	3.31	12.18	--	0.10	--	1,150	1.56	40,710	64	6.5	1,940	7.8
Mar. 11-19	27,790	--	5.04	2.30	14.22	--	3.52	4.04	14.10	--	.09	--	1,290	1.75	48,800	66	7.4	2,180	8.2
Mar. 20.....	3,530	--	5.74	3.21	25.96	--	3.16	5.85	24.96	--	.08	--	2,060	2.80	9,900	74	12	3,520	8.2
Mar. 21-22	6,390	--	5.69	2.88	21.53		3.61	5.14	21.29	--	.06	--	1,870	2.54	16,260	72	10	3,140	8.0
Mar. 23-24	5,750	--	5.59	2.80	19.62		3.75	4.89	19.32	--	.05	--	1,730	2.35	13,550	70	9.6	2,890	7.9
Mar. 25-31	17,380	--	4.49	2.71	17.66		3.05	4.60	17.20	--	.01	--	1,530	2.08	36,190	71	9.3	2,600	7.7
Apr. 1-3.....	19,300	--	5.09	2.63	16.31	--	2.80	3.91	17.77	--	.05	--	1,460	1.99	38,360	68	8.3	2,550	8.1
Apr. 4-5	19,440	--	3.09	1.07	5.22	--	2.43	1.54	5.33	--	.05	--	558	.76	14,760	56	3.6	981	7.9
Apr. 6-7.....	10,570	--	3.54	1.48	7.96	--	2.51	2.29	8.32	--	.06	--	794	1.08	11,430	61	5.0	1,380	8.1
Apr. 8-10.....	10,970	--	4.24	1.97	11.52	--	2.88	3.12	12.13	--	.04	--	1,060	1.44	15,830	65	6.5	1,880	7.9
Apr. 11-20.....	26,340	9.6	4.69	2.38	13.87	0.17	3.20	3.83	13.96	0.02	.03	0.31	1,280	1.74	45,900	66	7.4	2,180	7.8
Apr. 21-30.....	23,190	10	4.84	2.38	15.70	.17	2.98	4.25	16.08	.01	.02	.41	1,440	1.96	45,450	68	8.3	2,450	8.0
May 1-4	8,570	--	4.79	2.55	18.17		3.54	4.31	17.63	--	.03	--	1,500	2.04	17,500	71	9.5	2,610	8.2
May 5-10	14,520	--	4.19	2.14	13.88		3.05	3.73	13.40	--	.03	--	1,190	1.62	23,520	69	7.8	2,110	8.0
May 11.....	2,780	--	4.09	1.99	13.13		2.85	3.08	13.20	--	.08	--	1,180	1.60	4,460	68	7.5	2,060	8.4
May 12-13.....	21,980	--	2.50	.90	5.70		2.08	1.21	5.78	--	.03	--	553	.75	16,540	63	4.4	997	7.8
May 14-15	12,600	--	2.89	1.15	7.73		2.18	1.62	7.90	--	.07	--	733	1.00	12,570	66	5.4	1,270	8.3
May 16-18.....	15,250	--	3.34	1.42	9.69		2.59	2.19	9.59	--	.08	--	866	1.18	17,980	67	6.3	1,550	8.0
May 19.....	4,400	--	4.44	1.84	14.87		2.94	3.10	15.00	--	.11	--	1,300	1.77	7,790	70	8.4	2,210	8.5
May 20.....	4,640	--	3.69	1.63	11.44		2.84	2.48	11.34	--	.10	--	1,020	1.39	6,440	68	7.0	1,790	8.4
May 21-25.....	18,800	--	4.29	1.81	14.83	--	2.95	3.31	14.95	--	.05	.27	1,320	1.80	33,790	71	8.5	2,310	8.0
May 26-30.....	15,210	--	5.09	2.30	18.52	--	3.36	3.81	19.18	--	.05	.31	1,640	2.23	33,960	71	9.6	2,810	7.9
May 31	30,940	--	2.00	.49	1.62		2.08	.50	1.41	--	.12	--	252	.34	10,610	39	1.5	398	8.2
June 1	23,800	--	2.30	.66	3.03		1.85	.77	3.27	--	.10	--	386	.52	12,510	51	2.5	674	8.2
June 2-3	12,770	--	3.09	1.11	7.55		2.15	1.50	8.04	--	.06	--	728	.99	12,660	64	5.2	1,270	8.3
June 4-6	10,930	--	4.04	1.44	10.18		2.78	2.25	10.58	--	.05	--	975	1.33	14,510	65	6.1	1,750	8.3
June 7-8	8,570	--	3.09	1.27	7.42		2.38	1.58	7.76	--	.06	--	721	.98	8,410	63	5.0	1,300	7.9

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT RALSTON, OKLA.--Continued

Chemical analyses, water year October 1952 to September 1953--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 9-10, 1953..	5,810	--	4.74	2.02	12.64		3.08	2.60	13.68	--	0.04	--	1,180	1.60	9,330	65	6.9	2,050	7.6
June 11-13.....	6,450	--	4.49	1.99	14.34		2.74	2.94	15.09	--	.05	--	1,280	1.74	11,230	69	8.0	2,210	8.2
June 14-20	10,430	--	4.49	2.51	17.22		2.72	3.39	18.05	--	.06	--	1,580	2.15	22,440	71	9.2	2,550	7.8
June 21-27	10,850	--	4.49	2.55	16.31	--	2.54	3.21	17.63	--	.05	--	1,520	2.07	22,440	70	8.7	2,540	8.0
June 28-30.....	4,770	--	4.49	2.06	12.61	--	2.67	2.37	13.82	--	.04	--	1,200	1.63	7,790	66	6.9	2,060	8.2
July 1-7	6,510	--	5.04	2.80	18.57	--	2.74	3.58	19.60	--	.04	--	1,660	2.26	14,700	70	9.4	2,800	7.8
July 8-9	2,670	--	4.19	2.22	16.22	--	2.67	3.25	16.78	--	.05	--	1,440	1.96	5,240	72	9.1	2,470	8.0
July 10	1,560	--	3.69	1.73	12.78	--	2.61	2.66	12.55	--	.11	--	1,140	1.55	2,420	70	7.8	1,970	8.2
July 11	1,420	--	3.69	1.73	11.78	--	2.40	2.25	12.41	--	.12	--	1,120	1.52	2,160	68	7.2	1,880	8.3
July 12-18.....	51,790	--	1.65	.75	4.26	--	1.62	.79	4.29	--	.04	--	426	.58	30,030	64	3.9	741	7.9
July 19-20.....	14,940	--	3.74	1.73	25.92	--	2.08	3.62	25.52	--	.07	--	1,960	2.67	39,850	83	16	3,360	8.0
July 21-31.....	39,930	16	5.09	2.55	35.48	0.26	2.47	5.10	35.25	0.03	.06	0.51	2,670	3.63	145,100	82	18	4,580	8.0
Aug. 1-5	9,070	--	4.74	2.86	33.91		1.88	5.41	34.13	--	.09	--	2,540	3.45	31,360	82	17	4,340	7.7
Aug. 6	7,930	--	1.75	.59	2.89		1.85	.58	2.68	--	.12	--	307	.42	3,320	55	2.7	538	8.1
Aug. 7-10	17,220	--	2.84	1.20	9.59		2.21	1.75	9.59	--	.08	--	826	1.12	19,360	70	6.7	1,470	7.9
Aug. 11-18	33,280	--	2.74	.82	5.66		2.39	1.39	5.36	--	.08	--	559	.76	25,330	61	4.2	971	7.7
Aug. 19-20	5,670	--	3.54	1.30	10.77		2.67	2.14	10.72	--	.08	--	950	1.29	7,340	69	7.0	1,660	8.1
Aug. 21-31	20,610	--	4.19	1.81	16.79		2.80	3.29	16.64	--	.06	--	1,360	1.85	38,160	74	9.7	2,360	7.5
Sept. 1-6	8,960	--	3.89	1.95	15.75		2.51	3.10	15.93	--	.05	--	1,310	1.78	15,980	73	9.2	2,290	7.8
Sept. 7-10.....	4,350	--	4.49	2.31	19.55		2.54	3.46	20.31	--	.04	--	1,580	2.15	9,360	74	11	2,730	7.9
Sept. 11-20	7,170	7.5	4.34	2.47	18.70	.24	2.67	3.56	18.76	.03	.02	.49	1,520	2.07	14,830	73	10	2,670	7.9
Sept. 21-31.....	4,280	6.2	4.59	2.63	18.79	.23	2.95	3.77	18.90	.03	.02	.69	1,570	2.14	9,150	72	9.9	2,720	7.9
Total or weighted average.....	918,300	--	4.29	1.97	14.21		2.90	3.21	14.30	--	0.06	--	1,250	1.70	1,563,000	69	8.0	2,150	--

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.--17,825 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1953.
Water temperatures: October 1952 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum, 27,400 micromhos Jan. 11-12; minimum daily, 950 micromhos July 13.
Percent sodium: Maximum, 92 Dec. 31, Jan. 1-2, 11-13, Feb. 21-23, Mar. 11-12, May 28; minimum, 72 July 21, 27-28.
REMARKS.--Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1281. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla.

Chemical analyses, water year October 1952 to September 1953

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, 1952	96.8	12	12.28	6.09	71.31	0.33	4.03	5.12	80.38	0.01	--	0.31	5,940	7.47	723	79	24	9,460	7.9
Oct. 11-19	62.9	--	11.78	6.41	69.00		3.90	4.89	78.40	--	--	--	5,260	7.15	450	79	23	8,940	7.7
Oct. 20	7.9	--	11.23	6.25	62.03		4.44	4.56	70.51	--	--	--	4,770	6.49	52	78	21	8,120	8.1
Oct. 21-22	18.2	--	12.03	6.58	68.87		4.23	4.85	78.40	--	--	--	5,360	7.29	133	79	23	8,810	7.8
Oct. 23-31	65.5	--	11.68	6.00	66.02		4.28	4.68	74.74	--	--	--	5,110	6.95	455	79	22	8,420	7.7
Nov. 1-10	65.5	14	11.23	5.92	63.92	.24	4.28	4.52	72.76	.02	--	.34	5,000	6.80	446	79	22	8,270	7.9
Nov. 11-13	17.3	--	11.13	6.00	61.28		4.90	4.41	69.10	--	--	--	4,770	6.49	112	78	21	8,080	7.7
Nov. 14-20	58.7	--	9.72	5.59	57.04		4.38	4.52	63.46	--	--	--	4,410	6.00	352	79	21	7,350	7.9
Nov. 21, 23, 25	93.2	--	9.23	4.85	53.49		4.41	4.50	58.66	--	--	--	4,090	5.56	519	79	20	7,310	7.6
Nov. 22, 30	121	--	8.63	5.02	44.95		3.93	5.60	49.07	--	--	--	3,710	5.05	611	77	17	6,320	7.7
Nov. 24, 26-27	186	--	7.34	4.19	36.67		4.88	4.12	39.20	--	--	--	2,910	3.96	739	76	15	4,930	7.7
Nov. 28	75.4	--	6.74	4.36	31.15		5.93	4.73	31.59	--	--	--	2,570	3.50	264	74	13	4,370	7.4
Nov. 29	101	--	8.43	5.02	44.56		5.28	7.04	45.69	--	--	--	3,550	4.83	489	77	17	5,990	7.5
Dec. 1-2	190	--	8.18	4.85	51.84		5.13	7.56	52.18	--	--	--	3,850	5.24	998	80	20	6,530	8.1
Dec. 3	79.3	--	9.58	5.35	72.30		5.06	9.41	72.76	--	--	--	5,150	7.00	556	83	26	8,700	8.2
Dec. 4, 9-10	192	--	9.83	5.84	84.37		5.01	9.29	85.74	--	--	--	5,980	8.13	1,570	84	30	10,100	7.5
Dec. 5, 8	135	--	10.98	6.00	100.46		4.95	9.83	102.66	--	--	--	6,960	9.47	1,280	86	34	11,600	8.0
Dec. 6-7	135	--	11.93	6.17	112.78		5.15	10.66	115.07	--	--	--	7,810	10.62	1,430	86	37	13,100	7.9
Dec. 11-12, 16	206	--	8.78	5.76	77.96		4.77	8.20	79.53	--	--	--	5,430	7.38	1,520	84	29	9,240	8.0
Dec. 13-15	190	--	8.68	5.43	71.26		4.93	7.68	72.76	--	--	--	4,980	6.77	1,290	83	27	8,490	8.1
Dec. 17, 20	266	--	9.48	6.17	105.65		4.05	10.08	107.17	--	--	--	7,190	9.78	2,600	87	38	12,200	8.0

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1952 to September 1953--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				
Dec. 18-19, 1952	252	--	11.43	6.58	131.17		4.11	11.95	133.12	--	--	--	8,830	12.01	3,030	88	44	14,700	7.8
Dec. 21-22, 24..	746	--	9.23	5.51	110.13		4.03	9.72	111.12	--	--	--	7,310	9.94	7,420	88	41	12,300	8.1
Dec. 23, 25-26..	877	--	8.83	5.18	90.39		4.34	8.68	91.38	--	--	--	6,150	8.36	7,340	87	34	10,500	8.1
Dec. 27.....	274	--	10.93	6.74	153.91		4.24	11.66	155.68	--	--	--	10,100	13.74	3,760	90	52	16,900	8.2
Dec. 28.....	264	--	10.48	6.50	133.54		4.29	10.85	135.38	--	--	--	9,000	12.24	3,230	89	46	15,100	8.1
Dec. 29-30	631	--	11.78	7.65	200.97		3.98	11.95	204.47	--	--	--	13,100	17.82	11,250	91	65	21,400	8.0
Dec. 31	325	--	12.28	7.65	232.85		3.92	12.80	236.06	--	--	--	15,000	20.40	6,640	92	74	24,100	8.2
Jan. 1, 1953	274	--	11.88	7.65	237.58		3.87	12.95	240.29	--	--	--	15,300	20.81	5,700	92	76	24,300	8.2
Jan. 2.....	230	--	9.13	6.58	175.28		3.95	10.49	176.55	--	--	--	11,200	15.23	3,510	92	63	18,400	8.2
Jan. 3-9.....	1,380	--	9.28	6.41	156.63		3.67	10.43	158.22	--	--	--	10,100	13.74	19,010	91	56	16,800	8.1
Jan 10	399	--	11.83	8.06	189.44		3.29	12.85	193.19	--	--	--	12,300	16.73	6,680	90	60	20,200	8.0
Jan. 11-12.....	774	--	13.72	8.47	272.18		3.65	14.61	276.11	--	--	--	17,600	23.94	18,530	92	82	27,400	8.0
Jan. 13	333	--	8.43	6.09	161.89		3.75	10.49	162.17	--	--	--	10,700	14.55	4,850	92	60	17,600	8.1
Jan. 14-18.....	1,110	--	8.88	6.17	144.39		3.72	9.91	145.81	--	--	--	9,630	13.10	14,510	91	53	16,000	8.1
Jan. 19-20.....	490	--	8.63	5.59	129.27		3.67	9.24	130.58	--	--	--	8,670	11.79	5,780	90	49	14,500	8.0
Jan. 21-22, 24, 29	1,170	--	10.03	6.58	143.12		3.61	10.31	145.81	--	--	--	9,680	13.16	15,390	90	50	16,000	7.8
Jan. 23, 25, 27-28	1,000	--	9.48	5.51	131.67		3.59	9.95	133.12	--	--	--	8,780	11.94	11,950	90	48	14,500	7.9
Jan. 26.....	230	--	8.93	5.10	110.00		4.29	8.62	111.12	--	--	--	7,430	10.10	2,330	89	42	12,600	7.8
Jan. 30.....	311	--	11.83	6.91	178.01		3.31	12.66	180.78	--	--	--	11,800	16.05	5,000	90	58	19,300	7.9
Jan. 31.....	280	--	12.08	7.40	207.04		3.57	13.12	209.83	--	--	--	13,500	18.36	5,140	91	66	21,900	7.9
Feb. 1, 7-10....	1,100	--	9.48	7.07	153.14		3.67	10.62	155.40	--	--	--	10,000	13.60	15,000	90	53	16,700	8.0
Feb. 2-3	528	--	8.63	6.25	123.41		3.61	9.74	124.94	--	--	--	8,350	11.36	6,000	89	45	13,900	7.8
Feb. 4-6	674	--	10.18	7.48	183.10		3.52	11.10	186.14	--	--	--	11,700	15.91	10,740	91	62	19,200	7.8
Feb. 11-17	2,010	--	9.98	6.99	141.95		3.67	10.85	144.40	--	--	--	9,360	12.73	25,600	89	49	15,600	7.9
Feb. 18-19	736	--	10.78	7.48	158.78		3.87	11.85	161.32	--	--	--	10,400	14.14	10,420	90	52	17,200	7.8
Feb. 20	333	--	11.03	7.65	181.16		3.88	12.08	183.88	--	--	--	11,700	15.91	5,310	91	59	18,800	7.9
Feb. 21-23	785	--	12.67	8.63	247.10		4.16	12.95	251.29	--	--	--	15,900	21.61	17,000	92	76	25,500	8.0
Feb. 24-25	498	--	10.53	7.24	168.15		3.98	11.03	170.91	--	--	--	11,000	14.96	7,450	90	56	18,300	7.9
Feb. 26-28	684	--	10.23	7.15	147.25		4.06	10.53	150.04	--	--	--	9,790	13.31	9,120	89	50	16,000	8.0

Mar. 1, 1953...	298	--	9.98	7.07	140.12		3.85	10.33	142.99	--	--	--	9,590	13.04	3,880	89	48	15,700	8.3
Mar. 2, 9	869	--	8.13	5.51	101.01		3.56	8.43	102.66	--	--	--	6,920	9.41	8,180	88	39	11,600	8.1
Mar. 3-5	2,680	--	4.69	3.04	47.47		2.67	4.02	48.51	--	--	--	3,410	4.64	12,460	86	24	5,910	8.0
Mar. 6	922	--	6.44	4.28	72.79		3.23	7.52	72.76	--	--	--	5,060	6.88	6,350	87	31	8,560	8.3
Mar. 7-8	1,330	--	6.64	4.61	86.89		3.59	7.97	86.58	--	--	--	5,950	8.09	10,760	89	37	10,000	8.3
Mar. 10	526	--	8.88	5.51	116.79		3.30	9.99	117.89	--	--	--	7,940	10.80	5,680	89	44	13,100	8.3
Mar. 11	472	--	11.38	7.32	224.49		3.44	11.87	227.88	--	--	--	14,700	19.99	9,450	92	73	23,100	8.2
Mar. 12	444	--	9.43	6.41	180.14		3.62	10.45	181.91	--	--	--	11,700	15.91	7,080	92	64	19,100	8.3
Mar. 13	417	--	7.83	5.67	140.90		3.64	9.18	141.58	--	--	--	9,320	12.68	5,280	91	54	15,500	8.3
Mar. 14	942	--	5.39	3.45	77.35		2.69	5.10	78.40	--	--	--	5,200	7.07	6,670	90	37	8,980	8.0
Mar. 15	778	--	6.49	5.02	100.42		3.08	7.04	101.81	--	--	--	6,770	8.21	7,170	90	42	11,400	8.0
Mar. 16, 20 ...	1,690	--	4.89	3.21	57.49		3.00	4.77	57.82	--	--	--	3,950	5.37	9,090	88	29	6,860	7.7
Mar. 17	841	--	5.39	3.45	65.26		2.64	5.18	66.28	--	--	--	4,530	6.16	5,190	88	31	7,780	8.1
Mar. 18	1,400	--	3.19	2.22	34.60		2.26	3.06	34.69	--	--	--	2,450	3.33	4,680	86	21	4,230	7.9
Mar. 19	895	--	4.24	2.63	50.27		2.44	3.93	50.77	--	--	--	3,470	4.72	4,230	88	27	5,920	8.0
Mar. 21-22, 27, 29	1,190	--	7.58	5.43	106.19		4.06	7.97	107.17	--	--	--	7,260	9.87	11,720	89	42	12,200	7.9
Mar. 23	305	--	8.63	5.84	120.06		4.31	8.10	122.12	--	--	--	8,110	11.03	3,370	89	45	13,500	8.1
Mar. 24, 31....	444	--	9.48	6.41	128.26		4.26	9.31	130.58	--	--	--	8,650	11.76	5,230	89	45	14,400	7.8
Mar. 25-26	474	--	9.68	6.83	153.47		4.16	10.14	155.68	--	--	--	10,100	13.74	6,520	90	53	16,700	8.0
Mar. 28	188	--	9.18	6.58	137.29		4.08	9.93	139.04	--	--	--	9,120	12.40	2,340	90	49	15,100	7.6
Mar. 30	192	--	8.53	5.92	91.47		5.01	7.56	93.35	--	--	--	6,500	8.84	1,700	86	34	10,900	7.7
Apr. 1-5.....	1,300	--	9.43	6.41	126.54	--	3.46	9.49	128.61	--	--	--	8,370	11.38	14,760	89	45	13,600	7.8
Apr. 6	706	--	4.59	2.96	45.66	--	2.23	3.48	47.66	--	--	--	3,130	4.26	3,010	86	23	5,490	7.6
Apr. 7, 10.....	1,850	--	5.99	3.78	64.36	--	3.47	5.79	64.30	--	--	--	4,320	5.88	10,870	87	29	7,330	7.6
Apr. 8	1,110	--	2.89	1.73	20.65	--	2.20	2.44	20.02	--	0.05	--	1,470	2.00	2,220	82	14	2,640	7.1
Apr. 9	734	--	4.19	2.55	36.22	--	3.59	4.31	34.41	--	--	--	2,490	3.39	2,490	84	20	4,430	7.9
Apr. 11-13	966	--	8.28	4.61	101.75	--	3.29	8.08	104.63	--	--	0.52	6,760	9.19	8,890	89	40	11,300	8.2
Apr. 14	236	--	8.98	5.43	118.71	--	3.51	9.16	120.15	--	--	--	7,820	10.64	2,510	89	44	12,800	8.1
Apr. 15-16	401	--	9.88	6.09	128.28	--	3.69	10.22	128.61	--	--	--	8,380	11.40	4,570	89	45	14,000	8.0
Apr. 17-18.....	952	--	10.43	6.33	136.54	--	3.44	10.41	138.78	--	--	--	9,020	12.27	11,690	89	47	14,900	7.6
Apr. 19	444	--	4.49	2.63	49.14	--	2.97	5.18	47.95	--	--	--	3,290	4.47	1,990	87	26	5,860	8.0
Apr. 20	282	--	4.99	2.80	41.92	--	2.84	4.37	42.30	--	--	--	2,950	4.01	1,130	84	21	5,120	7.6

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 21, 1953..	236	--	6.79	3.87	66.34		3.23	6.08	67.69	--	--	--	4,570	8.22	1,470	86	29	7,790	8.3
Apr. 22, 25....	393	--	8.33	5.18	100.46		3.29	8.02	102.66	--	--	--	6,830	9.29	3,650	88	39	11,200	8.1
Apr. 23-24, 26, 28	740	--	9.23	6.00	111.22		3.67	9.12	113.68	--	--	--	7,700	10.47	7,750	88	40	12,800	8.1
Apr. 27, 29-30.	417	--	10.08	6.09	118.11		3.72	9.85	120.71	--	--	--	8,120	11.04	4,600	88	42	13,300	7.8
May 1-3, 5-10..	869	--	10.53	6.25	120.25		3.92	10.14	122.97	--	--	--	8,150	11.08	9,640	88	41	13,600	8.0
May 4	97.2	--	7.68	5.67	85.99		4.05	7.58	87.71	--	--	--	5,950	8.09	787	87	33	10,000	8.2
May 11	131	--	9.28	6.48	108.35		3.02	9.97	111.12	--	--	--	7,500	10.20	1,340	87	39	12,400	8.4
May 12	575	--	7.29	4.41	77.45		3.06	7.12	78.97	--	--	--	5,430	7.38	4,250	87	32	9,200	8.5
May 13	1,310	--	3.99	2.17	30.35		2.49	3.00	31.02	--	--	--	2,250	3.06	4,010	83	17	3,980	8.2
May 14	1,610	--	2.79	1.45	12.98		2.27	1.96	12.92	--	0.07	--	1,040	1.41	2,270	75	9.0	1,850	8.4
May 15	2,280	--	4.49	2.11	38.82		2.48	5.43	37.51	--	--	--	2,770	3.77	8,600	85	21	4,840	8.4
May 16-18	3,680	--	4.64	2.00	28.37		2.33	4.98	26.64	--	.06	--	2,130	2.90	10,670	81	16	3,660	7.9
May 19-20	1,280	--	8.28	3.22	43.52		2.36	9.51	43.15	--	--	--	3,420	4.65	5,940	79	18	5,710	8.4
May 21	502	--	6.19	3.31	41.82		2.23	6.79	42.30	--	--	--	3,200	4.35	2,190	81	19	5,560	8.3
May 22	403	--	8.48	3.62	60.59		3.14	8.91	60.64	--	--	--	4,450	6.05	2,440	83	25	7,330	8.5
May 23	317	--	9.58	3.82	69.38		3.16	9.68	69.94	--	--	--	5,130	6.98	2,220	84	27	8,380	8.5
May 24	347	--	9.98	4.42	83.73		3.24	10.28	84.61	--	--	--	6,010	8.17	2,840	85	31	9,970	8.5
May 25	375	--	11.93	5.79	126.54		3.01	12.64	128.61	--	--	--	8,790	11.95	4,490	88	43	14,300	8.4
May 26-27	573	--	14.62	7.98	241.89		3.05	15.51	245.93	--	--	--	16,200	22.03	12,840	91	72	25,200	8.0
May 28	222	--	11.68	6.80	200.19		3.68	13.34	201.65	--	--	--	13,200	17.95	3,990	92	66	21,100	8.4
May 29	192	--	10.13	6.09	172.31		3.52	12.41	172.60	--	--	--	11,300	15.37	2,960	91	61	18,300	8.4
May 30-31	311	--	10.23	6.11	150.94		3.87	11.68	151.73	--	--	--	10,100	13.74	4,280	90	53	15,800	8.3
June 1-5.	526	--	10.53	6.59	146.38		3.54	11.33	148.63	--	--	--	9,860	13.41	7,050	90	50	15,400	7.8
June 6	252	--	8.83	5.83	112.42		2.80	8.93	115.35	--	--	--	7,720	10.50	2,850	88	41	12,900	8.4
June 7	369	--	5.39	3.21	61.43		2.71	5.27	62.05	--	--	--	4,230	5.75	2,120	88	30	7,370	8.4
June 8	2,520	--	2.10	.94	9.37		2.48	1.27	8.60	--	.06	--	741	1.01	2,540	76	7.6	1,370	8.4
June 9-10	3,120	--	2.25	.95	12.40		2.00	1.42	12.13	--	.05	--	949	1.29	4,040	79	9.8	1,740	7.3
June 11-12.....	1,210	--	4.39	1.93	28.90		2.33	3.56	29.33	--	--	--	2,160	2.94	3,560	82	16	3,820	8.4

June 13-14, 1953	659	--	8.88	3.92	81.89		2.70	10.20	81.79	--	--	--	5,830	7.93	5,230	86	32	9,810	8.2
June 15	175	--	9.08	3.62	61.55		2.97	11.49	59.79	--	--	--	4,570	6.22	1,090	83	24	7,630	8.5
June 16-17	244	--	9.58	3.62	54.55		2.69	11.47	53.59	--	--	--	4,220	5.74	1,400	81	21	6,730	8.2
June 18	89.3	--	8.98	3.82	52.31		2.92	10.01	52.18	--	--	--	3,970	5.40	482	80	21	6,590	8.5
June 19	67.4	--	10.08	4.32	61.25		3.04	10.56	62.05	--	--	--	4,690	6.38	431	81	23	7,810	8.5
June 20	53.6	--	9.88	4.72	66.83		2.92	10.26	68.25	--	--	--	5,100	6.94	372	82	25	8,450	8.4
June 21-22	81.3	--	10.68	4.93	73.05	--	3.54	9.83	75.58	--	--	--	5,350	7.28	592	82	26	8,980	8.4
June 23-24	117	--	9.28	4.44	64.79	--	3.13	7.25	69.10	--	--	--	4,750	6.46	757	83	25	8,070	8.3
June 25	33.7	--	9.03	4.85	71.75	--	3.08	7.33	74.74	--	--	--	5,140	6.99	236	84	27	8,730	8.2
June 26	27.8	--	9.98	5.43	79.14	--	3.23	8.06	85.17	--	--	--	5,810	7.90	220	84	29	9,740	7.6
June 27-29	67.4	--	10.13	5.84	85.23	--	3.06	8.20	93.35	--	--	--	6,320	8.60	580	84	30	10,500	8.1
June 30	21.8	--	10.58	6.50	97.40	--	2.43	7.87	103.51	--	--	--	6,960	9.47	207	85	33	11,400	8.1
July 1	19.8	--	4.44	4.77	49.57	--	1.84	4.56	53.02	--	--	--	3,520	4.79	95	84	23	6,380	8.1
July 2-6	99.0	--	10.18	6.33	94.36	--	2.85	7.79	99.84	--	--	--	6,680	9.08	900	85	33	11,300	8.0
July 7	63.5	--	5.19	2.88	36.74	--	1.82	2.89	40.61	--	--	--	2,750	3.74	238	82	18	4,890	8.2
July 8	27.8	--	5.99	3.29	46.96	--	2.29	3.54	49.36	--	--	--	3,330	4.53	126	83	22	5,930	7.2
July 9	103	--	7.98	4.52	63.92	--	2.94	5.48	69.10	--	--	--	4,650	6.32	653	84	26	8,050	8.4
July 10	39.7	--	4.64	2.55	32.87	--	2.52	2.66	35.25	--	--	--	2,420	3.29	131	82	17	4,350	8.2
July 11	39.7	--	3.19	1.64	19.48	--	1.93	1.35	20.59	--	.06	--	1,470	2.00	79	80	13	2,670	8.1
July 12-14	4,280	--	1.70	.72	6.78	--	1.51	.71	7.19	--	.04	--	566	.77	3,300	74	6.2	1,060	7.9
July 15-16	8,130	--	9.08	2.96	57.83	--	2.28	10.06	55.84	--	--	--	4,150	5.64	45,940	83	24	6,950	7.9
July 17-19	13,410	--	9.33	3.12	107.41	--	2.26	8.62	105.48	--	--	--	6,980	9.49	127,400	90	43	11,800	7.8
July 20	5,790	--	4.69	1.48	26.26	--	2.08	6.47	23.55	--	.09	--	2,000	2.72	15,770	81	15	3,480	8.0
July 21	9,000	--	6.54	1.64	21.13	--	2.02	6.91	20.02	--	.07	--	1,810	2.46	22,190	72	10	3,060	7.6
July 22	5,220	--	2.59	.74	10.70	--	1.77	2.10	9.87	--	.07	--	850	1.16	6,040	76	8.3	1,550	8.1
July 23	2,680	--	3.39	1.56	16.48	--	1.52	2.33	16.92	--	.05	--	1,290	1.75	4,700	77	10	2,330	7.6
July 24	1,790	--	4.39	1.40	25.39	--	1.80	3.29	25.66	--	.03	--	1,890	2.57	4,590	81	15	3,410	8.1
July 25	4,280	--	7.14	2.06	47.83	--	1.82	6.81	49.36	--	--	--	3,520	4.79	20,530	84	22	6,140	7.7
July 26	4,200	--	7.83	1.81	25.57	--	1.97	7.54	26.45	--	.04	--	2,190	2.98	12,540	73	12	3,720	8.3

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1952 to September 1953--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, 1953	2,530	--	5.59	1.40	17.65	--	1.70	5.87	16.78	--	0.09	--	1,540	2.09	5,300	72	9.4	2,630	7.9
July 29	1,200	--	7.39	1.97	31.57	--	1.95	7.33	31.02	--	--	--	2,490	3.39	4,070	77	15	4,290	7.7
July 30-31	1,840	--	15.12	4.28	104.80	--	2.21	13.34	108.86	--	--	--	7,650	10.40	19,150	84	34	12,300	7.9
Aug. 1-6	4,190	--	7.19	2.96	67.40	--	2.65	7.08	69.10	--	--	--	4,760	6.47	27,120	87	30	8,130	7.7
Aug. 7	662	--	2.69	.99	12.09	--	2.03	1.50	11.85	--	.07	--	956	1.30	862	77	8.9	1,750	8.2
Aug. 8-9	813	--	7.04	2.96	54.35	--	2.74	5.91	55.84	--	--	--	3,880	5.28	4,300	84	24	6,710	7.6
Aug. 10	557	--	10.18	4.52	90.45	--	3.15	9.33	92.79	--	--	--	6,350	8.64	4,820	86	33	10,700	8.3
Aug. 11	341	--	10.33	4.33	103.52		2.85	11.26	104.07	--	--	--	7,090	9.64	3,290	88	38	11,900	8.2
Aug. 12-15, 17	2,020	--	6.99	2.61	36.23		3.06	5.54	37.23	--	--	--	2,750	3.74	7,570	79	17	4,780	7.9
Aug. 16, 18	853	--	7.58	3.22	76.54		1.61	7.33	78.40	--	--	--	5,250	7.14	6,100	88	33	8,960	7.8
Aug. 19-20	2,130	--	3.49	1.39	30.32		2.03	3.56	29.61	--	--	--	2,070	2.82	5,990	86	19	3,710	7.8
Aug. 21-22	1,780	--	6.14	2.46	58.19		2.21	5.35	59.23	--	--	--	3,970	5.40	9,610	87	28	6,990	8.0
Aug. 23	813	--	12.03	4.31	114.64		2.18	10.91	117.89	--	--	--	8,010	10.89	8,870	88	40	13,200	8.1
Aug. 24	762	--	13.37	5.11	193.04		2.29	13.22	196.01	--	--	--	12,600	17.14	13,060	91	63	20,400	8.1
Aug. 25	549	--	11.23	4.19	151.92		2.51	11.97	152.86	--	--	--	9,840	13.38	7,360	91	55	16,300	8.0
Aug. 26	1,320	--	6.79	3.11	67.49		4.79	5.48	67.12	--	--	--	4,660	6.34	8,380	87	30	8,150	8.2
Aug. 27	1,610	--	10.73	4.21	129.18		3.15	10.39	130.58	--	--	--	8,650	11.76	18,920	90	47	14,400	8.2
Aug. 28-31	2,610	--	5.69	3.11	58.65		2.95	5.27	59.23	--	--	--	4,060	5.52	14,440	87	28	7,030	7.6
Sept. 1-3	1,030	--	7.78	4.22	74.21		3.34	6.72	76.15	--	--	--	5,130	6.98	7,220	86	30	8,830	8.1
Sept. 4-6	4,800	--	2.79	1.25	20.89		2.36	1.94	20.59	--	04	--	1,480	2.01	9,660	84	15	2,730	7.7
Sept. 7-10	2,080	--	4.89	2.01	37.63		2.67	3.79	38.07	--	--	--	2,620	3.56	7,410	85	20	4,710	7.9
Sept. 11	252	--	7.68	3.12	65.08		3.15	6.45	66.28	--	--	--	4,520	6.15	1,550	86	28	7,850	8.2
Sept. 12-13	543	--	9.73	4.43	94.37		3.41	9.51	95.61	--	--	--	6,480	8.81	4,790	87	35	10,900	8.1
Sept. 14-15	357	--	12.97	6.01	160.75		3.47	10.99	165.27	--	--	--	10,900	14.82	5,300	89	52	17,400	8.2
Sept. 16-20	569	--	8.63	4.43	99.93		3.39	7.79	101.81	--	--	--	6,820	9.28	5,280	88	39	11,800	7.9
Sept. 21-23	222	--	9.53	5.13	101.74		3.13	8.64	104.63	--	--	--	7,030	9.56	2,130	87	38	11,800	7.7
Sept. 24-28	309	--	11.13	5.81	112.23		3.74	9.51	115.92	--	--	--	7,790	10.59	3,280	87	39	12,700	7.9
Sept. 29-30	105	--	10.43	4.93	92.70		4.41	8.04	95.61	--	--	--	6,400	8.70	916	86	33	10,900	8.0
Total or weighted average	169,800	--	6.99	3.29	69.20		2.65	6.89	69.94	--	--	--	4,780	6.50	1,105,000	87	30	8,020	--

ARKANSAS RIVER AT VAN BUREN, ARK.

LOCATION.--At gaging station at Van Buren, Crawford County 1½ miles downstream from Lee Creek, and 8½ miles downstream from Poteau River.
DRAINAGE AREA.--150,218 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1953.
Water temperatures: October 1945 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum, 4,440 micromhos Aug. 14; minimum, 273 micromhos Apr. 30.
Percent sodium: Maximum, 75 Sept. 7-10; minimum, 47 Apr. 29-30, May 1-6.
EXTREMES, 1945-53.--Specific conductance: Maximum, 4,900 micromhos July 21, 1952; minimum, 132 micromhos May 11, 1948.
Percent sodium: Maximum, 80 Oct. 21-24, 1946; minimum, 32 July 18-27, 1951.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Fayetteville, Ark. Records of water discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1281.

Chemical analyses, water year October 1952 to September 1953

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, 1952 .	45,940	--	3.79	1.48	7.74	--	2.75	1.50	9.02	--	0.02	0.00	788	1.07	49,160	59	4.8	1,380	8.1
Oct. 11-20	30,510	6.6	4.29	1.89	8.04	0.15	3.33	1.52	9.87	0.02	.02	.10	925	1.26	38,440	56	4.6	1,570	8.0
Oct. 21-31	29,300	--	4.49	2.06	9.11	--	3.41	1.69	11.51	--	.02	.00	986	1.34	39,260	59	5.0	1,730	8.1
Nov. 1-10.....	26,940	--	4.74	2.14	10.18	--	3.31	1.75	11.84	--	.03	.00	1,020	1.39	37,450	60	5.5	1,760	7.9
Nov. 11-20	29,120	--	4.89	2.14	11.13	--	3.31	1.79	12.92	--	.02	.00	1,090	1.48	43,100	61	5.9	1,900	7.9
Nov. 21-25	19,540	--	5.49	2.55	13.91	--	3.51	1.85	16.13	--	.02	.15	1,300	1.77	34,590	63	7.0	2,260	7.5
Nov. 26-30	71,920	5.2	3.09	1.32	8.44	.13	1.77	.98	10.04	.02	.03	.00	832	1.13	81,270	65	5.7	1,400	7.5
Dec. 1-3, 5-7...	79,020	7.2	4.49	1.97	15.61	.16	1.36	.79	19.40	.02	.04	.00	1,410	1.92	151,700	70	8.7	2,340	7.3
Dec. 4, 8-10	37,090	--	4.99	2.22	17.57	--	1.64	1.00	21.77	--	.06	--	1,530	2.08	77,150	71	9.3	2,660	7.7
Dec. 11-12.....	19,660	--	7.14	3.12	23.74	--	2.85	1.69	28.77	--	.05	--	2,130	2.90	57,010	70	10	3,440	8.2
Dec. 13-20	43,020	--	4.49	1.89	9.70	--	2.66	1.35	11.70	--	.04	.00	979	1.33	57,220	60	5.4	1,700	8.1
Dec. 21-31	61,230	--	5.59	2.47	16.44	--	2.66	1.77	19.46	--	.05	.00	1,530	2.08	127,400	67	8.2	2,570	8.2
Jan. 1-10, 1953 .	46,890	7.3	6.79	2.63	22.87	.21	2.87	2.02	26.57	.02	.06	.00	2,010	2.73	128,000	70	11	3,340	7.8
Jan 11-20	44,510	--	6.69	3.45	24.22	--	2.93	2.33	27.64	--	.08	.00	2,150	2.92	130,000	70	11	3,500	7.5
Jan. 21-24, 31 ..	46,330	--	5.54	2.14	21.00	--	2.65	2.19	23.27	--	.05	.00	1,730	2.35	108,900	73	11	3,000	7.4
Jan. 25-27, 29 ..	55,740	--	2.69	.99	8.31	--	1.47	1.19	9.00	--	.04	.00	712	.97	54,070	69	6.1	1,300	7.3
Jan. 28, 30	25,110	--	3.00	1.40	12.26	--	1.57	1.27	13.40	--	.04	--	1,000	1.36	34,150	74	8.3	1,720	7.1
Feb. 1-5	47,840	--	4.19	1.56	13.74	--	1.84	1.46	15.65	--	.03	.00	1,190	1.62	77,500	70	8.1	2,100	7.3
Feb. 6-11.....	36,750	6.6	5.69	2.63	21.96	.20	2.26	2.02	25.33	.02	.03	.00	1,870	2.54	93,340	72	11	3,150	7.5

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 12, 14-16, 18-19, 1953...	61,010	--	4.24	1.64	14.91	--	1.87	1.83	17.82	--	0.03	0.00	1,260	1.71	104,300	72	8.7	2,200	7.1
Feb. 13, 17.....	22,990	--	3.09	1.23	11.26	--	1.51	1.46	12.41	--	.02	--	941	1.28	29,430	72	7.7	1,690	7.6
Feb. 20-21, 26-28	38,520	--	5.28	2.16	20.00	--	a2.11	1.89	23.07	--	.03	.10	1,750	2.38	91,680	73	10	2,950	8.3
Feb. 22-25.....	36,600	--	4.64	1.89	17.78	--	1.70	1.73	20.08	--	.02	.00	1,500	2.04	74,660	73	9.9	2,580	7.2
Mar. 1-2, 9-10 .	64,940	--	3.99	1.64	15.52	--	b1.50	1.39	17.49	--	.02	.00	1,320	1.80	116,900	73	9.3	2,270	8.8
Mar. 3-8	158,600	--	2.78	1.17	10.26	--	1.28	1.02	11.28	--	.03	.05	868	1.18	187,100	72	7.3	1,550	7.4
Mar. 11-14	77,950	--	4.89	2.14	18.48	--	1.82	1.27	21.63	--	.06	--	1,590	2.16	168,400	72	9.9	2,720	7.6
Mar. 15-18	350,100	--	1.35	.37	2.74	--	.92	.48	3.10	--	.05	--	320	.44	154,000	61	3.0	540	7.2
Mar. 19-21	365,800	--	1.22	.34	1.87	--	1.00	.42	2.03	--	.03	--	246	.33	120,700	55	2.1	377	7.2
Mar. 22-25, 31..	278,900	--	1.75	.58	3.52	--	.97	.50	4.12	--	.03	.00	378	.51	142,200	60	3.3	619	7.2
Mar. 26-30.....	164,200	7.8	2.36	1.61	6.57	0.12	1.38	1.00	8.46	0.01	.03	.00	718	.98	160,900	62	4.7	1,180	7.7
Apr. 1-2, 6-8 ...	519,300	--	1.60	.65	3.30	--	1.08	.56	3.84	--	.03	.20	391	.53	275,200	59	3.1	606	7.5
Apr. 3-5, 9-11 ..	462,000	--	2.25	.81	4.96	--	1.38	.60	5.78	--	.04	.05	520	.71	328,000	62	4.0	852	7.8
Apr. 12-13, 17, 19-21.....	293,400	7.6	2.25	.70	3.39	.09	1.39	.75	4.26	.01	.02	.05	431	.59	173,100	53	2.8	709	7.7
Apr. 14-16, 18, 26-27.....	593,900	--	1.70	.68	2.48	--	1.30	.58	2.90	--	.03	.05	339	.46	273,200	51	2.3	519	7.4
Apr. 22-25, 28 ..	443,700	--	2.48	.94	4.91	--	1.62	.83	5.98	--	.03	--	573	.78	346,100	59	3.8	909	7.5
Apr. 29-30.....	285,200	--	1.08	.40	1.30	--	.87	.33	1.50	--	.03	--	216	.29	82,710	47	1.5	293	8.2
May 1-6	548,000	--	1.12	.40	1.35	--	.97	.38	1.58	--	.03	.04	214	.29	158,900	47	1.5	318	7.8
May 7-12, 17 ...	402,600	9.0	1.44	.60	2.57	.07	1.10	.50	3.13	.01	.03	--	321	.44	177,100	55	2.5	517	7.6
May 13-16, 18 ..	794,800	--	1.30	.34	1.74	--	1.00	.35	2.12	--	.03	.06	253	.34	270,200	51	1.9	380	7.8
May 19-22, 30-31	358,600	--	1.72	.70	3.74	--	1.20	.56	4.48	--	.03	.06	425	.58	208,000	61	3.4	689	7.9
May 23-29	294,700	--	1.42	.59	2.57	--	1.21	.56	2.96	--	.04	.07	304	.41	120,800	56	2.6	520	7.8
June 1-4, 7-10 ..	99,630	11	2.80	.77	5.61	.11	2.10	1.02	5.95	.02	.05	--	617	.84	83,860	60	4.2	993	8.1
June 5-6	49,390	--	3.94	1.40	11.00	--	2.57	1.81	12.55	--	.05	.00	1,080	1.47	72,600	67	6.8	1,720	8.0
June 11-13.....	54,510	--	3.69	1.17	8.52	--	2.34	1.21	9.73	--	.04	.00	792	1.08	58,870	64	5.4	1,440	8.0

a Includes 0.03 equivalent per million of carbonate (CO_3).
b Includes 0.30 equivalent per million of carbonate (CO_3).

June 14-19, 1953	52,400	--	4.52	1.72	13.70	--	2.20	1.29	16.64	--	0.02	0.00	1,350	1.84	96,420	69	7.8	2,180	7.9
June 20-24	28,560	--	4.96	2.00	16.05	--	c 2.74	1.54	19.74	--	.04	.00	1,530	2.08	59,400	70	8.6	2,510	8.3
June 25-30	33,820	--	3.80	1.68	12.31	--	2.10	1.77	14.10	--	.03	.10	1,150	1.56	52,760	69	7.4	1,850	8.1
July 1-4	20,610	--	3.86	1.44	11.52	--	2.18	1.54	12.83	--	.04	.10	1,020	1.39	28,650	68	7.1	1,820	7.8
July 5, 8-11	22,790	9.2	4.14	1.73	12.65	0.19	2.39	1.60	14.95	0.02	.08	.00	1,260	1.71	38,970	68	7.4	2,030	7.9
July 6-7	8,510	--	3.92	2.86	15.74	--	2.26	1.62	18.05	--	.04	--	1,390	1.89	16,080	70	8.5	2,440	7.9
July 12-13	12,650	--	3.92	1.62	10.91	--	2.18	1.25	12.83	--	.04	--	1,040	1.41	17,840	66	6.6	1,780	8.1
July 14-19, 21	155,900	--	3.29	1.40	9.65	--	1.84	.79	11.28	--	.05	.00	897	1.22	190,200	67	6.3	1,670	8.0
July 20, 22-24, 26-28	579,200	--	2.40	.67	6.87	--	1.52	.58	7.56	--	.04	.00	636	.86	498,100	69	5.5	1,120	7.5
July 25, 29-31	213,000	--	1.75	.55	5.31	--	1.25	.69	5.58	--	.04	.00	493	.67	142,700	70	5.0	869	7.5
Aug. 1-2	40,920	--	2.50	.99	10.00	--	1.57	1.37	10.58	--	.05	--	748	1.02	41,740	74	7.6	1,310	8.0
Aug. 3-7	72,500	--	3.29	1.48	11.74	--	d 1.89	2.08	12.35	--	.03	.30	1,020	1.39	100,800	71	7.6	1,790	8.3
Aug. 8-13, 15-18	126,600	--	4.14	1.97	15.83	--	1.88	1.81	17.63	--	.04	.15	1,360	1.85	234,200	72	9.1	2,380	8.2
Aug. 14, 19-23	81,100	--	5.29	2.30	19.92	--	2.10	1.29	23.69	--	.06	.20	1,710	2.33	189,000	72	10	2,990	7.4
Aug. 24-31	77,900	7.1	4.19	1.40	12.87	.20	2.20	1.46	14.52	.02	.03	.10	1,170	1.59	124,000	69	7.7	2,010	8.2
Sept. 1-4	29,100	--	4.54	1.89	13.91	--	2.69	2.85	14.67	--	.04	.10	1,250	1.70	49,470	68	7.8	2,160	8.0
Sept. 5-6	40,240	--	4.74	1.64	17.78	--	2.38	2.54	19.18	--	.05	--	1,510	2.05	82,490	74	9.9	2,630	7.9
Sept. 7-10	59,820	--	3.19	1.15	13.09	--	1.66	1.37	13.82	--	.04	.10	1,060	1.44	86,140	75	8.9	1,920	7.9
Sept. 11-15	38,200	--	3.59	1.32	11.65	--	2.18	1.33	12.69	--	.04	.10	1,020	1.39	53,100	70	7.4	1,800	7.6
Sept. 16-21	28,030	6.4	4.19	1.64	15.31	.20	2.41	1.54	16.78	.02	.03	.10	1,310	1.78	49,890	72	9.0	2,300	7.4
Sept. 22-30	27,710	--	4.39	1.56	13.09	--	2.75	1.44	14.67	--	.02	.05	1,220	1.66	46,000	69	7.6	2,060	7.6
Total or weighted average	9,365,650	--	2.35	0.90	5.96	--	1.43	0.79	6.88	--	0.04	--	597	0.81	7,597,000	65	4.7	997	--

c Includes 0.12 equivalent per million of carbonate (CO_3).
d Includes 0.07 equivalent per million of carbonate (CO_3).

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ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR TASCOSA, TEX.

LOCATION.--At Boy's Ranch near Tascosa, Oldham County, 20 miles upstream from gaging station near Amarillo, Potter County.
DRAINAGE AREA.--19,287 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: June 1948 to September 1953.
Water temperatures: February 1949 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 3,410 micromhos Jan. 8; minimum daily, 492 micromhos July 19.
Percent sodium: Maximum, 76 May 5-9, 15-17, June 6, 14, 18, 28-29; minimum, 62 Oct. 1-2, 26, 28-31, July 16, 19-24.
EXTREMES, 1948-53.--Specific conductance: Maximum daily, 3,600 micromhos Mar. 2, 1951; minimum daily, 347 micromhos Feb. 24, 1949.
Percent sodium: Maximum, 87 Mar. 6-10, 1952; minimum, 11 Nov. 11-20, 1948.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are sums of determined constituents unless otherwise noted. Total acre-feet values reported are adjusted to reflect small discharge of sewage effluent entering Canadian River between sampling point and gaging station. No other appreciable inflow between sampling point and gaging station except during periods of heavy local rains. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Amarillo for water year October 1952 to September 1953 given in Water-Supply Paper 1281.

Chemical analyses, water year October 1952 to September 1953

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. 1-2, 26, 28-31, 1952	30	18	4.04	3.54	12.46		3.59	8.64	7.76	0.04	0.01		1,230	1.67	50	62	6.4	1,950	8.2
Nov. 1-2, 4-16, 18-20	56	18	4.44	4.03	16.71		4.15	8.81	12.13	.04	.05		1,520	2.07	116	66	8.1	2,440	8.0
Nov. 21-24	14	14	3.69	3.21	12.81		4.64	6.91	8.12	.03	.01		1,180	1.60	22	65	6.9	1,930	8.0
Dec. 1-8	58	15	4.39	3.78	18.73		4.59	7.54	14.72	.04	.01		1,600	2.18	126	70	9.3	2,660	8.0
Dec. 11-20	73	18	3.99	4.03	17.28		4.61	7.64	12.92	.05	.08		1,510	2.05	150	68	8.6	2,510	8.1
Dec. 21-24, 27-31	60	16	4.49	4.36	17.43		5.28	8.41	12.47	.06	.06		1,570	2.14	128	66	8.3	2,570	8.0
Jan. 1-10, 1953	248	16	3.64	4.11	21.65		3.75	8.04	17.49	.05	.07		1,760	2.39	593	74	11	3,000	8.1
Jan. 11-20	113	18	3.49	4.03	16.72		4.38	7.66	12.07	.06	.07		1,450	1.97	223	69	8.6	2,410	8.1
Jan. 21-25, 27, 30-31	34	18	3.29	3.21	13.04		4.61	6.83	8.04	.04	.02		1,180	1.60	54	67	7.2	1,900	8.0
Feb. 1, 3-8, 10	20	16	2.79	2.22	9.76		4.75	5.29	4.68	.04	.01		a888	1.21	24	66	6.2	1,450	8.2
Feb. 12-13, 15	12	18	2.74	2.38	9.19		4.64	5.00	4.63	.04	.00		865	1.18	14	64	5.8	1,410	8.0
Feb. 25-27	7.9	19	2.25	2.63	11.78		4.70	6.22	5.64	.04	.06		1,010	1.37	11	71	7.5	1,640	8.1
Mar. 1-12, 29, 31, Apr. 1-8, 10-12.	113	36	1.30	2.55	10.60		b3.63	5.66	5.08	.05	.03		a901	1.23	139	73	7.6	1,460	8.4

a Sum of determined constituents.
b Includes 0.20 equivalent per million of carbonate (CO_3).

May 5-9, 15-17, June 6, 14, 18, 28-29	48	24	3.19	3.21	19.85	4.28	8.64	13.26	0.05	0.02	1,600	2.18	105	76	11	2,630	8.2
July 7-15, 17-18, 25-31	2,420	20	2.20	1.40	9.35	3.72	3.66	5.50	.03	.04	809	1.10	2,660	72	7.0	1,340	7.9
July 16, 19-24	27,980	19	1.70	.90	4.24	3.02	1.67	2.09	.03	.03	413	.56	15,670	62	3.7	690	8.2
Aug. 1-6, 18-22	30,700	23	1.80	.99	5.65	2.82	2.08	3.44	.04	.06	518	.70	21,490	67	4.8	873	8.2
Aug. 7-13, 28-31	1,820	23	3.14	1.89	12.12	3.65	4.46	8.97	.04	.03	1,030	1.40	2,550	71	7.7	1,770	8.2
Aug. 14-17, 23-27	15,320	21	2.15	1.23	8.32	3.41	3.10	5.10	.04	.05	717	.98	15,010	71	6.4	1,210	8.2
Sept. 1-4, 7-13	1,110	22	2.54	1.56	8.23	3.29	3.68	5.25	.05	.06	776	1.06	1,180	67	5.7	1,230	8.1
Sept. 5-6, 15-20, 25, 29-30	153	27	4.69	3.12	21.02	4.16	6.20	18.33	.11	.03	1,720	2.34	358	73	11	2,900	8.2
Total or weighted average	80,400	21	1.90	1.07	6.13	3.06	2.33	3.64	0.04	0.04	556	0.76	61,100	67	5.0	934	--

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.

LOCATION.--At gaging station at bridge on State Highway 2, 5½ miles upstream from Snake Creek, and three-quarters of a mile north of Whitefield, Haskell County.
DRAINAGE AREA.--47,576 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1944 to February 1945, September 1946 to September 1953.
Water temperatures: September 1944 to February 1945, September 1946 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 18,900 micromhos Dec. 2; minimum daily, 378 micromhos Mar. 17.
Percent sodium: Maximum, 76 Dec. 2-3, Feb. 1-3, 7, June 16; minimum, 51 Mar. 17, May 1-3.
EXTREMES, 1946-53.--Specific conductance: Maximum daily, 18,900 micromhos Dec. 2, 1952; minimum daily, 71.7 micromhos Jan. 2, 1948.
Percent sodium: Maximum, 80 Nov. 6-14, Dec. 21-23, 1947; minimum, 37 Feb. 3-5, 1948.
REMARKS.--Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1281. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	1,160	12	9.18	4.03	32.48	0.36	3.15	0.52	42.02	0.01	--	0.39	2,840	3.86	4,480	71	13	4,770	7.8
Oct. 11.....	83.3	--	8.78	4.11	30.44		3.31	.54	39.48	--	--	--	2,750	3.74	312	70	12	4,690	7.9
Oct. 12-20	617	--	10.23	4.93	33.99		3.44	.58	45.13	--	--	--	3,070	4.18	2,580	69	12	5,290	7.5
Oct. 21-29	448	--	9.63	4.61	29.84		3.77	.54	39.77	--	--	--	2,670	3.63	1,630	69	11	4,670	7.7
Oct. 30-31	93.2	--	10.83	4.77	36.18		3.80	.60	47.38	--	--	--	3,170	4.31	402	70	13	5,390	7.6
Nov. 1-6	298	--	11.68	5.43	40.28		3.44	.65	53.30	--	--	--	3,720	5.06	1,510	70	14	6,140	7.7
Nov. 7-10	194	--	13.37	6.09	50.18		3.52	.69	65.43	--	--	--	4,250	5.78	1,120	72	16	7,190	7.4
Nov. 11-12	95.2	--	14.37	6.50	49.66		3.54	.71	66.28	--	--	--	4,500	6.12	583	70	15	7,540	7.9
Nov. 13	55.5	--	15.27	6.58	56.18		3.39	.75	73.89	--	--	--	4,920	6.69	372	72	17	8,210	7.8
Nov. 14-18	397	--	16.92	7.15	63.95		3.20	.77	84.05	--	--	--	5,560	7.56	3,000	73	18	8,930	7.6
Nov. 19-20	226	--	18.61	7.73	72.87		2.75	.85	95.61	--	--	--	6,200	8.43	1,910	73	20	10,000	7.4
Nov. 21-24, 29...	2,770	--	19.16	7.89	74.37		2.57	.98	97.87	--	--	--	6,470	8.80	24,400	73	20	10,500	8.0
Nov. 25, 28.....	3,820	--	12.48	5.18	50.04		1.67	.60	65.43	--	--	--	4,290	5.83	22,310	74	17	7,210	7.5
Nov. 26	2,680	--	9.13	4.28	35.47		1.84	.50	46.54	--	--	--	3,100	4.22	1,130	73	14	5,290	7.8
Nov. 27	4,600	--	4.19	2.14	14.62		1.54	.35	19.04	--	0.02	--	1,320	1.80	8,270	70	8.2	2,360	7.7
Nov. 30	1,380	--	20.71	9.46	90.04		1.29	.75	118.17	--	--	--	7,430	10.10	13,940	75	23	12,300	7.5

Dec. 1, 4-5, 1952	2,370	--	25.80	11.02	113.11	1.84	0.87	147.22	--	--	--	9,570	13.02	30,900	75	26	15,200	7.5
Dec. 2-3	1,620	--	31.84	13.32	140.66	1.52	.98	183.32	--	--	--	11,800	16.05	26,090	76	30	18,600	7.3
Dec. 6, 9	1,030	--	20.51	9.21	87.70	2.54	.94	113.94	--	--	--	7,450	10.13	10,460	75	23	14,000	7.3
Dec. 7-8, 10.....	1,430	--	18.96	7.98	75.59	2.64	.90	98.99	--	--	--	6,570	8.94	12,750	74	21	10,700	7.5
Dec. 11-12	740	--	17.42	7.32	69.17	2.70	.96	90.25	--	--	--	6,010	8.17	6,050	74	20	9,660	7.2
Dec. 13-20	2,810	--	15.02	6.58	59.05	2.84	1.10	76.71	--	--	--	5,160	7.02	19,770	73	18	8,470	7.8
Dec. 21	1,040	--	16.52	7.24	65.70	2.52	.92	86.02	--	--	--	5,640	7.67	7,960	73	19	9,360	7.8
Dec. 22	1,310	--	7.04	3.78	27.78	1.28	.94	36.38	--	--	--	2,440	3.32	4,340	72	12	4,250	7.4
Dec. 23	1,020	--	9.83	4.44	39.88	1.47	.79	51.89	--	--	--	3,430	4.66	4,780	74	15	5,890	7.4
Dec. 24	904	--	11.58	5.35	48.13	1.64	.81	62.61	---	--	--	4,160	5.66	5,120	74	17	6,960	7.3
Dec. 25	785	--	13.37	6.00	57.12	1.75	.85	73.89	--	--	--	4,790	6.51	5,120	75	18	8,080	7.2
Dec. 26-28, 30...	2,400	--	19.41	9.13	83.08	2.38	.94	108.30	--	--	--	6,900	9.38	22,580	74	22	11,200	7.5
Dec. 29, 31.....	980	--	21.56	10.28	96.82	2.74	.98	124.94	--	--	--	8,130	11.06	10,840	75	24	13,000	7.4
Jan. 1-7, 1953...	2,590	--	22.46	9.95	91.44	2.70	1.00	120.15	--	--	--	7,830	10.65	27,630	74	23	12,800	7.2
Jan. 8-10	954	--	19.91	8.47	81.65	2.74	.96	106.33	--	--	--	6,890	9.37	8,950	74	22	11,200	7.3
Jan. 11-20	2,790	8.0	20.96	8.39	82.18 | 0.84	2.67	1.06	109.15	0.01	--	0.52	6,970	9.48	26,520	73	21	11,300	7.6
Jan. 21-28	3,280	--	21.61	8.96	84.83	2.47	.96	111.97	--	--	--	7,220	9.82	32,260	74	22	11,900	7.7
Jan. 29-31	1,570	--	24.55	10.86	101.21	2.18	1.04	133.40	--	--	--	8,700	11.83	18,560	74	24	14,100	7.4
Feb. 1-3, 7.....	1,830	--	25.10	10.94	112.74	1.87	1.10	145.81	--	--	--	9,180	12.48	22,930	76	27	14,800	7.6
Feb. 4-6, 8.....	1,540	--	23.95	10.36	103.58	1.98	1.10	134.81	--	--	--	8,570	11.66	18,000	75	25	13,800	7.5
Feb. 9-10	617	--	21.91	9.87	88.29	2.21	1.10	116.76	--	--	--	7,700	10.47	6,470	74	22	12,400	7.3
Feb. 11-12, 17 ..	1,420	--	20.01	9.54	81.88	2.05	1.08	108.30	--	--	--	6,960	9.47	13,440	73	21	11,400	7.8
Feb. 13-14, 18-20	2,690	--	22.75	10.28	97.95	1.97	1.25	127.76	--	--	--	8,000	10.88	29,310	75	24	13,000	7.5
Feb. 15-16	1,870	--	13.47	6.50	58.53	1.39	.96	76.15	--	--	--	4,840	6.58	12,310	75	19	8,100	7.5
Feb. 21-23, 27-28	2,610	--	23.35	10.77	100.82	1.72	1.23	131.99	--	--	--	8,350	11.36	29,690	75	24	13,500	7.1
Feb. 24	744	--	16.97	6.88	69.93	1.44	1.27	93.07	--	--	--	6,080	8.27	6,160	73	19	9,940	7.6
Feb. 25	776	--	12.87	6.50	57.43	1.20	2.27	73.33	--	--	--	4,790	6.51	5,060	75	18	7,990	7.4
Feb. 26	704	--	19.86	9.37	83.52	1.34	1.42	109.99	--	--	--	7,060	9.60	6,770	74	22	11,400	7.6

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1952 to September 1953--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, 8, 1953	4,990	--	25.75	12.09	112.77		1.88	1.23	147.50	--	--	--	9,320	12.66	63,260	75	26	14,900	7.3
Mar. 2	2,220	--	16.27	8.14	69.85		1.57	.83	91.66	--	--	--	5,670	7.98	17,750	74	20	9,650	7.4
Mar. 3, 6, 10	9,460	--	8.48	4.11	35.23		1.36	.75	45.69	--	--	--	3,020	4.11	38,980	74	14	5,150	7.2
Mar. 4-5	6,900	--	7.34	3.70	30.56		1.10	.73	39.77	--	--	--	2,640	3.59	24,810	73	13	4,480	7.1
Mar. 7, 9	6,510	--	13.02	6.00	56.67		1.51	.85	73.33	--	--	--	4,730	6.43	41,890	75	18	7,830	7.3
Mar. 11-13	6,940	--	6.79	3.12	27.35	--	1.93	.75	34.41	--	--	--	2,460	3.37	23,420	73	12	3,900	8.0
Mar. 14	8,410	--	4.39	2.14	16.70	--	1.51	.54	21.15	--	0.09	--	1,500	2.04	17,170	72	9.3	2,520	7.8
Mar. 15-16, 19	74,360	--	1.30	.51	2.96	--	1.03	.29	3.53	--	.03	--	321	.44	32,490	62	3.1	516	7.1
Mar. 17	31,540	--	1.20	.52	1.78		1.00	.19	2.26	--	.05	--	295	.40	12,660	51	1.9	378	7.4
Mar. 18	51,170	--	2.25	.82	5.44	--	1.38	.29	7.05	--	.05	--	553	.75	38,520	64	4.4	927	7.6
Mar. 20	32,130	--	2.40	.90	7.48	--	.95	.25	9.31	--	.04	--	707	.96	30,920	69	5.8	1,170	7.7
Mar. 21	28,760	--	2.30	.82	7.74	--	.85	.21	9.65	--	.03	--	737	1.00	28,850	71	6.2	1,200	7.7
Mar. 22,31	90,680	--	2.00	.76	5.31	--	1.16	.27	6.83	--	.03	--	548	.75	67,650	66	4.5	908	7.7
Mar. 23	6,430	--	3.44	1.40	12.13	--	1.11	.44	15.79	--	.06	--	1,060	1.44	9,270	71	7.8	1,860	7.7
Mar. 24, 28-30	11,340	--	5.79	2.71	22.79	--	1.44	.71	29.90	--	--	--	1,950	2.65	30,090	73	11	3,440	7.6
Mar. 25-27	6,210	--	7.29	3.29	30.05	--	1.33	.69	39.20	--	--	--	2,600	3.54	29,060	74	13	4,440	7.6
Apr. 1-2	72,600	--	4.09	1.56	14.52	--	1.28	.31	18.05	--	.05	--	1,260	1.71	124,500	72	8.7	2,200	7.7
Apr. 3-4, 6,10	75,870	--	2.69	1.07	8.57	--	1.20	.35	10.72	--	.04	0.22	780	1.06	80,550	70	6.3	1,380	7.7
Apr. 5, 8-9	70,890	--	3.44	1.32	10.87	--	1.51	.42	13.54	--	.05	--	969	1.32	93,510	70	7.0	1,730	7.7
Apr. 7	40,260	--	2.40	.90	6.91	--	1.11	.37	8.60	--	.04	--	645	.88	35,350	68	5.4	1,120	7.8
Apr. 11-12	16,500	--	2.59	1.15	7.20		1.59	.50	8.80	--	.05	--	657	.89	14,760	66	5.3	1,220	8.2
Apr. 13-14	14,620	--	1.90	1.07	5.57		1.56	.44	6.49	--	.05	--	504	.69	10,030	65	4.6	938	8.0
Apr. 15-16	26,480	--	1.70	.77	3.90		1.33	.42	4.57	--	.05	--	386	.53	13,990	61	3.5	702	7.8
Apr. 17-18	16,980	--	2.84	1.23	9.24		1.21	.44	11.62	--	.04	--	848	1.15	19,600	69	6.5	1,500	7.7
Apr. 19	4,960	--	3.39	1.73	11.80		1.33	.73	14.81	--	.05	--	1,080	1.47	7,290	70	7.4	1,830	7.7
Apr. 20	3,390	--	8.03	3.87	33.01		1.44	.60	42.87	--	--	--	2,810	3.82	12,970	74	14	4,820	7.9
Apr. 21	3,270	--	6.49	3.29	27.33		1.56	.58	34.97	--	--	--	2,320	3.16	10,340	74	12	3,970	7.9
Apr. 22-23	5,300	--	5.19	2.55	20.08		1.75	.62	25.38	--	.07	--	1,780	2.42	12,830	72	10	3,040	8.0

Apr. 24, 30, 1953..	118,400	--	2.25	0.90	5.58	1.16	0.33	7.19	--	0.05	--	575	0.78	92,680	64	4.4	983	7.7
Apr. 25-26	122,600	--	2.59	.99	7.20	1.51	.27	8.97	--	.03	--	675	.92	112,600	67	5.4	1,210	7.6
Apr. 27, 29	79,930	--	1.35	.58	2.77	.98	.25	3.44	--	.03	--	300	.41	32,640	59	2.8	510	7.4
Apr. 28.....	26,980	--	1.10	.49	2.84	.93	.67	2.82	--	.01	--	254	.35	9,330	64	3.2	435	7.7
May 1-3.....	86,800	--	1.20	.62	1.92	.98	.23	2.51	--	.02	--	263	.36	31,070	51	2.0	410	7.2
May 4.....	5,990	--	1.65	.90	4.63	1.03	.42	5.70	--	.03	--	495	.67	4,040	64	4.1	816	7.7
May 5.....	3,990	--	2.99	1.73	9.06	1.25	.37	12.13	--	.03	--	919	1.25	4,990	66	5.9	1,530	7.9
May 6.....	3,170	--	3.54	2.06	12.98	1.31	.46	16.78	--	.03	--	1,330	1.81	5,750	70	7.8	2,070	7.7
May 7-8.....	5,060	--	4.59	2.63	17.37	1.51	.50	22.56	--	.02	--	1,760	2.39	12,120	71	9.2	2,750	7.9
May 9-10	3,980	--	5.44	2.88	21.08	1.72	.54	27.13	--	.01	--	2,060	2.80	11,150	72	10	3,270	8.0
May 11.....	2,700	--	5.39	2.88	20.40	1.66	.54	26.45	--	.02	--	1,960	2.67	7,200	71	10	3,200	8.0
May 12	35,110	--	3.64	1.81	11.47	1.31	.35	15.23	--	.03	--	1,180	1.60	56,390	68	7.0	1,900	7.7
May 13	59,500	--	1.35	.57	2.91	1.05	.25	3.50	--	.03	--	340	.46	27,540	60	3.0	532	7.8
May 14.....	48,000	--	2.59	1.48	8.70	.98	.21	11.56	--	.02	--	897	1.22	58,610	68	6.1	1,440	7.6
May 15-16	89,060	--	1.45	.72	3.56	.98	.19	4.54	--	.02	--	406	.55	49,220	62	3.4	645	7.5
May 17-18.....	65,260	--	2.74	1.40	10.04	1.15	.31	12.69	--	.03	--	1,020	1.39	90,610	71	7.0	1,600	7.8
May 19.....	17,970	--	5.39	2.71	20.98	1.46	.44	27.13	--	.05	--	2,060	2.80	50,390	72	10	3,150	7.8
May 20	13,880	--	3.24	1.81	11.79	1.46	.40	14.95	--	.03	--	1,130	1.54	21,360	70	7.5	1,910	8.0
May 21-24.....	30,030	--	3.19	1.45	10.23	1.69	.44	12.69	--	.05	--	921	1.25	37,650	69	6.7	1,650	8.3
May 25.....	3,470	--	4.24	1.92	13.07	2.10	.56	16.50	--	.07	--	1,230	1.67	5,810	68	7.4	2,070	8.4
May 26-31.....	10,370	--	5.44	2.44	18.54	2.18	.79	23.41	--	.04	--	1,680	2.28	23,710	70	9.3	2,890	7.7
June 1-2.....	1,770	--	6.49	3.31	21.36	2.56	.94	27.64	--	.02	--	2,000	2.72	4,810	69	9.7	3,440	7.6
June 3.....	766	--	7.49	3.41	25.30	2.58	.90	32.72	--	--	--	2,400	3.26	2,500	70	11	3,940	8.5
June 4-7.....	2,690	--	8.78	3.82	30.08	2.67	.81	39.20	--	--	--	2,820	3.84	10,330	70	12	4,660	7.7
June 8	766	--	9.68	4.22	35.53	2.65	.81	45.97	--	--	--	3,280	4.46	3,420	72	13	5,380	7.6
June 9	950	--	10.68	4.62	39.89	2.45	.85	51.89	--	--	--	3,810	5.18	4,930	72	14	5,940	8.4
June 10	2,040	--	13.17	5.23	51.65	2.03	.90	67.12	--	--	--	4,730	6.43	13,150	74	17	7,100	8.4
June 11-12	2,920	--	21.71	9.69	92.09	1.56	.94	120.99	--	--	--	8,320	11.32	33,090	75	23	13,200	8.1
June 13.....	916	--	17.51	8.29	76.70	1.74	.92	99.84	--	--	--	7,000	9.52	8,730	75	21	10,900	8.2

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1952 to September 1953--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 14, 1953....	724	--	15.77	6.83	66.42		2.10	0.90	86.02	--	--	--	6,000	8.16	5,910	75	20	9,520	8.3
June 15.....	617	--	17.12	8.08	72.94		2.16	.94	95.04	--	--	--	6,620	9.00	5,560	74	21	10,500	8.2
June 16.....	553	--	19.71	8.29	86.41		2.33	.96	111.12	--	--	--	7,790	10.59	5,870	76	23	12,000	8.3
June 17.....	494	--	15.17	7.23	63.85		2.11	.94	83.20	--	--	--	6,030	8.20	4,050	74	19	9,230	8.1
June 18-20	1,050	--	13.47	5.93	53.95		2.49	.92	69.94	--	--	--	4,750	6.46	6,810	74	17	7,880	7.7
June 21-23	758	--	13.17	5.93	54.49		2.23	.85	70.51	--	--	--	4,920	6.69	5,070	74	18	7,790	8.0
June 24-28	1,210	--	12.38	5.62	47.82		2.44	.77	62.61	--	--	--	4,480	6.09	7,370	73	16	7,080	8.0
June 29-30	466	--	13.47	6.03	53.42		2.25	.73	69.94	--	--	--	4,910	6.68	3,120	73	17	7,720	8.2
July 1.....	192	--	14.37	7.03	58.96		2.05	.75	77.56	--	--	--	5,450	7.41	1,430	73	18	8,520	8.1
July 2	198	--	15.97	7.43	62.22		2.44	.83	82.35	--	--	--	5,870	7.98	1,580	73	18	9,030	8.3
July 3.....	173	--	17.17	7.23	68.90		2.26	.79	90.25	--	--	--	6,420	8.73	1,510	74	20	9,750	8.1
July 4.....	145	--	19.31	8.49	76.07		2.41	.77	100.69	--	--	--	6,690	9.10	1,320	73	20	10,500	8.0
July 5	127	--	16.77	7.63	68.72		2.16	.71	90.25	--	--	--	6,330	8.61	1,090	74	20	9,850	8.1
July 6.....	107	--	16.17	7.43	65.33		2.20	.71	86.02	--	--	--	6,000	8.16	875	73	19	9,350	8.1
July 7.....	192	--	14.97	7.43	60.91		2.26	.67	80.38	--	--	--	5,480	7.45	1,440	73	18	8,760	8.1
July 8	315	--	13.77	6.03	52.45		2.57	.58	69.10	--	--	--	4,990	6.79	2,140	73	17	7,740	7.6
July 9-10.....	375	--	10.88	5.02	42.05		2.41	.54	55.00	--	--	--	4,020	5.47	2,050	73	15	6,140	8.0
July 11	849	--	12.87	5.67	48.27	--	2.53	.50	64.87	--	--	--	4,280	5.82	4,950	72	16	7,170	8.3
July 12.....	4,940	--	28.49	12.58	118.71	--	1.38	.69	157.09	--	--	--	10,100	13.74	67,900	74	26	16,200	7.8
July 13-14.....	17,590	--	9.13	3.70	37.05	--	1.67	.50	47.38	--	--	--	3,150	4.28	75,440	74	15	5,310	8.0
July 15-16.....	14,800	--	6.19	2.63	23.09	--	1.77	.44	30.46	--	--	--	2,050	2.79	41,290	72	11	3,520	7.8
July 17-18.....	15,910	--	3.69	1.64	12.70	--	1.44	.33	16.22	--	0.05	--	1,180	1.60	25,550	70	7.8	2,050	7.9
July 19.....	12,610	--	6.09	2.30	24.05	--	1.36	.42	31.02	--	--	--	2,080	2.83	35,720	74	12	3,630	7.9
July 20	19,000	--	4.19	1.81	14.65	--	1.70	.44	18.61	--	.09	--	1,340	1.82	34,660	71	8.5	2,320	8.0
July 21-23	211,800	--	2.30	.72	5.35	--	1.57	.18	6.54	--	.04	--	532	.72	153,400	64	4.4	944	8.0
July 24-25.....	108,100	--	1.50	.52	2.44	--	1.31	.21	2.93	--	.04	--	293	.40	43,110	55	2.4	501	7.9
July 26.....	36,300	--	3.14	1.15	9.18	--	1.20	.23	11.70	--	.07	--	908	1.23	44,860	68	6.3	1,550	7.9
July 27-31.....	60,600	--	2.00	.77	5.04	--	1.20	.29	6.26	--	.03	--	528	.72	43,550	65	4.3	903	7.5

Aug. 1-3, 1953...	17,590	--	3.49	1.64	7.78	--	1.97	1.92	9.17	--	0.05	--	829	1.13	19,850	60	4.9	1,440	8.0
Aug. 4-6.....	9,740	--	3.94	1.89	11.09	--	1.75	1.77	13.26	--	.04	--	1,100	1.50	14,590	66	6.5	1,890	7.8
Aug. 7.....	12,240	--	7.49	2.88	24.57	--	1.70	.71	32.43	--	--	--	2,380	3.24	39,650	70	11	3,800	7.4
Aug. 8-9.....	8,010	--	4.19	1.73	13.70	--	1.15	.42	17.77	--	.03	--	1,310	1.78	14,290	70	8.0	2,230	7.8
Aug. 10.....	2,420	--	9.98	4.44	37.22	--	1.38	.60	50.77	--	--	--	3,320	4.52	10,940	72	14	5,610	7.9
Aug. 11-14.....	8,870	--	7.14	3.29	25.66	--	1.67	.71	34.41	--	--	--	2,490	3.39	30,050	71	11	4,020	7.6
Aug. 15-16.....	7,700	--	14.37	6.58	56.53	--	1.59	.85	76.15	--	--	--	5,340	7.26	55,940	73	17	8,240	7.8
Aug. 17-20.....	23,730	--	8.13	3.54	32.96	--	1.56	.48	43.43	--	--	--	3,060	4.16	98,840	74	14	4,880	7.7
Aug. 21.....	7,830	--	3.39	1.32	9.04	--	2.03	.58	10.86	--	.09	--	888	1.21	9,470	66	5.9	1,550	8.0
Aug. 22-23.....	7,740	--	6.09	2.71	22.26	--	1.44	.62	29.61	--	--	--	2,100	2.86	22,110	72	11	3,440	7.8
Aug. 24-26.....	7,260	--	3.39	1.56	11.04	--	1.67	.35	13.96	--	.03	--	1,060	1.44	10,470	69	7.0	1,830	7.8
Aug. 27-31.....	16,400	--	6.04	3.04	16.96	--	2.80	4.43	18.76	--	.12	--	1,610	2.19	35,930	65	8.0	2,740	7.8
Sept. 1-3.....	5,890	--	5.89	2.79	17.92	--	2.67	3.71	20.59	--	.11	--	1,650	2.24	13,220	67	8.6	2,810	8.2
Sept. 4-6.....	57,660	--	2.59	.97	7.09	--	1.49	.71	8.52	--	.05	--	680	.92	53,370	67	5.3	1,210	8.0
Sept. 7.....	5,100	--	3.49	1.19	10.52	--	1.25	.44	13.88	--	.04	--	993	1.35	6,890	69	6.9	1,760	7.9
Sept. 8-9.....	4,780	--	4.04	1.68	13.09	--	1.62	1.25	16.08	--	.04	--	1,200	1.63	7,810	70	7.8	2,110	7.9
Sept. 10.....	1,420	--	5.24	2.28	17.05	--	1.98	1.44	22.00	--	.03	--	1,580	2.15	3,060	69	8.8	2,810	7.9
Sept. 11-12.....	2,040	--	6.14	2.58	21.13	--	2.10	1.23	27.08	--	.04	--	1,880	2.56	5,220	71	10	3,270	8.1
Sept. 13.....	895	--	8.43	3.47	30.31	--	2.11	1.17	39.48	--	--	--	2,710	3.69	3,300	72	12	4,590	8.0
Sept. 14-18.....	2,690	--	9.58	3.92	36.44	--	1.92	1.00	47.95	--	--	--	3,170	4.31	11,600	73	14	5,440	7.6
Sept. 19-20.....	710	--	10.98	4.42	42.44	--	2.20	1.04	55.84	--	--	--	3,740	5.09	3,630	73	15	6,220	8.0
Sept. 21-23.....	902	--	11.18	4.52	42.27	--	2.38	.83	55.84	--	--	--	3,730	5.07	4,580	73	15	6,190	8.1
Sept. 24-30.....	1,900	--	12.77	4.93	47.40	--	2.65	.83	63.46	--	--	--	4,190	5.70	10,840	73	16	6,930	8.0
Total or weighted average.....	2,363,000	--	3.44	1.48	11.39		1.34	0.42	14.55	--	--	--	1,060	1.44	3,410,000	70	7.3	1,770	--

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, 4 miles northwest of Denison, Grayson County, and 3 miles upstream from gaging station near Colbert, Bryan County, Okla.
DRAINAGE AREA.--39,719 square miles above dam, 39,777 square miles above gaging station, of which 5,936 square miles is probably non-contributing.
RECORDS AVAILABLE.--Chemical analyses: May 1944 to September 1953.
Water temperatures: October 1945 to September 1953.
EXTREMES,1952-53.--Specific conductance: Maximum daily, 1,640 micromhos Sept. 18; minimum daily, 1,490 micromhos Nov. 17.
Percent sodium: Maximum, 55 Oct. 1-31, Jan. 1-31, July 1-31, Aug. 1-31, Sept. 1-30; minimum, 52 June 1-30.
EXTREMES, 1944-53.--Specific conductance: Maximum daily, 3,520 micromhos Aug. 14, 1944; minimum daily, 362 micromhos May 2, 1944.
Percent sodium: Maximum, 59 July 3-10, 1944; minimum, 31 Nov. 1-10, 1945.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Colbert, Okla., for water year October 1952 to September 1953 given in Water-Supply Paper 1281. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	147,200	11	4.39	2.30	8.17	2.29	4.23	8.32		0.02			912	1.24	182,500	55	4.5	1,520	7.9
Nov. 1-30.....	90,230	11	4.54	2.38	8.02	2.33	4.27	8.32		.02			921	1.25	112,800	54	4.3	1,550	7.7
Dec. 1-31.....	83,330	10	4.49	2.38	8.17	2.31	4.35	8.32		.06			918	1.25	104,200	54	4.4	1,550	7.7
Jan. 1-31, 1953..	92,440	6.4	4.49	2.38	8.35	2.36	4.39	8.40		.07			961	1.31	121,100	55	4.5	1,550	7.9
Feb. 1-28.....	70,410	5.2	4.59	2.47	8.11	2.33	4.37	8.46		.01			929	1.26	88,700	53	4.3	1,570	7.9
Mar. 1-31.....	43,700	4.6	4.64	2.47	8.11	2.29	4.31	8.60		.02			934	1.27	55,500	53	4.3	1,560	7.3
Apr. 1-30.....	104,000	4.6	4.69	2.47	8.08	2.38	4.37	8.46		.03			933	1.27	132,100	53	4.3	1,580	7.9
May 1-31	90,790	7.3	4.64	2.47	8.05	2.41	4.39	8.32		.04			978	1.33	120,800	53	4.3	1,570	7.9
June 1-30	125,400	8.0	4.64	2.55	7.93	2.43	4.21	8.46		.02			919	1.25	156,800	52	4.2	1,550	8.0
July 1-31	154,800	9.6	4.64	2.47	8.71	2.41	4.31	9.03	0.02	.05			972	1.32	204,300	55	4.6	1,620	8.0
Aug. 1-31.....	180,300	11	4.59	2.30	8.57	2.29	4.27	8.88		.02			995	1.35	243,400	55	4.6	1,620	8.0
Sept. 1-30.....	159,100	16	4.59	2.38	8.44	2.16	4.35	8.88		.02			a922	1.25	198,900	55	4.5	1,590	7.7
Total or weighted average	1,341,700	9.5	4.59	2.38	8.26	2.33	4.31	8.60		0.03			944	1.28	1,717,000	54	4.4	1,570	--

a Sum of determined constituents.

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 1953.
Water temperatures: October 1947 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 417 micromhos Dec. 10-11; minimum daily, 32.9 micromhos May 22.
Percent sodium: Maximum, 76 Nov. 21-30; minimum, 34 May 20-24.
EXTREMES, 1945-46, 1947-53.--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 residues on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1952 to September 1953 given Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	8,120	22	0.35	0.25	1.44		0.74	0.11	1.16		0.03		144	0.20	1,620	71	2.6	222	7.3
Oct. 11-20	7,560	22	.37	.25	1.41		.74	.11	1.16		.02		144	.20	1,510	69	2.5	223	7.2
Oct. 21-31	7,560	21	.39	.24	1.58		.72	.10	1.35		.04		146	.20	1.510	71	2.8	230	7.1
Nov. 1-10.....	7,030	21	.40	.26	1.57		.70	.12	1.38		.03		154	.21	1,480	72	2.7	239	7.3
Nov. 11-20.....	13,360	18	.32	.25	1.53		.64	.14	1.30		.02		142	.19	2,540	73	2.9	218	7.2
Nov. 21-30.....	18,450	14	.35	.24	1.83		.64	.19	1.58		.01		159	.22	4,060	76	3.4	265	7.1
Dec. 1-9, 16-20 .	105,600	11	.34	.23	1.05		.36	.25	.99		.02		a104	.14	14,780	65	2.0	192	6.8
Dec. 10-15	47,860	12	.49	.32	2.14		.29	.42	2.20		.04		a184	.25	11,960	73	3.4	350	6.9
Dec. 21-31	86,480	12	.36	.27	.95		.36	.27	.93		.02		a103	.14	12,110	60	1.7	184	6.8
Jan. 1-10, 1953..	136,600	12	.38	.29	1.24		.29	.35	1.24		.03		a124	.17	23,220	65	2.1	221	7.0
Jan. 11-20	75,910	13	.49	.32	1.43		.33	.48	1.41		.02		a144	.20	15,180	64	2.2	258	6.9
Jan. 21-31	129,500	13	.35	.25	1.07		.28	.35	1.02		.02		a111	.15	19,420	64	2.0	193	6.7
Feb. 1-2, 6-20,23	303,700	12	.32	.23	.85		.24	.35	.79		.02		a94	.13	39,480	61	1.6	166	6.8
Feb. 3-5	32,290	15	--	--	2.38		.25	.75	2.40		.02		232	.32	10,330	70	3.3	396	6.7
Feb. 21-22, 24-28	279,700	8.6	.21	.14	.56		.20	.25	.45		.01		a62	.08	22,380	62	1.3	105	6.8
Mar. 1-2, 14-26 .	763,500	7.8	.15	.12	0.36	0.06	.16	.21	.31		.02		a50	.07	53,440	51	1.0	82.1	6.5
Mar. 3-8, 27-31 .	500,000	11	.28	.17	.70	.06	.20	.29	.68		.02		a82	.11	55,000	58	1.5	146	6.6
Mar. 9-13	63,830	15	36	.29	1.17	.05	.25	.35	1.18		.02		a122	.17	10,850	63	2.1	223	6.8

a Sum of determined constituents.

SABINE RIVER BASIN--Continued

SABINE RIVER NEAR RULIFF, TEX.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-8, 1953 ..	218,500	14	0.41	0.21	1.03		0.38	0.42	0.82		0.03		127	0.17	37,140	62	1.8	190	6.7
Apr. 9-23	135,200	18	.60	.26	1.63		.54	.52	1.41		.02		186	.25	33,800	65	2.5	286	6.9
Apr. 24-30.....	102,500	11	.36	.21	.93		.34	.29	.85		.02		a 97	.13	13,320	62	1.7	178	7.0
May 1, 5-7, 10-13, 15, 17-19	1,206,000	4.9	--	--	0.39	0.05	.20	.14	.34		.02		71	.10	120,600	54	1.0	84.0	6.6
May 2-4, 8-9, 26-27	912,200	4.6	--	--	.23	.05	.16	.10	.23		.02		73	.10	91,220	44	.6	59.1	6.7
May 14, 16, 25, 28-31.....	865,400	6.8	.28	.19	.48		.29	.19	.42		.05		a 62	.08	69,230	51	1.0	115	6.6
May 20-24	1,076,000	4.1	--	--	.10	.03	.15	.05	.09		.00		52	.07	75,320	34	.4	33.3	6.9
June 1-9	715,600	8.4	.27	.22	.54		.49	.20	.42		.02		a 72	.10	71,560	48	1.0	121	7.1
June 10-30	510,700	14	.55	.30	.74		.72	.17	.68		.02		a 101	.14	71,500	47	1.1	180	7.6
July 1-9	69,980	16	.38	.22	.81		.51	.20	.68		.02		a 95	.13	9,100	57	1.5	154	7.1
July 10-18, 25, 30-31	83,720	18	.47	.29	1.30		.66	.23	1.16		.01		a 134	.18	15,070	63	2.1	231	7.2
July 19-24, 26-29	108,500	14	.33	.21	.82		.43	.18	.73		.02		a 91	.12	13,020	60	1.6	150	7.4
Aug. 1-10	129,900	15	.28	.20	.94		.29	.21	.90		.02		127	.17	22,080	66	1.9	165	7.3
Aug. 11-20.....	43,420	22	.41	.26	1.10		.56	.23	.96		.02		134	.18	7,820	62	1.9	198	7.2
Aug. 21-31.....	48,560	20	.35	.21	1.00		.49	.18	.85		.04		113	.15	7,280	64	1.9	167	7.0
Sept. 1-12, 29-30	60,610	16	.32	.21	.93		.49	.13	.82		.02		112	.15	9,090	64	1.8	159	7.5
Sept. 13-22	38,200	19	.55	.31	1.83		.59	.25	1.83		.02		181	.25	9,550	68	2.8	304	7.1
Sept. 23-28	18,150	17	.50	.31	2.37		.52	.24	2.40		.01		216	.29	5,260	75	3.7	356	7.2
Total or weighted average	8,930,000	8.7	0.26	0.17	0.57		0.29	0.20	0.51		0.02		81	0.11	982,300	57	1.2	119	--

a Sum of determined constituents.

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 & 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 1953.
Water temperatures: October 1947 to September 1953
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 415 micromhos Nov. 29; minimum daily, 49.3 micromhos May 9.
Percent sodium: Maximum, 73 Nov. 27-30, Dec. 1-3; minimum, 34 June 1-10.
EXTREMES, 1947-53.--Specific conductance: Maximum daily, 415 micromhos Nov. 29, 1952; minimum daily, 49.3 micromhos May 9, 1953.
Percent sodium: Maximum, 74 Dec. 21-31, 1948; minimum, 14 June 4-18, 1950.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	3,650	25	0.55	0.35	1.59		1.15	0.16	1.13	0.02	0.03		161	0.22	803	64	2.4	261	7.6
Oct. 11-20	3,390	23	.60	.35	1.51		1.07	.17	1.13	.03	.06		159	.22	746	61	2.2	265	6.9
Oct. 21-31	4,020	23	.55	.33	1.72		1.10	.18	1.27	.03	.02		166	.23	925	66	2.6	285	7.4
Nov. 1-10	3,890	23	.55	.31	1.84		1.15	.17	1.33	.03	.02		171	.23	895	68	2.8	292	7.3
Nov. 11-26	6,970	23	.55	.28	1.58		1.08	.19	1.10	.03	.01		155	.21	1,460	66	2.5	253	7.8
Nov. 27-30, Dec. 1-3	13,820	20	.55	.35	2.40		1.02	.37	1.86	.03	.02		206	.28	3,870	73	3.6	355	7.8
Dec. 4-10	30,920	12	.40	.22	.99		.41	.42	.73	.03	.02		105	.14	4,330	61	1.8	181	7.2
Dec. 11-20	30,900	14	.39	.27	.97		.31	.56	.71	.03	.02		110	.15	4,640	60	1.7	184	6.9
Dec. 21-31	36,480	17	.48	.31	1.38		.28	.58	1.27	.03	.01		145	.20	7,300	64	2.2	251	6.9
Jan. 1-10, 1953..	76,500	15	.41	.25	1.05		.26	.48	.93	.03	.01		115	.16	12,240	61	1.8	196	6.9
Jan. 11-13, 25-29	104,100	11	.28	.21	.73		.21	.35	.62	.02	.02		82	.11	11,450	60	1.5	144	7.0
Jan. 14-24, 30-31	69,340	16	.44	.29	1.40		.23	.56	1.30	.02	.02		142	.19	13,170	66	2.3	247	7.1
Feb. 1-10	80,570	14	.41	.28	1.02		.28	.52	.87	.02	.02		114	.16	12,890	60	1.7	195	6.8
Feb. 11-23	144,000	14	.42	.27	.99		.29	.50	.85	.02	.02		113	.15	21,600	59	1.7	197	7.0
Feb. 24-28, Mar. 1-4.....	261,200	9.6	.23	.16	.54		.21	.29	.39	.02	.02		64	.09	23,510	58	1.2	104	6.9
Mar. 5-10.....	93,180	13	.37	.27	.82		.25	.50	.68	.02	.01		99	.13	12,110	56	1.4	167	7.0
Mar. 11-18.....	106,400	14	.41	.32	.90		.26	.54	.79	.03	.01		110	.15	15,960	55	1.5	195	7.0
Mar. 19-31.....	538,500	9.8	.23	.17	0.36	0.07	.21	.27	.28	.03	.01		58	.08	43,080	43	.8	91.9	6.5

NECHES RIVER BASIN--Continued

NECHES RIVER AT EVADALE, TEX.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953..	320,200	12	0.35	0.27	0.64		0.31	0.35	0.56	0.02	0.01		84	0.11	35,220	51	1.1	145	6.8
Apr. 11-16, 26-30	87,510	15	.44	.31	.93		.44	.42	.76	.02	.04		111	.15	13,130	55	1.5	189	7.2
Apr. 17-25.....	34,040	18	.55	.39	1.17		.59	.52	.96	.02	.02		139	.19	6,470	55	1.7	227	7.2
May 1-4, 23, 30-31.....	561,300	8.2	.25	.16	.46		.26	.19	.34	.02	.06		58	.08	44,900	53	1.0	108	6.7
May 5-12, 26-27..	935,800	6.1	.23	.12	0.20	--	.28	.12	.13	.02	.01		36	.05	46,790	36	.5	57.6	6.8
May 13-22, 24-25, 28-29.....	1,380,000	7.0	.21	.14	.23	--	.26	.15	.16	.01	.01		40	.05	69,000	40	.5	67.4	6.8
June 1-10.....	548,600	13	.34	.25	.34	.07	.39	.21	.34	.02	.02		69	.09	49,370	34	.6	102	6.5
June 11-20.....	92,010	15	.49	.33	.58		.66	.25	.45	.02	.02		92	.13	11,960	41	.9	147	6.6
June 21-30.....	25,790	15	.60	.37	.63		.79	.21	.56	.02	.02		101	.14	3,610	39	.9	171	6.9
July 1-10	46,000	20	.55	.38	.72		.82	.20	.59	.02	.02		110	.15	6,900	44	1.1	177	7.5
July 11-20.....	28,900	22	.60	.35	.85		.87	.21	.68	.02	.02		120	.16	4,620	47	1.2	197	7.1
July 21-31.....	64,720	20	.55	.31	.79		.75	.21	.65	.02	.02		111	.15	9,710	48	1.2	177	7.4
Aug. 1-10.....	47,270	20	.50	.31	.88		.61	.25	.79	.02	.02		114	.16	7,560	52	1.4	178	7.5
Aug. 11-20.....	30,390	18	.47	.29	.83		.57	.25	.73	.02	.02		107	.15	4,560	52	1.3	178	7.5
Aug. 21-31.....	42,470	18	.46	.27	.81		.59	.23	.68	.02	.02		104	.14	5,950	53	1.3	167	7.4
Sept. 1-10.....	27,630	23	.46	.25	.91		.70	.21	.68	.01	.02		113	.15	4,140	56	1.5	179	7.5
Sept. 11-20.....	20,690	29	.55	.30	1.07		.84	.21	.85	.01	.01		135	.18	3,720	56	1.6	211	7.5
Sept. 21-30.....	18,480	30	.50	.31	1.34		.88	.23	1.02	.01	.01		150	.20	3,700	62	2.1	234	7.8
Total or weighted average.....	5,919,000	10	0.29	0.20	0.48		0.31	0.23	0.37	0.02	0.02		66	0.09	532,700	49	1.0	109	--

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 & 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 to September 1953. Water temperatures: February 1950 to September 1951, April to September 1953.
EXTREMES, 1953.--Specific conductance: Maximum daily, 2,720 micromhos Sept. 29; minimum daily, 132 micromhos May 19. Percent sodium: Maximum, 80 Sept. 28-30; minimum, 25 May 23-31.
EXTREMES, 1945-50, 1953.--Specific conductance: Maximum daily, 2,720 micromhos Sept. 29; minimum daily, 103 micromhos Nov. 9, 1946. Percent sodium: Maximum, 80 Sept. 28-30, 1953; minimum, 23 June 11-20, 1946.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residues on evaporation and for concentrations more than 1,000 ppm are sums of 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 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, April to September 1953

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. 1-10, 26-29, 1953	89,730	13	2.50	0.57	3.24		2.18	1.37	2.68		0.08		383	0.52	46,660	51	2.6	677	7.6
Apr. 11-25	53,140	15	2.89	.68	4.58		2.46	1.67	3.92		.10		488	.66	35,070	56	3.4	875	7.7
Apr. 30, May 2-3, 14-22	946,700	9.6	.90	.22	.45		.93	.27	.34		.03		a95	.13	123,100	29	.6	168	7.4
May 1, 4-13	473,500	13	1.60	.30	.75		1.56	.52	.51		.06		a160	.22	104,200	28	.8	282	7.8
May 23-31	666,600	12	1.70	.28	.65		1.75	.50	.34		.04		a156	.21	140,000	25	.7	277	7.7
June 1-8	249,900	21	2.10	.40	1.06		2.23	.60	.71		.02		232	.32	79,970	30	.9	361	7.7
June 9-19	22,500	23	2.59	.45	1.87		2.69	.65	1.55		.02		317	.43	9,680	38	1.5	499	7.9
June 20-30	12,820	12	2.89	.59	3.01		2.79	.92	2.76		.02		402	.55	7,050	46	2.3	681	7.6
July 1-2, 6, 10-22	19,550	22	2.94	.57	3.74		2.84	.92	3.47		.02		450	.61	11,930	52	2.8	767	8.0
July 3-5, 7-9	6,790	22	2.30	.48	2.84		2.15	.87	2.57		.03		364	.50	3,400	51	2.4	601	7.9
July 23-31	15,290	20	3.34	.67	5.93		3.20	1.08	5.64		.02		616	.84	12,840	60	4.2	1,070	8.1

a Sum of determined constituents.

TRINITY RIVER BASIN--Continued

TRINITY RIVER AT ROMAYOR, TEX.--Continued

Chemical analyses, April to September 1953--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. 1-5, 23-31, 1953	16,260	24	2.79	0.58	7.33		3.33	1.64	5.70		0.03		663	0.90	14,630	69	5.6	1,140	8.2
Aug. 6-16, 21-22.	10,220	28	3.39	.67	10.15		3.82	1.77	8.60		.02		861	1.17	11,960	71	7.1	1,500	8.2
Aug. 17-20	2,720	23	3.89	.78	16.25		4.08	1.56	15.23		.05		1,220	1.66	4,520	78	11	2,250	8.0
Sept. 1-13	21,090	15	2.20	.49	5.07		2.26	1.21	4.26		.03		478	.65	13,710	65	4.4	813	7.8
Sept. 14-19	7,470	14	2.69	.60	9.31		3.20	2.37	6.99		.04		757	1.03	7,690	74	7.3	1,280	7.9
Sept. 20-27	4,930	10	3.19	.67	11.78		3.70	1.71	10.21		.02		915	1.24	6,110	75	8.5	1,600	8.1
Sept. 28-30	1,590	11	3.94	.90	19.39		3.93	1.81	18.47		.02		1,410	1.92	3,050	80	12	2,510	7.8
Total or weighted average	b 2,621,000	13	1.55	0.30	1.04		1.56	0.52	0.79		0.04		178	0.24	629,000	36	1.1	309	--

b Represents 66 percent of runoff for water year October 1952 to September 1953.

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SAN JACINTO RIVER BASIN

SAN JACINTO RIVER NEAR HUFFMAN, TEX.

LOCATION.--At Sheldon pumping plant of City of Houston, 5½ miles downstream from Huffman gaging station at Beaumont, Sour Lake and Western Railway bridge, 0.4 mile downstream from confluence of East and West Forks, and 3.4 miles southwest of Huffman, Harris County.
DRAINAGE AREA.--2,791 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: September 1945 to July 1948, December 1948 to September 1953.
Water temperatures: January 1949 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 780 micromhos Nov. 28; minimum daily, 85.1 micromhos May 1.
Percent sodium: Maximum, 75 Nov. 27-30; minimum, 36 May 8-10, 21-25.
EXTREMES, 1945-53.--Specific conductance: Maximum daily, 6,340 micromhos Nov. 23, 1951; minimum daily, 78.9 micromhos Sept. 1, 1945.
Percent sodium: Maximum, 79 Nov. 16, 18, 26, 1947; minimum, 18 June 3-10, 1950.
REMARKS.--Values reported for dissolved solids are sums of determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Huffman for water year October 1952 to September 1953 given in Water-Supply Paper 1282. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains.

Chemical anlayses, water year October 1952 to September 1953

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, 1952..	1,150	20	1.15	0.45	3.79		1.33	0.10	3.95		0.01		a 328	0.45	518	70	4.2	596	7.5
Oct. 11-20	1,070	16	1.20	.41	4.41		1.28	.10	4.63		.01		a 360	.49	524	73	4.9	678	7.4
Oct. 21-31	1,120	15	1.15	.45	4.08		1.18	.12	4.37		.01		a 344	.47	526	72	4.6	640	7.6
Nov. 1-8, 11	1,350	15	1.15	.39	4.08		1.16	.10	4.34		.02		a 343	.47	634	73	4.7	615	7.6
Nov. 9-10, 12-26	5,800	13	.75	.38	3.11		1.00	.15	3.07		.02		252	.34	1,970	73	4.1	469	7.4
Nov. 27-30.....	1,730	13	1.00	.47	4.31		.95	.14	4.68		.01		340	.46	796	75	5.0	646	7.4
Dec. 1-4, 21-22, 28-30	7,970	15	1.10	.40	3.46		.97	.16	3.81		.02		295	.40	3,190	70	4.0	565	7.3
Dec. 5-9, 23, 31.	14,660	9.6	.65	.25	1.27		.62	.11	1.41		.03		131	.18	2,640	58	1.9	257	7.2
Dec. 10-20, 24-27	6,990	15	.95	.35	2.12		.92	.17	2.31		.02		207	.28	1,960	62	2.6	387	7.2
Jan. 1-8, 26-27, 1953	23,980	11	.65	.25	1.33		.69	.13	1.38		.03		136	.18	4,320	60	2.0	246	7.2
Jan. 9-19, 28 ...	5,370	15	1.10	.35	2.28		1.05	.18	2.48		.02		222	.30	1,610	61	2.7	410	7.4
Jan. 20-25, 29-31	9,070	14	1.15	.37	2.89		1.08	.19	3.13		.01		260	.35	3,170	66	3.3	483	7.4
Feb. 1-2, 22-28 .	68,010	9.6	.75	.21	1.02		.72	.14	1.10		.02		119	.16	10,880	52	1.5	219	7.1
Feb. 3-4, 8-12, 17-20	11,700	15	1.10	.29	2.07		1.00	.18	2.26		.02		208	.28	3,280	60	2.5	380	7.4
Feb. 5-7, 13-16,21	12,140	15	1.20	.40	2.72		1.07	.18	3.05		.02		257	.35	4,250	63	3.0	481	7.3

a Residue at 180° C.

SAN JACINTO RIVER BASIN--Continued

SAN JACINTO RIVER NEAR HUFFMAN, TEX.--Continued

Chemical analyses, water year October 1952 to September 1953--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, 21, 1953	15,590	16	1.05	0.34	1.25		0.97	0.18	1.47		0.02		161	0.22	4,310	47	1.5	296	7.5
Mar. 10-19	12,530	19	1.35	.36	1.90		1.21	.18	2.20		.02		218	.30	3,760	53	2.1	404	7.5
Mar. 20, 22-31	7,890	18	1.45	.37	1.63		1.38	.16	1.89		.02		205	.28	2,210	47	1.7	384	7.7
Apr. 1-10	3,820	20	1.45	.38	2.34		1.39	.17	2.59		.02		251	.34	1,300	56	2.4	469	7.7
Apr. 11-24	4,040	17	1.55	.44	2.55		1.46	.14	2.93		.01		a 280	.38	1,540	56	2.6	510	7.7
Apr. 25-29	22,770	8.2	.42	.23	1.10		.48	.11	1.13		.03		106	.14	3,190	63	1.9	202	6.9
Apr. 30, May 1-7, 14-20	541,200	6.6	.44	.09	0.36	0.06	.46	.08	.34		.04		60	.08	43,300	38	.7	103	7.3
May 8-10, 21-25	120,500	9.4	.65	.20	.48		.69	.10	.51		.03		82	.11	13,260	36	.7	150	7.4
May 11-13, 26-31	27,210	14	1.00	.27	1.00		1.00	.17	1.07		.03		138	.19	5,170	44	1.3	250	7.1
June 1-10	7,020	23	1.35	.40	1.65		1.43	.19	1.75		.03		a 237	.32	2,250	49	1.8	361	7.7
June 11-20	5,890	23	1.30	.42	2.06		1.38	.18	2.20		.02		a 249	.34	2,000	54	2.2	406	7.9
June 21-28	3,040	24	1.35	.39	2.02		1.47	.15	2.12		.02		a 244	.33	1,000	54	2.2	402	8.0
June 29-30, July 1-5	9,800	11	.60	.21	.95		.72	.13	.87		.04		109	.15	1,470	54	1.5	188	7.4
July 6-10	2,000	18	.95	.33	1.97		1.05	.17	2.00		.03		198	.27	540	61	2.5	355	7.9
July 11-19	2,420	18	1.30	.39	2.44		1.38	.16	2.57		.02		a 268	.36	871	59	2.7	450	7.8
July 20-31	3,890	17	1.25	.41	2.62		1.36	.14	2.76		.02		a 274	.37	1,440	61	2.9	471	8.1
Aug. 1-2, 11-20	3,030	23	1.15	.21	2.64		1.29	.12	2.57		.02		a 259	.35	1,060	66	3.2	430	7.6
Aug. 3-10	2,240	19	.75	.39	1.66		.80	.09	1.89		.02		174	.24	538	59	2.2	313	7.4
Aug. 21-31	5,020	22	1.00	.25	2.74		1.08	.20	2.68		.03		a 273	.37	1,860	69	3.5	438	7.5
Sept. 1-4, 8-16	11,150	20	.90	.30	1.59		1.02	.14	1.58		.05		174	.24	2,680	57	2.1	306	7.4
Sept. 5-7, 24-30	4,700	22	1.10	.26	2.54		1.28	.12	2.48		.02		a 262	.36	1,690	65	3.1	423	7.5
Sept. 17-23	1,470	22	1.15	.26	2.15		1.28	.12	2.14		.02		220	.30	441	60	2.6	388	7.5
Total or weighted average	993,400	9.4	0.65	0.17	0.87		0.64	0.11	0.85		0.03		101	0.14	139,100	51	1.4	181	--

a Residue at 180° C.

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 & New Orleans Railroad bridge, and at mile 93.
DRAINAGE AREA.--44,050 square miles, approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1953.
Water temperatures: November 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,350 micromhos Oct. 2; minimum daily, 203 micromhos May 3.
Percent sodium: Maximum, 55 Oct. 11-20, Nov. 11-20; minimum, 19 May 1-10, 21-31.
EXTREMES, 1945-53.--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 are residues on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	2,820	17	4.14	1.56	6.00	0.13	3.54	2.35	6.04	0.01	0.02	0.13	739	1.01	2,850	51	3.6	1,210	8.2
Oct. 11-20	4,010	20	2.74	1.97	5.78	--	2.65	2.65	5.61	.01	.06	.36	636	.86	3,450	55	3.8	1,090	7.7
Oct. 21-31	5,640	21	3.44	2.06	5.74	--	3.56	2.27	5.50	.01	.07	.42	703	.96	5,410	51	3.5	1,140	7.6
Nov. 1-10.....	4,960	18	3.29	1.81	4.91	--	3.80	1.85	4.46	.02	.06	.29	607	.83	4,120	49	3.1	1,010	7.7
Nov. 11-20.....	6,010	21	2.10	1.64	4.65	--	2.65	1.64	3.98	.02	.03	.31	509	.69	4,150	55	3.4	857	7.9
Nov. 21-30.....	13,810	20	3.39	1.73	4.61	--	3.93	1.71	4.09	.02	.02	.17	585	.80	11,050	47	2.9	978	8.1
Dec. 1-3, 16, 21-22	37,620	13	2.30	.67	2.52	--	2.23	1.00	2.28	.02	.05	.18	348	.47	17,680	46	2.1	582	7.8
Dec. 4-12, 25-31.	133,900	9.8	1.70	.39	1.09	--	1.80	.52	.79	.03	.06	.21	200	.27	36,150	34	1.1	321	7.7
Dec. 13-15, 17-20, 23-24	58,510	13	2.10	.53	1.87	--	2.06	.81	1.52	.03	.05	.28	282	.38	22,230	42	1.6	459	7.8
Jan. 1-10, 1953..	196,700	11	1.55	.30	.74	.08	1.62	.44	.56	.03	.05	.25	a160	.22	43,270	28	.8	276	7.6
Jan. 11-20	53,200	13	1.60	.36	1.39	.10	1.69	.48	1.18	.03	.04	.32	a205	.29	15,430	40	1.4	351	7.6
Jan. 21-31	26,080	13	2.45	.58	1.70	.09	2.62	.83	1.41	.01	.04	.22	300	.41	10,690	35	1.4	496	7.7
Feb. 1-3, 5-6, 17-19	31,870	12	2.45	.64	1.83	.09	2.62	.92	1.52	.02	.02	.17	309	.42	13,390	37	1.5	513	7.7
Feb. 4, 7-16	34,330	13	1.80	.46	1.26	.08	1.93	.56	1.10	.02	.04	.22	230	.31	10,640	35	1.2	377	7.9
Feb. 20-25.....	26,540	14	2.50	.59	1.48	.09	2.41	.90	1.41	.02	.07	.11	301	.41	10,880	32	1.2	475	8.0

a Sum of determined constitutents.

BRAZOS RIVER BASIN--Continued

BRAZOS RIVER AT RICHMOND, TEX.--Continued

Chemical analyses, water year October 1952 to September 1953--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solide			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. 26-28, Mar. 1-7, 1953	57,280	13	1.70	0.41	0.96	0.09	1.74	0.46	0.93	0.02	0.03	0.12	229	0.31	17,760	30	0.9	325	7.8
Mar. 8-16	49,100	15	2.74	.79	1.70	.09	2.80	.98	1.52	.02	.06	.14	346	.47	23,080	32	1.3	530	8.0
Mar. 17-31	168,200	12	1.80	.49	1.09	.11	1.82	.54	1.07	.02	.06	.12	254	.35	58,870	31	1.0	357	7.7
Apr. 1-4, 26-29	29,990	11	1.85	.51	1.17	.11	2.00	.54	.99	.02	.05	.11	233	.32	9,600	32	1.1	372	7.9
Apr. 5-14, 30	36,790	10	2.45	.72	1.74	.10	2.46	1.04	1.38	.02	.04	.09	308	.42	15,450	35	1.4	501	7.8
Apr. 15-25	8,240	11	3.34	.99	2.22	.10	3.62	1.27	1.78	.02	.02	.10	394	.54	4,450	33	1.5	649	7.9
May 1-10	226,300	13	1.55	.37	.48	.10	1.64	.35	.34	.01	.06	.13	162	.22	49,790	19	.5	243	7.9
May 11-20	891,900	13	1.65	.37	.65	.09	1.70	.37	.56	.01	.07	.13	175	.24	214,100	24	.6	285	7.8
May 21-31	527,900	13	1.55	.43	.48	.10	1.72	.31	.39	.01	.06	.09	175	.24	126,700	19	.5	252	7.9
June 1-10	82,390	18	1.80	.51	.78	.13	2.13	.42	.68	.02	.03	.12	203	.28	23,070	24	.7	324	7.7
June 11-20	19,650	9.6	2.40	.78	1.26	.12	2.70	.77	1.10	.02	.04	.14	268	.36	7,070	28	1.0	456	7.6
June 21-30	11,780	12	2.59	.99	1.70	.12	3.08	.96	1.35	.02	.02	.19	317	.43	5,070	31	1.3	532	7.9
July 1-4, 7-12	25,760	14	2.50	.90	2.48	.14	2.56	1.19	2.23	.02	.02	.13	362	.49	12,620	41	1.9	645	8.2
July 5-6, 23-31	26,030	13	3.09	1.07	3.52	.15	2.92	1.52	3.36	.02	.02	.17	473	.64	16,660	45	2.4	815	8.2
July 13-22	9,340	15	2.79	.82	2.13	.14	3.08	.92	1.86	.02	.02	.11	346	.47	4,390	36	1.6	593	8.2
Aug. 1-17	13,370	18	2.50	1.15	3.57	.12	2.52	1.46	3.30	.02	.02	.18	441	.60	8,020	49	2.6	773	7.8
Aug. 18-24, 30-31	24,210	16	2.59	.99	3.04	.12	2.62	1.25	2.88	.02	.02	.17	402	.55	13,320	45	2.3	709	7.9
Aug. 25-29	11,660	13	3.29	1.15	4.65	.13	2.62	1.89	4.71	.02	.02	.15	558	.76	8,860	50	3.1	971	7.9
Sept. 1-2, 4, 11, 15, 17-23	37,310	16	2.30	.66	1.70	.10	2.41	.90	1.49	.02	.03	.16	284	.39	14,550	36	1.4	491	7.9
Sept. 3, 5-8, 12-14	51,070	18	1.80	.46	1.22	.10	1.92	.54	1.07	.02	.06	.08	227	.31	15,830	34	1.1	369	7.9
Sept. 9-10, 16, 24-30	27,580	18	2.69	.75	1.96	.11	2.97	.83	1.75	.02	.03	.18	324	.44	12,140	36	1.5	560	8.1
Total or weighted average	2,972,000	13	1.80	0.47	1.00	0.10	1.88	0.52	0.87	0.02	0.06	0.14	215	0.29	861,900	30	0.9	342	--

COLORADO RIVER BASIN

COLORADO RIVER AT AUSTIN, TEX.

LOCATION.--At raw-water intake of Austin City Water Plant, 4½ miles upstream from gaging station which is at Montopolis bridge on U. S. Highway 183 at southeast edge of Austin, Travis County, 2.8 miles upstream from Walnut Creek, 3.8 miles downstream from Waller Creek, 5 miles downstream from Barton Creek, and at mile 290.
DRAINAGE AREA.--38,160 square miles, approximately, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1953.
Water temperatures: October 1947 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 448 micromhos Feb. 17, 18; minimum daily, 294 micromhos Apr. 29.
Percent sodium: Maximum, 25 Oct. 1-31; minimum, 17 Sept. 1-30.
EXTREMES, 1947-53.--Specific conductance: Maximum daily, 591 micromhos July 1, 1948; minimum daily, 294 micromhos Apr. 29, 1953.
Percent sodium: Maximum, 46 Nov. 1-30, 1951; minimum, 17 Sept. 1-30, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1952 to September 1953

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, 1952	17,470	12	2.25	1.07	1.08		2.92	0.42	0.99	0.02	0.05		250	0.34	5,940	25	0.8	431	8.2
Nov. 1-30	25,480	10	2.20	.99	.99		2.80	.42	.90	.02	.04		236	.32	8,150	24	.8	411	7.9
Dec. 1-31	18,520	9.6	2.30	1.07	.89		2.88	.46	.85	.02	.05		232	.32	5,930	21	.7	417	7.9
Jan. 1-31, 1953	48,020	9.8	2.35	.99	.82		2.88	.40	.79	.02	.07		242	.33	15,850	20	.6	400	7.9
Feb. 1-28	54,580	10	2.15	.90	.73		2.59	.31	.79	.02	.07		230	.31	16,920	19	.6	383	7.9
Mar. 1-31	16,700	9.4	2.30	1.07	.81		2.90	.42	.79	.01	.06		232	.32	5,340	19	.6	394	8.1
Apr. 1-30	57,730	10	2.15	.99	.83		2.69	.40	.82	.01	.05		216	.29	16,740	21	.7	387	7.8
May 1-31	84,460	11	2.15	.90	.74		2.64	.35	.73	.02	.05		226	.31	26,180	20	.6	385	7.9
June 1-30	118,100	11	2.05	.82	.90		2.59	.35	.76	.02	.05		223	.30	35,430	24	.8	370	7.9
July 1-31	116,400	10	2.10	.90	.79		2.64	.35	.73	.02	.05		214	.29	33,760	21	.6	379	7.9
Aug. 1-31	80,370	9.8	2.10	.82	.86		2.65	.35	.73	.02	.03		219	.30	24,110	23	.7	376	7.9
Sept. 1-30	29,170	15	2.30	.99	.67		2.92	.31	.68	.01	.04		231	.31	9,040	17	.5	378	8.1
Total or weighted average	667,000	11	2.15	0.90	0.83		2.69	0.35	0.76	0.02	0.05		225	0.31	206,800	21	0.7	384	--

COLORADO RIVER BASIN--Continued

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 & New Orleans Railroad bridge, 12 miles upstream from Jones Creek and at mile 67.
DRAINAGE AREA.--41,150 square miles, approximately, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: April 1944 to September 1953.
Water temperatures: October 1945 to September 1948, March 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 721 micromhos Oct. 3; minimum daily, 211 micromhos Nov. 25.
Percent sodium: Maximum, 31 Jan. 1-31; minimum, 18 Nov. 1-30.
EXTREMES, 1944-53.--Specific conductance: Maximum daily, 721 micromhos Oct. 3, 1952; minimum daily, 186 micromhos Feb. 27-28, 1949.
Percent sodium: Maximum, 43 Nov. 1-30, 1951; minimum, 7 Jan. 19-24. 1945.
REMARKS.--Values reported for dissolved solids concentrations are residues on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952 .	23,580	9.0	2.74	1.48	1.83	--	3.74	0.71	1.52	1.52	0.02	0.11	331	0.45	10,610	30	1.3	579	7.7
Nov. 1-30.....	39,230	8.4	1.55	.49	.43	--	1.66	.40	.31	.02	.06	.10	170	.23	9,020	18	.4	251	7.7
Dec. 1-31	114,600	11	1.80	.49	.74	--	1.85	.73	.37	.03	.05	.27	192	.26	29,800	24	.7	302	7.5
Jan. 1-31, 1953 ..	85,540	5.0	2.00	.99	1.35	--	2.64	.62	.99	.02	.03	.25	243	.33	28,230	31	1.1	421	7.8
Feb. 1-28.....	102,500	6.5	1.90	.78	1.00	0.05	2.29	.58	.87	.01	.04	.13	226	.31	31,780	27	.9	379	7.7
Mar. 1-31.....	46,060	5.0	2.10	.99	1.13	.10	2.69	.65	1.04	.02	.02	.05	240	.33	15,200	26	.9	440	7.9
Apr. 1-30	71,550	13	2.05	.90	.96	.10	2.59	.50	.90	.02	.06	.09	236	.32	22,900	24	.8	406	8.1
May 1-31	236,700	15	1.85	.46	.61	.10	2.15	.29	.48	.02	.04	.04	189	.26	61,540	20	.6	298	8.1
June 1-30	56,500	12	1.95	.76	.78	.12	2.43	.37	.82	.02	.02	.14	214	.29	16,380	22	.7	365	8.0
July 1-31.....	71,420	12	2.00	.90	.87	.10	2.65	.37	.82	.02	.02	.13	220	.30	21,430	22	.7	395	7.9
Aug. 1-31.....	54,070	10	1.65	.58	.61	.16	2.11	.25	.62	.02	.03	.05	176	.24	12,980	20	.6	300	7.8
Sept. 1-30.....	72,010	16	2.10	.77	.74	.10	2.62	.37	.62	.02	.03	.07	a209	.28	20,160	20	.6	359	7.9
Total or weighted average.....	973,800	11	1.90	0.71	0.83	0.10	2.33	0.46	0.71	0.02	0.04	0.12	211	0.29	282,400	23	0.7	353	--

a Sum of 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 & New Orleans Railroad bridge, 10 miles upstream from Coleto Creek, and at mile 51.
DRAINAGE AREA.--5,311 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1948 to September 1953.
Water temperatures: November 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,350 micromhos July 15; minimum daily, 201 micromhos Sept. 1.
Percent sodium: Maximum, 52 July 14-17, 28-30; minimum, 19 Sept. 11-20.
EXTREMES, 1945-46, 1948-53.--Specific conductance: Maximum daily, 1,950 micromhos Jan. 11-17, 1946; minimum daily, 201 micromhos Sept. 1, 1953.
Percent sodium: Maximum, 67 July 23-24, 1950; minimum, 18 May 22-29, 1950.
REMARKS.--Values reported for dissolved solids concentrations are residues on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952 ..	18,050	19	3.69	1.32	1.39	0.08	4.20	0.67	1.61	0.02	0.07	0.16	394	0.54	9,750	21	0.9	627	7.8
Oct. 11-20.....	13,230	15	3.04	1.73	1.74	--	3.56	.75	1.97	.01	.10	.23	394	.54	7,140	27	1.1	643	7.9
Oct. 21-31.....	12,160	17	2.50	1.73	1.87	--	3.16	.75	1.97	.02	.09	.25	371	.50	6,080	31	1.3	632	7.8
Nov. 1-10.....	10,150	14	3.59	1.81	2.13	--	4.20	.79	2.37	.01	.07	.15	446	.61	6,190	28	1.3	722	7.5
Nov. 11-20	9,980	20	2.45	1.48	2.04	--	3.20	.71	2.03	.02	.07	.28	363	.49	4,890	34	1.5	601	7.9
Nov. 21-29.....	29,910	17	2.64	1.15	1.87	--	3.31	.60	1.72	.02	.06	.22	333	.45	13,460	33	1.4	551	7.9
Nov. 30, Dec. 1, 3-6, 25-29.....	54,380	13	1.85	.57	.83	--	1.92	.44	.85	.03	.05	.17	a189	.26	14,140	26	.8	346	7.8
Dec. 2, 7-9, 23-24, 30-31.....	39,210	17	2.64	.81	1.74	--	2.82	.60	1.69	.03	.06	.24	a299	.41	16,080	34	1.3	524	8.0
Dec. 10-22.....	29,550	18	3.49	1.40	2.00	--	3.97	.79	2.14	.02	.06	.08	a388	.53	15,660	29	1.3	684	8.1
Jan. 1, 7-20, 1953	44,500	19	3.09	1.32	1.60	.04	3.59	.69	1.64	.01	.07	.22	364	.50	22,250	26	1.1	580	7.9
Jan. 2-6.....	37,630	12	1.80	.57	1.00	.09	1.93	.44	1.04	.03	.05	.32	219	.30	11,290	29	.9	360	7.8
Jan. 21-31.....	19,440	14	3.29	1.56	1.91	.04	3.87	.79	2.17	.01	.07	.26	a380	.52	10,110	28	1.2	676	8.0
Feb. 1-10.....	16,260	13	3.24	1.56	1.65	.06	4.03	.75	1.75	.01	.08	.20	a361	.49	7,970	25	1.1	634	7.8
Feb. 11-19	11,820	14	2.20	1.73	2.09	.07	2.56	.85	2.62	.01	.07	.23	361	.49	5,790	34	1.5	649	8.2
Feb. 20-28.....	16,720	11	2.94	1.73	2.13	.07	3.51	.83	2.45	.02	.07	.10	399	.54	9,030	31	1.4	692	8.2

a Sum of determined constutuents.

GUADALUPE RIVER BASIN--Continued

GUADALUPE RIVER AT VICTORIA, TEX.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953 .	13,970	13	3.19	1.56	2.17	0.08	3.56	0.85	2.59	0.02	0.06	0.11	418	0.57	7,960	31	1.4	704	8.2
Mar. 11-20	13,110	11	2.94	1.81	2.35	.08	3.54	.81	2.82	.02	.06	.25	423	.58	7,600	33	1.5	741	8.2
Mar. 21-31	12,910	25	3.19	1.81	2.48	--	3.80	.83	2.79	.02	.05	.18	454	.62	8,000	33	1.6	806	7.9
Apr. 1-10.....	11,360	18	3.09	1.73	2.09	--	3.83	.77	2.26	.02	.06	.21	417	.57	6,480	30	1.3	695	8.0
Apr. 11-20.....	10,730	34	3.14	1.81	2.57	--	3.74	.83	2.96	.02	.02	.33	476	.65	6,970	34	1.6	766	8.0
Apr. 21-30.....	21,400	20	2.74	1.81	2.57	.09	3.31	.77	3.16	.01	.06	.21	436	.59	12,630	36	1.7	753	8.2
May 1, 10-11, 13-17, 30.....	35,550	21	3.29	1.23	2.26	.12	3.47	.73	2.71	.02	.06	.25	430	.58	20,620	33	1.5	716	8.1
May 2, 8-9, 12, 23-25, 27-29, 31 ...	34,070	21	2.40	1.90	1.52	.13	2.64	.58	1.58	.02	.05	.16	310	.42	14,310	31	1.0	502	8.1
May 3-7, 18-22, 26	87,230	16	1.90	.49	.83	.12	2.05	.40	.79	.02	.06	.29	220	.30	26,170	25	.8	343	8.1
June 1-12.....	9,750	23	2.84	1.48	2.17	.13	3.51	.69	2.40	.02	.02	.17	392	.53	5,170	33	1.5	671	7.8
June 13-20.....	4,780	18	3.09	1.81	3.13	.13	3.67	.85	3.50	.02	.02	.24	471	.64	3,060	38	2.0	820	7.8
June 21-30	5,490	16	2.79	1.73	2.87	.12	3.47	.83	3.24	.02	.02	.22	445	.61	3,350	38	1.9	772	7.8
July 1-6, 13, 18, 20-24, 26-27, 31..	11,550	21	2.40	1.64	3.35	.12	2.87	.90	3.67	.02	.03	.27	445	.61	7,050	45	2.4	789	7.9
July 7-12, 19, 25..	4,360	22	1.95	1.56	2.78	.10	2.61	.83	2.88	.02	.03	.23	375	.51	2,220	44	2.1	668	7.8
July 14-17, 28-30.	3,730	20	2.79	1.89	5.17	.15	2.61	1.12	6.35	.02	.03	.32	606	.82	3,060	52	3.4	1,080	7.9
Aug. 1-10.....	5,050	30	1.70	1.81	3.30	.10	2.51	.87	3.44	.02	.01	.24	a406	.55	2,780	48	2.5	706	7.9
Aug. 11-19	2,970	30	2.25	1.73	2.87	.09	3.16	.79	2.82	.03	.01	.20	a400	.54	1,600	41	2.0	681	8.0
Aug. 20-30.....	16,330	23	2.20	1.48	2.35	.09	3.08	.69	2.43	.02	.01	.19	a355	.48	7,840	38	1.7	615	8.0
Aug. 31, Sept. 1-10	81,600	16	1.75	.53	.78	.10	2.10	.37	.62	.02	.05	.14	187	.25	20,400	25	.7	313	7.8
Sept. 11-20	16,610	18	2.45	.82	.78	.09	3.06	.40	.68	.02	.05	.08	a237	.32	5,320	19	.6	396	8.1
Sept. 21-30	10,230	18	2.69	1.15	1.22	.09	3.43	.46	1.16	.02	.06	.11	a288	.39	3,990	24	.9	483	8.0
Total or weighted average	777,400	17	2.54	1.15	1.61	0.09	2.93	0.60	1.72	0.02	0.06	0.21	319	0.43	334,300	30	1.2	538	--

a Sum of 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 U. S. Highway 59, 200 feet downstream from Texas & 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 1953.
Water temperatures: October 1947 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 894 micromhos May 16; minimum daily, 250 micromhos Sept. 9.
Percent sodium: Maximum, 63 May 1-20; minimum, 24 Sept. 1-30.
EXTREMES, 1947-53.--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, 24 Sept. 1-30, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952	3,400	22	2.10	0.33	2.17	--	2.87	0.60	1.02	0.02	0.02	0.24	274	0.37	1,260	47	2.0	446	7.6
Nov. 1-30	2,710	18	2.20	.44	2.04	--	3.00	.65	1.07	.02	.02	.37	286	.39	1,060	44	1.8	468	7.8
Dec. 1-31	2,710	26	2.30	.39	2.17	0.16	a 3.24	.67	1.16	.02	.02	.43	319	.43	1,170	43	1.9	492	8.4
Jan. 1-31, 1953	3,150	22	2.40	.42	2.39	.16	3.31	.75	1.33	.02	.01	.62	332	.45	1,420	45	2.0	522	7.9
Feb. 1-28	2,570	22	2.54	.41	3.00	.17	3.59	.83	1.75	.02	.00	.65	b 365	.50	1,280	49	2.5	600	8.1
Mar. 1-31	3,250	20	2.69	.62	3.57	.19	3.92	1.00	2.14	.02	.01	.41	414	.56	1,820	50	2.8	699	7.9
Apr. 1-30	4,170	23	2.59	.59	5.17	.19	4.33	1.17	2.90	.02	.01	.33	b 499	.68	2,840	61	4.1	852	8.1
May 1-20	21,060	22	2.40	.49	5.22	.19	4.05	1.21	3.16	.02	.02	.51	530	.72	15,160	63	4.3	880	8.2
May 21-31	60,090	16	1.65	.25	1.74	.14	2.10	.71	.85	.02	.05	.18	250	.34	20,430	46	1.8	385	7.6
June 1-30	4,370	25	1.90	.33	2.00	.18	2.65	.75	.90	.03	.02	.24	280	.38	1,660	45	1.9	436	8.2
July 1-31	5,070	27	2.30	.43	2.35	.18	c 3.31	.79	1.04	.03	.01	.23	326	.44	2,230	45	2.0	512	8.4
Aug. 1-31	23,720	40	2.59	.43	2.87	.17	d 3.71	.87	1.44	.03	.02	.41	377	.51	12,100	47	2.3	579	8.3
Sept. 1-30	400,200	20	2.00	.33	.78	.09	2.43	.42	.28	.02	.03	.15	207	.28	112,100	24	.7	311	8.0
Total or weighted average	536,500	21	2.00	0.34	1.26	0.11	2.56	0.52	0.59	0.02	0.03	0.19	240	0.33	177,000	34	1.2	368	--

a Includes 0.03 equivalent per million of carbonate (CO_3).
b Sum of determined constituents.
c Includes 0.13 equivalent per million of carbonate (CO_3).
d Includes 0.17 equivalent per million of carbonate (CO_3).

RIO GRANDE BASIN

RIO GRANDE ABOVE CULEBRA CREEK NEAR LOBATOS, COLO.

LOCATION.--Half a mile southeast of La Sauses, 7 miles upstream from Culebra Creek, and 15 miles upsteam from gaging station near Lobatos, Conejos County, Colorado.
DRAINAGE AREA.--7,700 square miles 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 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 966 micromhos June 27; minimum daily, 178 micromhos May 6.
Percent sodium: Maximum, 45 Sept. 21-30; minimum, 23 May 2-10.
EXTREMES, 1946-53.--Specific conductance: Maximum daily, 1,070 micromhos July 26, 1948; minimum daily, 122 micromhos June 1, 1949.
Percent sodium: Maximum, 46 Oct. 11-20, 1946, Aug. 1-10, 1951; minimum, 16 Dec 1, 3-10, 1946.
REMARKS.--Values reported for dissolved solids are residues on evaporation. 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 1952 to September 1953 given in Water-Supply Paper 1282. Culebra Creek which enters Rio Grande between sampling point and gaging station is usually dry at mouth. Inflow from other sources between sampling point and gaging station occurs only at times of heavy local rainfall.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	2,950	33	2.20	0.82	1.52	0.13	2.39	1.89	0.31	0.03	0.01	0.10	304	0.41	1,210	32	1.2	448	7.6
Oct. 11-18	1,850	--	2.69	.99	1.83	--	--	--	--	--	--	--	366	.50	925	33	1.3	533	--
Oct. 19-21	678	--	1.70	.61	.96	--	--	--	--	--	--	--	229	.31	210	29	.9	328	--
Oct. 22-31	2,160	--	2.59	.90	1.91	--	--	--	--	--	--	--	360	.49	1,060	35	1.4	526	--
Nov. 1-8	1,860	--	2.50	.90	1.74	--	--	--	--	--	--	--	344	.47	874	34	1.3	499	--
Nov. 9-20.....	4,730	--	1.80	.62	1.00	--	--	--	--	--	--	--	235	.32	1,510	29	.9	342	--
Nov. 21-30.....	5,670	--	2.00	.71	1.13	--	--	--	--	--	--	--	268	.36	2,040	29	1.0	383	--
Dec. 1-10	5,600	--	2.05	.70	1.13	--	--	--	--	--	--	--	270	.37	2,070	29	1.0	385	--
Dec. 11-20.....	6,210	--	1.85	.58	.91	--	--	--	--	--	--	--	230	.31	1,930	27	.8	330	--
Dec. 21-31.....	6,700	--	1.60	.47	.65	--	--	--	--	--	--	--	192	.26	1,740	24	.6	277	--
Jan. 1-10, 1953..	6,110	32	1.45	.49	.83	.12	1.67	1.04	.18	.02	.00	.10	214	.29	1,770	29	.8	294	7.3
Jan. 11-20	6,730	--	1.45	.46	.70	--	--	--	--	--	--	--	181	.25	1,680	27	.7	262	--
Jan. 21-31	7,810	--	1.50	.49	.70	--	--	--	--	--	--	--	183	.25	1,950	26	.7	266	--
Feb. 1-10.....	7,870	--	1.50	.46	.70	--	--	--	--	--	--	--	192	.26	2,050	26	.7	274	--
Feb. 11-20.....	6,340	--	1.55	.41	.70	--	--	--	--	--	--	--	192	.26	1,650	26	.7	272	--
Feb. 21-28.....	4,600	---	1.50	.37	.70	--	--	--	--	--	--	--	188	.26	1,200	27	.7	269	--

Mar. 1-10, 1953..	5,350	--	1.50	0.41	0.70	--	--	--	--	--	--	--	189	0.26	1,390	27	0.7	271	--
Mar. 11-20.....	4,230	--	2.30	.65	1.35	--	--	--	--	--	--	--	296	.40	1,690	31	1.1	436	--
Mar. 21-31.....	4,180	--	2.10	.60	1.17	--	--	--	--	--	--	--	275	.37	1,550	30	1.0	399	--
Apr. 1-10	3,920	32	2.50	.90	1.70	0.14	2.62	2.10	0.37	0.03	0.02	0.08	341	.46	1,800	32	1.3	499	7.4
Apr. 11-20.....	2,790	--	2.10	.80	1.30	--	--	--	--	--	--	--	192	.26	725	31	1.1	405	--
Apr. 21-22, 24, 26-27, 29-30....	3,870	--	1.15	.56	.57	--	--	--	--	--	--	--	164	.22	851	25	.6	218	--
Apr. 23, 25, 28, May 1	2,400	--	2.40	.82	1.52	--	--	--	--	--	--	--	316	.43	1,030	32	1.2	453	--
May 2-10	2,160	--	1.15	.44	.48	--	--	--	--	--	--	--	154	.21	454	23	.5	210	--
May 11-19.....	1,800	--	1.95	.72	1.17	--	--	--	--	--	--	--	297	.40	720	30	1.0	378	--
May 20	256	--	2.59	1.07	2.17	--	--	--	--	--	--	--	404	.55	141	37	1.6	561	--
May 21-31.....	6,180	--	1.40	.52	.83	--	--	--	--	--	--	--	202	.27	1,670	30	.8	280	--
June 1-6	3,130	--	1.90	.68	1.09	--	--	--	--	--	--	--	215	.29	908	30	1.0	359	--
June 7-8	633	--	3.24	1.23	2.00	--	--	--	--	--	--	--	429	.58	367	31	1.3	592	--
June 9-14	1,360	--	4.94	1.97	3.22	--	--	--	--	--	--	--	684	.93	1,260	32	1.7	932	--
June 15-24	6,130	--	2.30	.90	1.52	--	--	--	--	--	--	--	320	.44	2,700	32	1.2	458	--
June 25-30	1,390	--	4.39	1.97	3.22	--	--	--	--	--	--	--	625	.85	1,180	34	1.8	866	--
July 1-10	914	35	3.34	1.40	3.04	.22	3.23	4.12	.59	.05	.02	.26	531	.72	658	38	2.0	751	7.6
July 11-19.....	744	--	1.60	.58	.96	--	--	--	--	--	--	--	217	.30	223	31	.9	303	--
July 20-21, 27-31 .	791	--	2.89	1.15	2.65	--	--	--	--	--	--	--	432	.59	467	40	1.9	623	--
July 22-26	791	--	1.50	.52	1.00	--	--	--	--	--	--	--	216	.29	229	33	1.0	296	--
Aug. 1-2, 4-10 ...	436	--	1.75	.61	1.17	--	--	--	--	--	--	--	255	.35	153	33	1.1	352	--
Aug. 3	75	--	3.19	1.32	3.00	--	--	--	--	--	--	--	488	.66	50	40	2.0	711	--
Aug. 11-20.....	399	--	2.00	.62	1.39	--	--	--	--	--	--	--	272	.37	148	35	1.2	393	--
Aug. 21-31	946	--	2.00	.74	1.91	--	--	--	--	--	--	--	295	.40	378	41	1.6	421	--
Sept. 1-10	605	--	2.00	.70	2.04	--	--	--	--	--	--	--	306	.42	254	43	1.8	440	--
Sept. 11-20	641	--	1.70	.62	1.74	--	--	--	--	--	--	--	278	.38	244	43	1.6	399	--
Sept. 21-30	541	--	1.70	.65	1.91	--	--	--	--	--	--	--	280	.38	206	45	1.8	404	--
Weighted average	134,600	--	1.90	0.64	1.09	--	--	--	--	--	--	--	248	0.34	45,760	30	1.0	358	--

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

LOCATION.--At gaging station 400 feet downstream from bridge on State Highway 4, 1¾ miles southwest of San Ildefonso Pueblo, San Ildefonso Pueblo Grant, 2½ miles downstream from Rio Pojoaque, 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 1953.
Water temperatures: October 1948 to September 1953.
Sediment Records: October 1947 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 876 micromhos July 31; minimum daily, 201 micromhos June 3, 5.
Percent sodium: Maximum, 32 Sept. 11-20, 21-30; minimum, 17 June 11-20.
EXTREMES, 1946-53.--Specific conductance: Maximum daily, 1,230 micromhos Aug. 26, 1951; minimum daily, 165 micromhos June 13, 1952.
Percent sodium: Maximum, 32 Sept. 11-18, 22-30, 1947, Oct. 1-10, 11-20, 1951, Sept. 11-20, 21-30, 1953; minimum, 14 June 11-20, 1949, May 11-20, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952.	8,600	28	2.30	0.78	1.26	--	2.62	1.52	0.28	--	0.01		275	0.37	3,180	29	1.0	428	7.9
Oct. 11-20.....	7,650	25	2.25	.79	1.30	--	2.65	1.52	.34	--	.01		275	.37	2,830	30	1.1	427	8.0
Oct. 21-31	8,460	27	2.35	.80	1.35	--	2.69	1.60	.34	--	.00		285	.39	3,300	30	1.1	443	7.9
Nov. 1-10	8,210	27	2.50	.90	1.43	--	2.70	1.77	.34	--	.00		300	.41	3,370	30	1.1	462	7.9
Nov. 11-20	10,430	28	2.45	.99	1.57	--	2.77	1.94	.39	--	.01		316	.43	4,480	31	1.2	484	7.9
Nov. 21-30	11,620	32	2.30	.82	1.30	0.08	2.56	1.64	.28	0.03	.07		289	.39	4,530	29	1.0	432	7.9
Dec. 1-10	12,950	32	2.15	.76	1.13	.08	2.51	1.35	.28	.03	.02		265	.36	4,660	27	.9	396	7.8
Dec. 11-20	13,500	31	1.85	.72	1.00	--	2.39	.98	.27	--	.02		230	.31	4,180	28	.9	355	7.8
Dec. 21-31	13,850	29	1.85	.65	.91	--	2.31	.94	.28	--	.02		221	.30	4,160	27	.8	339	7.9
Jan. 1-10, 1953.	12,570	31	1.85	.65	.96	--	2.39	.96	.23	--	.02		225	.31	3,900	28	.9	346	7.9
Jan. 11-20.....	13,850	32	1.90	.62	.91	--	2.29	.92	.24	--	.02		222	.30	4,160	27	.8	331	7.7
Jan. 21-31.....	15,660	30	1.85	.62	.91	--	2.20	.94	.23	--	.03		216	.29	4,540	27	.8	331	7.7
Feb. 1-10	15,090	33	1.90	.64	.96	--	2.26	1.02	.25	--	.03		228	.31	4,680	27	.9	341	7.6
Feb. 11-18	11,780	30	1.85	.65	.96	--	2.23	1.02	.25	--	.02		223	.30	3,530	28	.9	340	7.9
Feb. 19-28	20,460	26	2.45	1.23	1.30	--	2.38	2.54	.22	--	.03		322	.44	9,000	26	1.0	494	7.9
Mar. 1-10	23,460	26	2.20	.82	1.00	--	2.31	1.56	.17	--	.03		255	.35	8,210	25	.8	393	7.7
Mar. 11-20	19,570	25	2.50	.90	1.26	--	2.44	2.06	.21	--	.02		296	.40	7,830	27	1.0	452	7.8
Mar. 21-31	15,790	24	2.45	.99	1.26	--	2.52	1.87	.25	--	.02		290	.39	6,160	27	1.0	446	7.6

Apr. 1-10, 1953.	16,080	25	2.25	0.90	1.09	--	2.49	1.52	0.23	--	0.02		263	0.36	5,790	26	0.9	407	7.8
Apr. 11-20	14,300	23	2.35	.90	1.17	--	2.52	1.58	.27	--	.01		270	.37	5,290	26	.9	423	7.8
Apr. 21-30	31,230	18	2.10	.65	.65	--	2.29	.90	.16	--	.03		202	.27	8,430	19	.6	323	7.7
May 1-10	17,800	20	1.90	.65	.78	--	2.20	1.00	.19	--	.01		206	.28	4,980	23	.7	321	7.3
May 11-20	13,560	21	2.05	.76	1.09	--	2.33	1.29	.25	--	.01		238	.32	4,340	28	.9	380	7.6
May 21-31	35,040	18	1.90	.58	.74	--	2.00	1.00	.20	--	.01		196	.27	9,460	23	.7	309	7.4
June 1-10	48,410	17	1.40	.43	.41	--	1.64	.60	.09	--	.01		141	.19	9,200	18	.4	220	7.7
June 11-20	39,050	20	1.80	.54	.48	--	1.87	.79	.14	--	.01		173	.24	9,370	17	.4	269	7.5
June 21-30	27,790	22	2.10	.71	.91	--	2.11	1.46	.23	--	.01		235	.32	8,890	24	.8	365	7.4
July 1-10	8,440	25	2.30	.82	1.17	--	2.43	1.73	.27	--	.01		274	.37	3,120	27	.9	421	7.6
July 11-20	8,270	29	2.54	.82	1.48	--	3.06	1.58	.28	--	.01		303	.41	3,390	31	1.1	467	7.5
July 21-30	7,600	29	2.54	.82	1.39	--	2.87	1.67	.28	--	.02		299	.41	3,120	29	1.1	461	7.5
July 31	1,200	25	6.39	1.56	2.00	--	3.39	6.25	.23	--	.01		628	.85	1,020	20	1.0	876	--
Aug. 1-10	6,170	25	2.69	.82	1.43	--	2.85	1.96	.28	--	.01		313	.43	2,650	29	1.1	482	7.6
Aug. 11-20	10,690	23	3.04	.99	1.22	--	3.11	1.92	.27	--	.03		320	.44	4,700	23	.9	494	--
Aug. 21-31.....	7,960	27	2.35	.90	1.22	--	2.77	1.42	.25	--	.01		274	.37	2,950	27	1.0	420	7.5
Sept. 1-10	3,980	27	1.95	.74	1.22	--	2.69	.92	.28	--	.01		239	.33	1,310	31	1.1	368	7.6
Sept. 11-20	3,780	28	1.85	.63	1.17	--	2.72	.81	.24	--	.01		230	.31	1,170	32	1.1	363	8.0
Sept. 21-30	3,600	31	1.90	.63	1.17	--	2.75	.81	.24	--	.01		235	.32	1,150	32	1.0	368	7.9
Weighted average	548,600	24	2.10	0.73	0.96	--	2.31	1.29	0.22	--	0.02		237	0.32	175,500	25	0.8	367	--

RIO GRANDE RIVER BASIN--Continued

RIO GRANDE TIFFANY CHANNEL AT SAN MARCIAL, N MEX.

LOCATION.--At water-stage recorder at Atchison, Topeka, and Santa Fe Railway bridge at Tiffany Channel, 3 miles northeast of San Marcial, Socorro County. Tiffany Channel is a bypass channel carrying water around the main channel gaging station at San Marcial.
RECORDS AVAILABLE.--Chemical analyses: April 1950 to September 1953.
Water temperatures: October 1950 to September 1953.
Sediment records: April 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 2,990 micromhos June 19; minimum daily, 913 micromhos Dec. 1.
Percent sodium: Maximum, 60 Aug. 11-20; minimum, 38 July 21-31.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 2,990 micromhos June 19, 1953; minimum daily, 294 micromhos June 12, 1952.
Percent sodium: Maximum, 63 May 1-10, 1951; minimum, 29 June 11-20, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 furnished by Santa Fe district office of Surface Water Branch; records for composite of Tiffany Channel and main channel given under Rio Grande at San Marcial in Water-Supply Paper 1282. Chemical analyses for Rio Grande at San Marcial given on page 104.

Chemical analyses, water year October 1952 to September 1953

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, 1952	524	40	4.19	1.40	7.57	0.19	4.23	5.12	4.20	0.03	0.00	0.32	865	1.18	618	57	4.5	1,320	7.8
Oct. 11-20.....	470	--	4.39	1.64	8.09	--	--	--	--	--	--	--	868	1.18	555	57	4.7	1,380	--
Oct. 21-31.....	557	--	4.39	1.64	8.26	--	--	--	--	--	--	--	873	1.19	663	58	4.8	1,390	--
Nov. 1-10	325	--	4.79	1.73	8.48	--	--	--	--	--	--	--	920	1.25	406	57	4.7	1,450	--
Nov. 11-20.....	256	--	4.79	1.73	7.91	--	--	--	--	--	--	--	878	1.19	305	55	4.4	1,380	--
Nov. 21-30.....	297	--	4.89	1.73	8.61	--	--	--	--	--	--	--	944	1.28	380	57	4.7	1,470	--
Dec. 1-10	1,130	--	4.29	1.32	4.96	--	--	--	--	--	--	--	645	.88	994	47	3.0	1,010	--
Dec. 11-20.....	1,080	--	4.29	1.56	6.96	--	--	--	--	--	--	--	787	1.07	1,160	54	4.1	1,250	--
Dec. 21-31	1,310	--	4.69	1.73	7.91	--	--	--	--	--	--	--	902	1.23	1,610	55	4.4	1,370	--
Jan. 1-10, 1953	1,740	31	4.59	1.64	8.00	20	4.57	5.68	4.76	.03	.00	.29	908	1.23	2,140	55	4.5	1,390	7.9
Jan. 11-20.....	1,190	--	4.79	1.81	8.26	--	--	--	--	--	--	--	925	1.26	1,500	56	4.5	1,410	--
Jan. 21-31.....	1,690	--	4.54	1.73	8.00	--	--	--	--	--	--	--	890	1.21	2,040	56	4.5	1,370	--
Feb. 1-9	1,280	--	5.04	1.48	8.26	--	--	--	--	--	--	--	887	1.21	1,550	56	4.6	1,380	--
Feb. 10-28	11	--	7.24	2.96	7.91	--	--	--	--	--	--	--	1,070	1.46	16	44	3.5	1,620	--
Mar. 1-10	1,640	--	6.69	2.30	8.09	--	--	--	--	--	--	--	1,020	1.39	2,280	47	3.8	1,550	--
Mar. 11-20	2,330	--	4.64	1.48	8.44	--	--	--	--	--	--	--	890	1.21	2,820	58	4.8	1,390	--
Mar. 21-31.....	2,450	--	4.69	1.73	7.65	-	--	--	--	--	--	--	854	1.16	2,840	54	4.3	1,330	--

Apr. 1-10, 1953	1,320	23	4.39	1.89	7.91	0.17	4.39	5.54	4.17	0.03	0.01	0.23	872	1.19	1,570	55	4.5	1,360	8.0
Apr. 11-20	1,570	--	4.84	1.64	7.39	--	--	--	--	--	--	--	832	1.13	1,770	53	4.1	1,280	--
Apr. 21-30	1,850	--	4.39	1.64	6.96	--	--	--	--	--	--	--	795	1.08	2,000	54	4.0	1,250	--
May 1-10	2,300	--	4.49	1.73	8.09	--	--	--	--	--	--	--	861	1.17	2,690	57	4.6	1,380	--
May 11-20	72	--	7.49	3.37	8.83	--	--	--	--	--	--	--	1,140	1.55	112	45	3.8	1,790	--
May 21-31	17	--	8.13	3.70	9.52	--	--	--	--	--	--	--	1,250	1.70	29	45	3.9	1,910	--
June 1-10	11	--	9.08	4.03	8.52	--	--	--	--	--	--	--	1,260	1.71	19	39	3.3	1,890	--
June 11-20	5.0	--	8.73	3.87	10.35	--	--	--	--	--	--	--	1,380	1.88	9	45	4.1	2,050	--
June 21-30	4.0	--	5.34	4.03	8.09	.26	--	--	--	--	--	--	1,090	1.48	6	46	3.7	1,600	--
July 1-10	4.0	48	3.49	3.95	8.22	.24	4.95	6.87	3.89	.04	.00	.33	977	1.33	5	52	4.3	1,470	8.0
July 11-20	2.0	--	6.49	4.03	8.09	--	--	--	--	--	--	--	1,120	1.52	3	43	3.5	1,670	--
July 21-31	112	--	8.78	3.95	7.96	--	--	--	--	--	--	--	1,230	1.67	187	38	3.2	1,790	--
Aug. 1-10	2,150	--	5.04	1.73	8.26	--	--	--	--	--	--	--	951	1.29	2,770	55	4.5	1,440	--
Aug. 11-20	906	--	4.49	1.64	9.04	--	--	--	--	--	--	--	962	1.31	1,190	60	5.2	1,470	--
Aug. 21-31	1,200	--	4.54	1.64	8.39	--	--	--	--	--	--	--	916	1.25	1,500	58	4.8	1,400	--
Sept. 1-10	533	--	4.29	1.81	8.22	--	--	--	--	--	--	--	879	1.20	640	57	4.7	1,360	--
Sept. 11-20	430	--	4.39	1.81	8.26	--	--	--	--	--	--	--	883	1.20	516	57	4.7	1,380	--
Sept. 21-30	319	--	4.39	1.73	8.83	--	--	--	--	--	--	--	934	1.27	405	59	5.1	1,470	--
Weighted average	31,100	--	4.74	1.73	7.87	--	--	--	--	--	--	--	882	1.20	37,320	55	4.4	1,3[illegible]0	--

RIO GRANDE BASIN--Continued

RIO GRANDE AT SAN MARCIAL, N. MEX.

LOCATION.--At gaging station at Atchison, Topeka and Santa Fe Railway bridge, 1.1 miles downstream from the former site of San Marcial, Socorro County, and 19 miles (revised) 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 1953.
Water temperatures: January 1949 to September 1953.
Sediment records: July 1946 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 2,730 micromhos Apr. 8; minimum daily, 486 micromhos June 10.
Percent sodium: Maximum, 60 May 24-30, June 1-2; minimum, 33 Dec. 21-31.
EXTREMES, 1946-53.--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 residues on evaporation. 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 the International Boundary Commission. Records of discharge for water year October 1952 to September 1953 furnished by Santa Fe district office of Surface Water Branch. Record given in Water-Supply Paper 1282, is composite of main channel and Rio Grande Tiffany Channel. Chemical analyses for Rio Grande Tiffany Channel near San Marcial given on page .

Chemical analyses, water year October 1952 to September 1953

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, 1952 a	24	30	4.09	1.32	3.78	0.16	3.56	4.35	1.41	--	0.03	--	597	0.81	19	40	2.3	887	7.7
Nov. 22-30 a ...	4,110	--	4.19	1.32	3.17	--	--	--	--	--	--	--	534	.73	3,000	37	1.9	805	--
Dec. 1-10	10,500	--	3.44	.99	2.48	--	--	--	--	--	--	--	434	.59	6,200	36	1.7	663	--
Dec. 11-20	10,850	--	3.34	.99	2.35	--	--	--	--	--	--	--	420	.57	6,180	35	1.6	640	--
Dec. 21-31	12,960	--	3.24	.99	2.13	--	--	--	--	--	--	--	404	.55	7,130	33	1.5	612	--
Jan. 1-10, 1953	10,760	26	3.09	.90	2.30	.11	3.16	2.48	.82	0.03	.03	0.18	414	.56	6,030	36	1.6	619	7.7
Jan. 11-20	10,160	--	3.34	.99	2.39	--	--	--	--	--	--	--	415	.56	5,690	36	1.6	630	--
Jan. 21-31	13,440	--	3.04	.90	2.30	--	--	--	--	--	--	--	396	.54	7,260	37	1.6	602	--
Feb. 1-10	12,370	--	3.04	.90	2.30	--	--	--	--	--	--	--	448	.61	7,550	37	1.6	610	--
Feb. 11-20	14,900	--	3.09	.99	3.00	--	--	--	--	--	--	--	445	.61	9,090	42	2.1	700	--
Feb. 21-28	14,300	--	3.29	1.07	2.87	--	--	--	--	--	--	--	468	.64	9,150	40	1.9	706	--
Mar. 1-10	17,920	--	3.24	.99	2.96	--	--	--	--	--	--	--	450	.61	10,930	41	2.0	685	--
Mar. 11-20	15,960	--	3.04	.99	2.70	--	--	--	--	--	--	--	420	.57	9,100	40	1.9	626	--
Mar. 21-31	5,310	--	3.99	1.32	3.22	--	--	--	--	--	--	--	510	.69	3,660	38	2.0	763	--

a No flow Oct. 4-Nov. 21, Aug. 30 - Sept. 30.

Apr. 1-5, 1953.	299	28	4.19	1.64	4.04	0.15	3.93	4.18	1.69	0.03	0.02	0.20	613	0.83	248	40	2.4	919	7.8
Apr. 6-10	892	33	7.63	4.03	12.22	.24	4.00	10.74	9.28	.02	.02	.30	1,520	2.07	1,850	51	5.1	2,270	7.9
Apr. 11-20	1,540	--	5.94	2.30	6.78	--	--	--	--	--	--	--	884	1.20	1,850	45	3.3	1,370	--
Apr. 21-28	1,920	--	5.39	2.06	6.26	--	--	--	--	--	--	--	810	1.10	2,110	46	3.3	1,250	--
Apr. 29-30, May 1-10	17,130	--	3.29	.99	2.74	--	--	--	--	--	--	--	415	.56	9,590	39	1.9	644	--
May 11-23	2,400	--	4.39	1.56	6.78	--	--	--	--	--	--	--	748	1.02	2,450	53	3.9	1,220	--
May 24-30, June 1-2	2,030	--	5.39	2.06	11.31	--	--	--	--	--	--	--	1,140	1.55	3,150	60	5.9	1,860	--
June 3-7.....	8,910	--	3.59	1.23	4.70	--	--	--	--	--	--	--	585	.80	7,130	49	3.0	939	--
June 8-20.....	24,050	--	2.99	.90	2.65	--	--	--	--	--	--	--	400	.54	12,990	41	1.9	641	--
June 21-30.....	13,240	--	3.19	.99	3.13	.16	--	--	--	--	--	--	469	.64	8,470	42	2.2	725	--
July 1-10	1,250	32	4.09	1.56	6.61	.18	4.31	4.66	3.38	.04	.01	.23	765	1.04	1,300	53	4.0	1,200	7.6
July 11-19	4,230	--	7.39	2.30	7.83	--	--	--	--	--	--	--	1,150	1.56	6,600	45	3.6	1,610	--
July 20-31	12,440	--	7.98	2.63	8.35	--	--	--	--	--	--	--	1,250	1.70	21,150	44	3.6	1,690	--
Aug. 1-10	3,710	--	10.73	3.54	9.87	--	--	--	--	--	--	--	1,640	2.23	8,270	41	3.7	2,060	--
Aug. 11-20.....	5,770	--	10.43	3.29	7.96	--	--	--	--	--	--	--	1,450	1.97	11,370	37	3.0	1,880	--
Aug. 21-31 a...	2,350	--	9.48	3.21	7.83	--	--	--	--	--	--	--	1,380	1.88	4,420	38	3.1	1,820	--
Weighted average	255,700	--	3.94	1.23	3.57	--	--	--	--	--	--	--	558	0.76	194,300	41	2.2	824	--

a No flow Oct. 4 - Nov. 21, Aug. 30 - Sept. 30.

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RIO GRANDE BASIN--Continued

RIO GRANDE BELOW ELEPHANT BUTTE OUTLET, N. MEX.

LOCATION.--At gaging station 1.0 mile downstream from dam, 1½ miles upstream from Cuchillo Negro River, and in Pedro Armendaris Grant, N. Mex.
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 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953

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 1952	20	925	--	2.51	0.83	2.01	--	b 2.53	2.17	0.85	--	(a)	0.13	350	0.48	444	38	1.6	541	8.2
November	25	1,870	--	2.56	1.08	2.19	--	c 2.45	2.47	.95	--	(a)	.08	376	.51	954	38	1.6	558	8.2
December	20	12,280	--	2.56	.84	2.50	--	c 2.45	2.55	.95	--	0	.07	392	.53	6,508	42	1.9	600	8.1
January 1953	20	64,180	26	2.04	1.00	2.42	0.08	d 2.05	2.61	.90	0.02	(a)	.09	360	.49	31,450	44	2.0	547	8.2
February	20	83,630	--	2.31	1.03	2.21	--	e 2.20	2.55	.90	--	(a)	.13	360	.49	40,980	40	1.7	551	8.3
March	25	83,880	--	2.76	1.06	2.30	--	f 2.60	2.54	1.00	--	(a)	.05	425	.58	48,650	38	1.7	600	8.3
April	20	58,420	--	2.76	1.08	2.62	--	2.66	2.65	1.20	--	.01	.09	418	.57	33,300	41	1.9	632	8.2
May	20	24,440	--	2.42	1.02	2.69	--	b 2.21	2.74	1.25	--	.01	.14	412	.56	13,690	44	2.1	620	8.1
June	25	64,320	--	2.46	1.16	3.03	--	d 2.35	3.08	1.45	--	(a)	.15	439	.60	38,590	46	2.3	679	8.2
July	20	65,140	22	2.56	1.32	3.51	.18	d 2.40	3.28	1.90	.03	.01	.15	459	.62	40,390	46	2.5	756	8.3
August	25	72,550	--	2.99	1.42	4.30	--	b 2.51	4.17	2.10	--	.01	.16	578	.79	57,310	49	2.9	871	8.1
September	20	22,100	--	3.46	1.53	5.10	--	g 2.23	5.59	2.35	--	.01	.17	697	.95	21,000	51	3.2	1,020	8.1
Total		553,700	--	--	--	--	--	--	--	--	--	--	--	--	--	333,300	--	--	--	--

a Less than 0.01 equivalent per million.
b Includes 0.20 equivalent per million carbonate (CO_3).
c Includes 0.22 equivalent per million carbonate (CO_3).
d Includes 0.24 equivalent per million carbonate (CO_3).
e Includes 0.30 equivalent per million carbonate (CO_3).
f Includes 0.52 equivalent per million carbonate (CO_3).
g Includes 0.10 equivalent per million carbonate (CO_3).

RIO GRANDE NEAR EL PASO, TEX.

LOCATION.--At gaging station 5 miles northwest of El Paso, Tex., 6 miles northwest of Juarez, Chihuahua, Mexico, 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 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953

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, 1952	31	7,410	--	5.20	2.16	11.90	--	b 4.49	8.42	6.95	--	(a)	0.14	1,287	1.75	12,970	62	6.2	1,930	8.0
November	30	5,120	--	5.66	2.39	12.90	--	4.95	8.73	7.30	--	0.02	.35	1,350	1.84	9,420	62	6.4	2,030	8.1
December	31	5,000	--	5.46	2.34	13.40	--	c 4.85	9.01	7.55	--	.02	.28	1,402	1.91	9,550	63	6.8	2,070	8.1
January, 1953	31	4,320	24	5.28	2.45	13.70	0.51	4.71	9.21	7.92	0.05	.02	.42	1,406	1.91	8,251	62	7.0	2,130	8.1
February	28	2,870	--	5.44	2.57	15.40	--	4.95	9.92	8.80	--	.01	.42	1,536	2.09	5,998	66	7.7	2,310	8.0
March	30	34,900	--	3.56	1.25	4.26	--	3.00	3.57	2.50	--	.04	.08	614	.84	29,320	47	2.7	905	7.8
April	30	33,000	--	3.89	1.33	4.78	--	d 3.33	4.13	2.75	--	.02	.14	652	.89	29,370	48	3.0	1,020	8.1
May	31	24,700	--	4.52	1.76	5.35	--	3.55	4.58	3.50	--	.02	.21	711	.97	23,960	46	3.0	1,120	8.0
June	30	35,200	--	3.86	1.34	4.90	--	3.40	4.10	2.60	--	.01	.18	667	.91	32,030	49	3.0	1,010	8.0
July	31	42,400	40	3.79	1.31	5.00	.23	3.45	4.19	2.70	.03	.02	.15	685	.93	39,430	48	3.1	1,020	7.8
August	31	46,800	--	4.02	1.31	5.40	--	3.45	4.25	3.10	--	.03	.20	693	.94	43,990	50	3.3	1,060	7.8
September	30	26,800	--	4.39	1.72	6.82	--	3.57	5.51	3.90	--	.01	.23	834	1.13	30,280	53	3.9	1,270	8.0
Total		268,500	--	--	--	--	--	--	--	--	--	--	--	--	--	274,600	--	--	--	--

a Less than 0.01 equivalent per million.
b Includes 0.10 equivalent per million carbonate (CO_3).
c Includes 0.20 equivalent per million carbonate (CO_3).
d Includes 0.24 equivalent per million carbonate (CO_3).

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 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953

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, 1952	5	848	--	18.30	9.52	55.20	--	3.42	24.44	55.60	--	0	0.70	5,288	7.19	6,097	66	15	7,840	7.8
November	4	1,510	--	17.18	8.90	45.40	--	4.71	21.13	46.50	--	(a)	.60	4,584	6.23	9,407	64	13	6,840	8.0
December	6	2,640	--	15.12	6.92	36.80	--	5.00	17.59	36.45	--	.02	.53	3,731	5.07	13,380	63	11	5,610	7.8
January, 1953	6	1,440	23	17.50	8.73	47.40	0.80	4.26	21.67	48.60	0.04	.01	.71	4,716	6.41	9,230	64	13	7,010	8.0
February	6	566	--	25.22	13.46	71.20	--	4.66	28.79	76.90	--	.01	.82	6,924	9.42	5,332	65	16	10,010	7.8
March	6	402	--	27.66	15.08	82.00	--	4.51	32.02	88.25	--	(a)	1.05	7,796	10.60	4,261	66	18	11,240	7.7
April	6	226	--	29.75	17.32	91.00	--	4.40	35.56	98.50	--	(a)	1.06	8,697	11.80	2,667	66	19	12,400	7.8
May	4	38.9	--	34.15	19.76	96.00	--	b2.71	35.35	112.1	--	(a)	.97	9,528	13.00	506	64	18	13,000	8.0
June	3	98.2	--	43.50	24.10	106.0	--	2.22	35.60	136.0	--	.01	.9	10,770	14.60	1,434	61	18	15,200	8.0
July	9	14,700	18	5.24	1.94	10.00	.27	2.55	5.00	9.80	.04	.09	.23	1,101	1.50	22,050	57	5.3	1,790	7.8
August	5	2,270	--	23.68	12.13	50.50	--	2.77	19.58	64.25	--	.03	.54	5,519	7.51	17,050	59	12	8,170	7.8
September	5	262	--	15.42	6.85	32.60	--	2.65	13.56	39.00	--	.08	.43	3,441	4.68	1,226	59	10	5,390	7.8
Total		25,000	--	--	--	--	--	--	--	--	--	--	--	--	--	92,640	--	--	--	--

a Less than 0.01 equivalent per million.
b Includes 0.22 equivalent per million carbonate (CO_3).

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, Mexico, 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 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953
/No flow during period October to May./

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				
June,1953	3	348	--	5.95		4.05	--	3.70	--	1.20	--	---	--	724	0.98	341	40	2.3	989	--
July	12	4,920	21	3.10	0.46	3.62	0.19	2.60	3.10	1.60	0.04	0.09	0.15	503	.68	3,346	49	2.7	748	7.7
August	10	3,220	--	4.05		3.28	--	2.71	--	2.00	--	--	--	484	.66	2,125	45	2.3	729	8.0
September ...	2	438	--	5.75		3.90	--	2.35	--	2.20	--	--	--	660	.90	394	40	2.3	967	--
Total		8,926	--	--	--	--	--	--	--	--	--	--	--	--	--	6,206	--	--	--	--

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 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953

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 1952	6	29,900	--	4.64	1.63	3.81	--	2.26	5.79	2.05	--	0.05	0.07	692	0.94	28,110	38	2.1	995	7.9
November	8	24,700	--	4.01	2.16	3.74	--	2.90	4.78	2.15	--	.03	.18	634	.86	21,240	38	2.1	950	8.1
December	8	26,300	--	3.92	1.91	4.21	--	3.03	5.02	2.10	--	.06	.20	679	.92	24,200	42	2.5	974	--
January 1953	6	30,000	20	3.72	1.64	4.62	0.18	a3.21	4.71	2.10	0.06	.05	.18	667	.91	27,300	45	2.8	983	8.1
February	7	25,300	--	3.91	2.02	4.30	--	3.05	5.02	2.10	--	.05	.24	673	.92	23,280	42	2.5	989	7.9
March	8	29,200	--	4.01	1.90	4.45	--	2.91	5.25	2.20	--	.05	.21	692	.94	27,450	43	2.6	1,010	8.0
April	6	17,800	--	3.11	1.85	3.05	--	3.00	3.44	1.60	--	.05	.17	518	.70	12,460	38	1.9	801	8.0
May	10	16,200	--	2.80	1.83	2.56	--	b2.70	3.05	1.50	--	.05	.18	440	.60	9,720	36	1.7	697	8.0
June	8	15,800	--	3.01	1.95	3.10	--	a2.83	3.62	1.60	--	.04	.20	520	.71	11,220	38	2.0	787	8.0
July	10	38,400	28	3.61	1.20	3.23	.19	a2.80	4.07	1.15	.05	.14	.17	545	.74	28,420	39	2.1	779	7.9
August	8	31,100	--	4.28	1.25	3.38	--	2.70	4.65	1.55	--	.09	.17	620	.84	26,120	38	2.0	874	7.9
September	7	51,700	--	3.85	1.06	2.69	--	2.85	3.41	1.30	--	.10	.09	516	.70	36,190	35	1.7	723	8.0
Total		336,400	--	--	--	--	--	--	--	--	--	--	--	--	--	275,700	--	--	--	--

a Includes 0.10 equivalent per million carbonate (CO_3).
b Includes 0.20 equivalent per million carbonate (CO_3).

RIO GRANDE AT EAGLE PASS, TEX.

LOCATION.--At gaging station 0.5 mile above the international highway bridge between Eagle Pass, Tex. and Piedras Negras, Coahuila, Mexico, and 754.6 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--125,502 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20).
RECORDS AVAILABLE.--Chemical analyses, 1938 to 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953

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 1952	27	31,560	--	6.04		4.42	--	2.70	--	3.70	--	--	--	659	0.90	28,400	42	2.6	1,060	--
November	--	a 35,630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	22	41,000	--	6.43		5.38	--	2.95	4.22	4.65	--	0.07	0.20	746	1.01	41,410	46	3.0	1,180	8.1
January 1953	27	42,690	20	4.24	2.59	5.98	0.19	3.00	4.67	5.20	0.04	.07	.16	830	1.13	48,240	46	3.2	1,280	8.1
February	24	33,320	--	6.51		6.10	--	2.77	--	5.30	--	--	--	835	1.14	37,980	48	3.4	1,300	--
March	26	48,910	--	6.32		6.25	--	2.71	--	5.15	--	--	--	804	1.09	53,310	50	3.5	1,260	--
April	24	14,770	--	6.38		6.35	--	2.63	--	5.80	--	--	--	821	1.12	16,540	50	3.5	1,320	--
May	25	8,430	--	5.87		5.60	--	b 2.63	--	5.00	--	--	--	737	1.00	8,430	49	3.3	1,190	--
June	25	4,530	--	5.82		5.90	--	2.55	--	4.90	--	--	--	762	1.04	4,711	50	3.5	1,210	--
July	27	29,300	24	3.54	1.62	3.78	.18	c 2.85	3.50	2.60	.05	.10	.15	583	.79	23,150	41	2.3	894	8.0
August	26	91,980	--	4.07		1.63	--	b 2.70	--	1.20	--	--	--	357	.49	45,070	29	1.1	566	8.0
September	25	287,200	--	3.68		1.56	--	2.95	--	.95	--	--	--	390	.53	152,200	30	1.1	501	--
Total		669,300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

a No samples collected.
b Includes 0.10 equivalent per million carbonate (CO_3).
c Includes 0.12 equivalent per million carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE AT ROMA, TEX.

LOCATION.--At gaging station at international bridge between Roma, Tex. and Cd. Miguel Aleman (formerly San Pedro), Tamulipas, Mexico, 14.9 river miles above the confluence of the Rio San Juan from Mexico, and 992.0 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--157,448 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20).
RECORDS AVAILABLE.--Chemical analyses, 1933 to 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953

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 1952...	31	24,040	--	3.29	2.03	5.08	--	2.21	4.28	4.25	--	(a)	0.14	696	0.95	22,840	49	3.1	1,090	7.8
November	30	35,340	--	3.66	2.24	4.66	--	2.23	4.51	3.88	--	.03	.20	679	.92	32,510	44	2.7	1,070	7.8
December	31	43,200	--	3.69	2.35	5.00	--	2.61	4.25	4.20	--	.04	.16	739	1.01	43,630	45	2.9	1,130	--
January, 1953..	31	50,170	8	3.98	2.44	6.00	0.21	2.55	4.86	5.15	0.04	.05	.19	809	1.10	55,190	48	3.4	1,280	8.1
February	28	33,730	--	4.11	2.82	6.78	--	2.60	5.31	5.90	--	.03	.23	868	1.18	39,800	49	3.7	1,360	7.8
March	31	69,760	--	2.56	2.30	6.20	--	b2.05	4.43	4.60	--	.03	.22	814	1.11	77,430	56	4.0	1,140	8.2
April.....	30	53,780	--	3.25	1.19	3.79	--	2.07	3.19	3.00	--	.05	.19	542	.74	39,800	46	2.6	854	7.8
May.....	31	48,340	--	3.22	1.15	4.05	--	2.15	3.06	3.28	--	.08	.24	566	.77	37,220	48	2.7	877	7.9
June	4	109	--	1.38	.81	6.00	--	c.79	2.53	4.90	--	.01	.4	550	.75	82	73	5.7	904	8.1
July	31	12,500	24	3.26	.86	3.40	.18	b2.40	2.66	2.60	.02	.05	.2	501	.68	8,500	44	2.4	747	8.1
August	31	292,800	--	2.74	.66	1.25	--	2.30	1.35	.85	--	.16	.12	297	.40	117,120	27	1.0	449	7.8
September.....	30	261,400	--	2.56	.55	.85	--	2.15	1.09	.60	--	.15	.08	240	.33	86,260	21	.7	376	7.9
Total		925,200	--	--	--	--	--	--	--	--	--	--	--	--	--	560,400	--	--	--	--

a Less than 0.01 equivalent per million.
b Includes 0.30 equivalent per million carbonate (CO_3).
c Includes 0.24 equivalent per million carbonate (CO_3).

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 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 3,050 micromhos May 19-20, 22-23; minimum daily, 1,320 micromhos Aug. 29.
Percent sodium: Maximum, 14 Jan. 1-10, 21-31; minimum, 6 Aug. 21-31.
EXTREMES, 1937-53.--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.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952	2,010	13	16.62	3.62	2.39	--	2.57	17.86	1.97		0.02		1,450	1.97	3,960	11	0.8	1,810	7.7
Oct. 11-20	1,670	13	18.16	4.03	2.74	--	2.56	20.11	2.17		.02		1,610	2.19	3,660	11	.8	1,950	7.7
Oct. 21-31	2,230	12	19.16	4.28	2.87	--	2.52	21.65	2.40		.00		1,720	2.34	5,220	11	.8	2,060	7.7
Nov. 1-10	99	13	18.16	4.44	3.13	--	2.44	21.03	2.37		.00		1,670	2.27	225	12	.9	2,010	7.8
Nov. 11-20 a	3.6	14	18.56	4.85	3.30	--	2.65	21.65	2.51		.00		1,730	2.35	8	12	1.0	2,070	7.8
Nov. 21-30 a	2.8	15	18.66	5.02	3.44	--	2.67	21.65	2.59		.01		1,740	2.37	7	13	1.0	2,110	7.6
Dec. 1-10 a	2.6	15	19.01	5.02	3.52	--	2.88	21.86	2.71		.00		1,770	2.41	6	13	1.0	2,150	7.8
Dec. 11-20 a	1.8	14	18.36	5.26	3.65	--	2.79	21.65	2.71		.00		1,750	2.38	4	13	1.1	2,130	7.8
Dec. 21-31	5.6	16	18.81	5.43	3.70	--	2.93	22.07	2.82		.00		1,790	2.43	14	13	1.1	2,170	7.7
Jan. 1-10, 1953	2.8	18	18.06	6.41	3.87	--	2.88	22.28	2.88		.01		1,810	2.46	7	14	1.1	2,190	7.8
Jan. 11-20	7.1	17	18.86	6.00	3.83	--	2.97	22.48	2.93		.01		1,830	2.49	18	13	1.1	2,210	7.7
Jan. 21-31	8.5	18	18.66	6.25	3.91	--	2.98	22.48	3.02		.01		1,830	2.49	21	14	1.1	2,230	7.6
Feb. 1-10	6.9	18	19.11	6.25	3.87	--	2.98	22.90	2.88		.01		1,860	2.53	17	13	1.1	2,220	7.6
Feb. 11-20	5.8	17	19.56	6.33	3.91	--	3.18	23.32	3.07		.00		1,900	2.58	15	13	1.1	2,270	7.6
Feb. 21-28 a	1.0	18	19.41	6.33	3.96	--	2.93	23.53	3.07		.00		1,900	2.58	3	13	1.1	2,260	7.6
Mar. 1-10	2,000	14	25.50	5.67	3.83	--	2.52	28.94	3.41		.01		2,270	3.09	6,180	11	1.0	2,590	7.7
Mar. 11-20	1,890	15	25.70	5.67	3.91	--	2.36	29.35	3.47		.00		2,290	3.11	5,880	11	1.0	2,610	7.7
Mar. 21-31	9,460	15	26.10	5.92	4.09	--	2.49	29.56	3.61		.01		2,330	3.17	29,990	11	1.0	2,660	7.7

a Flow less than 0.05 cfs on Nov. 18-19, 27-29, Dec. 8-18, Feb. 25-26, 28.

RIO GRANDE BASIN--Continued

PECOS RIVER BELOW ALAMOGORDO DAM, N. MEX.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953.	19,760	14	27.00	6.00	4.22	--	2.51	30.40	3.72		0.02		2,390	3.25	64,220	11	1.0	2,720	7.7
Apr. 11-20	1,510	16	28.19	6.33	4.48	--	2.52	32.06	3.86		.01		2,510	3.41	5,150	11	1.1	2,830	7.7
Apr. 21-30	822	14	27.84	6.58	4.61	--	2.41	32.69	3.92		.02		2,540	3.45	2,840	12	1.1	2,830	7.7
May 1-10	2,100	16	29.34	7.15	4.70	--	2.31	34.35	4.17		.03		2,670	3.63	7,620	11	1.1	2,990	7.7
May 11-20	1,680	16	29.44	7.24	4.74	--	2.00	35.18	4.34		.02		2,710	3.69	6,200	11	1.1	3,020	7.7
May 21-31	1,900	16	28.64	7.15	4.78	--	2.13	34.35	4.23		.03		2,650	3.60	6,840	12	1.1	2,960	7.7
June 1-10	1,710	14	23.15	5.84	3.83	--	2.10	27.06	3.27		.02		2,120	2.88	4,920	12	1.0	2,450	7.7
June 11-20	2,250	17	18.16	4.77	2.91	--	1.79	21.44	2.54		.01		1,680	2.28	5,130	11	.9	2,020	7.3
June 21-30	2,160	16	16.77	4.36	2.70	0.10	1.82	19.63	2.31		.01		1,550	2.11	4,560	11	.8	1,910	7.6
July 1-10	1,920	15	18.06	4.52	2.78	.10	2.18	20.38	2.43		.01		1,630	2.22	4,260	11	.8	2,010	7.6
July 11-20	1,420	16	18.86	4.69	2.91	--	1.95	21.65	2.51		.01		1,710	2.33	3,310	11	.8	2,060	7.8
July 21-31	1,540	18	18.51	3.04	2.70	--	1.85	20.22	1.89		.03		1,580	2.15	3,310	11	.8	1,970	7.6
Aug. 1-10	14,620	17	18.36	4.36	2.61	--	1.85	21.24	1.86		.03		1,640	2.23	32,600	10	.8	1,960	7.7
Aug. 11-20.....	4,010	19	18.01	3.54	2.78	--	3.11	19.30	1.95		.07		1,580	2.15	8,620	11	.8	1,960	7.5
Aug. 21-31	15,180	17	15.27	1.81	1.00	--	3.61	13.99	.59		.09		1,170	1.59	24,140	6	.3	1,490	7.4
Sept. 1-10	2,750	14	15.27	2.80	1.65	--	1.98	16.51	1.18		.04		1,290	1.75	4,810	8	.5	1,620	7.5
Sept. 11-20	1,650	13	19.11	3.04	2.44	--	2.29	20.42	1.86		.01		1,610	2.19	3,610	10	.7	1,950	7.5
Sept. 21-30	1,540	16	19.21	4.44	2.70	--	2.33	21.86	2.03		.02		1,710	2.33	3,590	10	.8	2,070	7.6
Weighted average	97,960	16	21.41	4.60	3.09	--	2.49	23.94	2.54		0.03		1,890	2.57	251,800	11	0.9	2,220	--

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 1953.
Water temperatures: April 1949 to September 1953.
Sediment records: January 1949 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 13,800 micromhos June 21; minimum daily, 1,650 micromhos Sept. 2.
Percent sodium: Maximum, 57 Sept. 21-30; minimum, 18 Sept. 1-7.
EXTREMES, 1937-53.--Specific conductance: Maximum daily, 17,200 micromhos Aug. 20, 1945; minimum daily, 898 micromhos Sept. 22, 1941.
Percent sodium: Maximum, 71 May 16, 1950; minimum, 12 Mar. 25-31, 1951.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	758	18	27.94	16.69	46.96		2.31	40.18	47.66		0.05		5,550	7.55	5,270	51	9.9	7,650	7.3
Oct. 11-20.....	900	17	26.95	15.21	40.87		2.28	38.93	41.18		.05		5,080	6.91	6,220	49	8.9	6,630	7.3
Oct. 21-31.....	1,080	18	26.55	16.45	42.96		2.41	38.10	44.28		.07		5,210	7.09	7,660	50	9.3	7,270	7.3
Nov. 1-10	1,120	17	26.45	17.11	45.66		2.64	38.52	47.10		.07		5,410	7.36	8,240	51	9.8	7,510	7.3
Nov. 11-20	1,130	18	27.54	15.87	38.27		3.08	37.68	40.33		.09		4,980	6.77	7,650	47	8.2	6,960	7.6
Nov. 21-30	1,330	18	27.64	16.78	42.61		3.38	37.06	45.13		.08		5,240	7.13	9,480	49	9.0	7,380	7.7
Dec. 1-10	1,540	19	26.15	16.61	41.74		3.41	36.64	43.43		.14		5,120	6.96	10,720	49	9.0	7,230	7.7
Dec. 11-20	1,280	16	26.65	17.43	45.22		3.26	38.31	47.38		.16		5,430	7.38	9,450	51	9.6	7,720	7.7
Dec. 21-31	1,380	18	26.85	17.35	46.96		3.20	38.31	48.23		.12		5,500	7.48	10,320	52	10	7,890	7.6
Jan. 1-10, 1953..	1,160	17	27.45	18.01	49.14		3.03	39.56	51.89		.09		5,750	7.82	9,070	52	10	8,170	7.6
Jan. 11-20	944	16	28.24	19.16	54.35		3.00	41.22	56.97		.08		6,160	8.38	7,910	53	11	8,710	7.6
Jan. 21-31	1,110	14	27.05	18.67	50.01		2.85	39.97	53.02		.08		5,820	7.92	8,790	52	10	8,290	7.5
Feb. 1-10	1,000	13	27.54	18.42	51.31		2.47	41.01	52.74		.10		5,890	8.01	8,010	53	11	8,340	7.4
Feb. 11-20	1,020	13	27.54	18.67	49.57		2.74	40.60	53.02		.11		5,850	7.96	8,120	52	10	8,260	7.3
Feb. 21-28	863	15	27.35	18.91	50.01		2.74	40.81	51.33		.10		5,810	7.90	6,820	52	10	8,220	7.3
Mar. 1-10.....	1,000	11	27.64	19.65	52.62		2.56	41.64	54.15		.09		6,020	8.19	8,190	53	11	8,480	7.3
Mar. 11-20.....	1,220	12	28.84	17.68	43.48		2.39	42.68	44.84		.07		5,520	7.51	9,160	48	9.0	7,620	7.4
Mar. 21-31.....	847	11	31.84	19.16	49.14		2.13	46.22	51.05		.08		6,110	8.31	7,040	49	9.7	8,330	7.2

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR ARTESIA, N. MEX.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-13, 1953..	17,510	16	29.44	7.73	9.48		2.44	34.98	8.88		0.06		2,990	4.07	71,270	20	2.2	3,520	7.6
Apr. 14-20.....	972	16	31.54	12.50	24.09		2.31	40.60	24.25		.06		4,240	5.77	5,610	35	5.1	5,400	7.4
Apr. 21-30.....	1,280	15	31.04	16.78	42.96		1.80	43.72	44.28		.05		5,560	7.56	9,680	47	8.8	7,520	7.3
May 1-10	758	17	31.64	19.82	53.92		2.39	46.84	55.56		.06		6,430	8.74	6,620	51	11	8,820	7.3
May 11-20	728	14	31.14	22.12	61.75		2.67	47.26	64.87		--		6,980	9.49	6,910	54	12	9,760	7.5
May 21-31	646	16	31.24	22.53	65.66		2.62	48.09	69.66		--		7,310	9.94	6,420	55	13	10,200	7.2
June 1-10	835	13	30.44	16.69	41.74		2.03	44.14	43.43		.06		5,510	7.49	6,250	47	8.6	7,420	7.4
June 11-20	359	18	31.24	22.53	62.62		2.25	48.51	87.12		--		7,140	9.71	3,490	54	12	10,100	7.5
June 21-30	223	18	33.23	20.89	65.66		2.10	50.59	66.28		--		7,290	9.91	2,210	55	13	10,200	7.6
July 1, 2[a].....	0.8	16	37.72	23.03	73.49		1.90	59.33	73.89		--		8,270	11.2	90	55	13	11,200	6.8
July 18.....	599	13	19.66	7.57	31.74		1.74	24.98	31.59		.19		3,610	4.91	2,940	54	8.6	5,450	--
July 19-26	8,430	15	24.85	5.84	13.05		1.87	29.35	12.18		.09		2,790	3.79	31,950	30	3.3	3,590	7.6
July 27-31	416	15	27.15	8.47	21.52		1.56	33.52	22.00		.05		3,600	4.90	2,040	38	5.1	4,810	7.8
Aug. 1-8.....	164	15	29.14	12.50	36.83		1.75	38.52	38.07		.11		4,860	6.81	1,080	47	8.1	6,700	7.8
Aug. 9-20.....	9,810	15	24.15	5.76	7.22		2.00	28.73	6.32		.10		2,410	3.28	32,180	19	1.9	2,920	7.8
Aug. 21-31.....	8,580	17	16.92	4.52	8.96		2.06	19.90	8.52		.09		1,940	2.64	22,650	29	2.7	2,650	7.8
Sept. 1-7.....	8,140	16	18.01	3.29	4.74		1.95	19.94	4.12		.07		1,690	2.30	18,720	18	1.5	2,150	7.4
Sept. 8-13.....	452	15	22.80	7.40	19.13		1.64	28.52	18.78		.08		3,090	4.20	1,900	39	4.9	4,210	7.4
Sept. 14-20.....	209	19	30.89	13.90	50.01		2.06	41.01	51.33		.11		5,820	7.92	1,660	53	11	8,110	6.5
Sept. 21-30.....	210	18	34.63	21.38	73.49		2.08	51.42	75.58		--		7,870	10.7	2,250	57	14	11,000	7.0
Weighted average	80,040	16	25.35	9.79	21.52		2.29	32.27	21.77		0.82		3,530	4.81	384,900	37	5.1	4,740	--

a No flow July 3 - 17.

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. During period October to November 1952, samples were collected at gaging station, which is 14 miles downstream from Red Bluff Dam.
DRAINAGE AREA.--21,300 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 24,200 micromhos Sept. 28, 30; minimum daily, 11,000 micromhos Mar. 31.
Percent sodium: Maximum, 74 Sept. 17-30; minimum, 57 July 1-31.
EXTREMES, 1937-53.--Specific conductance: Maximum daily, 24,200 micromhos Sept. 28, 30, 1953; minimum daily, 1,610 micromhos June 2, 1948.
Percent sodium: Maximum, 74 Sept. 17-30, 1953; minimum, 9 Aug. 17-19, 1944.
REMARKS.--Values reported for dissolved solids concentrations are sums of 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 1952 to September 1953 given in Water-Supply Paper 1282. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	284	19	35.43	23.60	123.65		1.64	54.13	126.91				11,000	15.0	4,260	68	23	15,900	7.5
Nov. 1-30	214	16	34.18	20.72	89.19		1.77	50.38	91.94				8,740	11.9	2,550	62	17	12,300	7.7
Mar. 19-31	262	9.0	28.44	19.16	77.62		2.02	43.10	80.10				7,570	10.3	2,700	62	16	11,100	7.8
Apr. 1-30.....	516	6.4	29.24	19.49	80.31		1.93	44.76	82.35				7,810	10.6	5,470	62	16	11,300	7.6
May 1-4, 12-13, 28-31	156	5.9	31.19	21.63	92.45		2.06	47.88	95.33				8,770	11.9	1,860	64	18	12,800	7.6
May 5-11, 14-27.	359	10	32.24	24.51	127.52		2.33	50.80	131.14				11,000	15.0	5,380	69	24	16,100	7.7
June 1-30	1,020	12	32.78	21.87	94.71		2.23	49.55	97.58				9,020	12.3	12,550	63	18	13,200	7.6
July 1-31	2,460	12	34.88	33.63	92.18		2.03	51.21	107.45				9,570	13.0	31,980	57	16	14,300	7.8
Aug. 1-31.....	1,640	10	35.73	24.18	107.50		1.82	54.75	110.84				10,100	13.7	22,470	64	20	14,600	7.7
Sept. 1-16	261	50	38.87	24.67	120.26		1.88	56.42	125.50				11,100	15.1	3,940	65	21	15,900	7.7
Sept. 17-30	257	23	38.37	29.61	193.23		1.82	62.25	197.14				15,600	21.2	5,450	74	33	22,500	7.6
Total or weighted average	a7,430	13	34.23	25.99	101.75		1.98	51.63	109.15				9,760	13.3	98,820	64	19	14,300	--

a Represents 79 percent of runoff for water year October 1952 to September 1953.

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR COMSTOCK, TEX.

LOCATION.--At gaging station at the Pecos High Bridge on the railroad 12 miles northwest of Comstock, Tex., 5.5 miles above the confluence with the Rio Grande. The river enters the Rio Grande 638.2 river miles below the American Dam at El Paso, Tex.
RECORDS AVAILABLE.--Chemical analyses, 1936 to 1953.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge and these same chemical analyses for water year October 1952 to September 1953 given in International Boundary and Water Commission Water Bulletin Numbers 22 and 23. Data for previous years given in earlier bulletins.

Chemical analyses, water year October 1952 to September 1953

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, 1952...	15	98.4	--	7.18	5.98	17.50	--	2.61	9.37	18.90	--	0.03	0.22	1,986	2.70	266	57	6.8	3,070	7.9
November	15	123	--	7.06	5.66	16.00	--	a2.67	8.64	17.52	--	.04	.23	1,808	2.46	303	56	6.3	2,900	8.1
December	16	155	--	8.92	7.48	23.10	--	3.05	12.13	24.45	--	.05	.26	2,467	3.36	521	58	8.1	3,870	8.0
January, 1953.	15	10,000	12	9.82	8.61	26.00	0.48	2.96	13.73	28.20	0.05	.07	.29	2,770	3.77	37,700	58	8.6	4,320	8.0
February.....	14	9,330	--	9.88	9.04	26.80	--	3.04	13.79	29.20	--	.02	.30	2,882	3.92	36,570	59	8.7	4,440	7.8
March	15	9,870	--	10.40	9.40	30.20	--	2.58	15.31	32.27	--	.03	.32	3,113	4.23	41,750	60	9.6	4,880	7.8
April	11	7,440	--	8.28	7.46	23.70	--	b2.45	11.47	25.90	--	.05	.28	2,547	3.46	25,740	60	8.5	3,980	8.0
May	16	6,280	--	7.42	6.24	19.50	--	2.35	10.04	21.20	--	.05	.27	2,094	2.85	17,900	59	7.5	3,350	7.9
June	15	4,810	--	6.32	5.37	16.05	--	2.31	8.31	17.20	--	.05	.25	1,755	2.39	11,500	58	6.6	2,810	8.0
July	17	8,750	18	4.30	3.05	8.80	.19	c2.20	4.55	9.55	.03	.09	.15	1,011	1.37	11,990	54	4.6	1,670	7.9
August	16	16,600	--	3.81	1.96	5.25	--	2.31	3.14	5.50	--	.18	.13	679	.92	15,270	48	3.1	1,140	7.8
September.....	15	11,900	--	5.28	3.43	9.75	--	3.15	4.99	10.30	--	.09	.17	1,138	1.55	18,450	53	4.7	1,860	8.0
Total		85,360	--	--	--	--	--	--	--	--	--	--	--	--	--	218,000	--	--	--	--

a Includes 0.16 equivalent per million carbonate (CO_3).
b Includes 0.10 equivalent per million carbonate (CO_3).
c Includes 0.20 equivalent per million carbonate (CO_3).

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 1953.
Water temperatures: May 1949 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,100 micromhos Dec. 28; minimum daily, 199 micromhos June 4.
Percent sodium: Maximum, 45 Dec. 26-31; minimum, 16 June 11-20.
EXTREMES, 1941-53.--Specific conductance: Maximum daily, 2,260 micromhos Aug. 10, 1947; minimum daily, 153 micromhos May 24, 1948.
Percent sodium: Maximum, 51 Mar. 21-31, 1944; minimum, 13 June 11-20, 1949, June 1-10, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. 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 1952 to September 1953 given in Water-Supply Paper 1283. No appreciable inflow between Shoshone power plant and gaging station except during periods of local rains.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	26,540	10	2.84	1.07	2.74	0.07	2.20	2.04	2.59		0.02	--	409	0.56	14,860	41	2.0	690	
Oct. 11-20.....	26,760	10	2.84	1.07	2.74	.07	2.13	1.96	2.59		.02	0.05	406	.55	14,720	41	2.0	688	
Oct. 21-31.....	23,540	10	3.29	1.23	3.04	.08	2.38	2.44	2.93		.02	--	471	.64	15,070	40	2.0	785	
Nov. 1-30.....	66,020	11	3.29	1.23	2.96	.07	2.33	2.44	2.76		.02	--	461	.63	41,590	39	2.0	761	
Dec. 1-20.....	41,420	13	3.04	1.07	2.57	.05	2.23	2.12	2.34		.01	--	413	.56	23,200	38	1.8	682	
Dec. 21-25.....	9,850	13	2.79	1.15	2.61	.05	2.16	1.83	2.48		.01	--	398	.54	5,320	40	1.9	661	
Dec. 26-31.....	8,570	14	3.79	1.48	4.35	.07	2.56	2.75	4.23		.02	--	583	.79	6,770	45	2.7	960	
Jan. 1-10, 1953..	22,140	13	2.89	1.15	2.78	.07	2.15	1.98	2.65		.02	--	414	.56	12,400	40	2.0	691	
Jan. 11-20.....	18,820	13	3.14	1.32	3.30	.07	2.29	2.23	3.13		.02	.06	466	.63	11,860	42	2.2	774	
Jan. 21-31.....	22,840	13	2.94	1.23	2.87	.06	2.16	2.00	2.79		.02	--	422	.57	13,020	40	2.0	706	
Feb. 1-28.....	53,130	13	2.79	1.23	2.78	.07	2.10	1.92	2.71		.01	--	412	.56	29,750	40	2.0	686	
Mar. 1-10.....	18,570	13	2.64	.99	2.74	.05	2.06	1.81	2.62		.01	--	392	.53	9,840	43	2.0	676	
Mar. 11-20.....	22,380	12	2.84	1.15	2.91	.06	2.10	2.00	2.85		.01	--	415	.56	12,530	42	2.1	715	
Mar. 21-31.....	26,650	12	2.84	1.15	2.83	.08	2.18	2.08	2.65		.02	--	409	.56	14,920	41	2.0	701	
Apr. 1-10.....	32,390	12	2.54	1.07	2.52	.08	2.03	1.92	2.37		.01	--	379	.52	16,840	41	1.9	642	
Apr. 11-20.....	28,130	11	2.59	1.15	2.78	.06	1.98	1.77	2.71		.01	.04	387	.53	14,910	42	2.0	669	
Apr. 21-27.....	26,000	13	2.25	.99	1.87	.05	1.92	1.56	1.72		.01	--	310	.42	10,920	36	1.5	524	

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLO.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 28-30, 1953	16,480	12	2.00	0.76	1.04	0.04	1.85	1.19	0.85		0.01	--	236	0.32	5,270	27	0.9	387	
May 1-10	45,920	12	2.05	.82	1.61	.05	1.80	1.37	1.38		.01	--	279	.38	17,450	36	1.3	467	
May 11-20	46,830	12	2.05	.80	1.57	.04	1.79	1.27	1.38		.01	--	269	.37	17,330	35	1.3	452	
May 21-31	136,600	12	2.20	.60	.65	.04	2.03	.92	.51		.02	--	213	.29	39,610	19	.5	339	
June 1-10	177,400	9.1	1.55	.49	.43	.03	1.47	.56	.34		.02	--	148	.20	35,480	17	.4	236	
June 11-20	214,100	8.0	1.45	.43	.37	.03	1.33	.56	.31		.02	--	139	.19	40,680	16	.4	224	
June 21-30	117,300	8.9	1.50	.54	.74	.03	1.47	.79	.68		.02	--	171	.23	26,980	26	.7	283	
July 1-10	63,950	9.6	1.95	.75	1.35	.04	1.57	1.31	1.13		.01	--	247	.34	21,740	33	1.2	416	
July 11-20	57,900	12	2.40	.90	1.48	.05	1.90	1.67	1.21		.01	0.05	296	.40	23,160	31	1.2	486	
July 21-31	48,830	11	2.94	1.07	2.09	.06	2.16	2.08	1.86		.01	--	377	.51	24,900	34	1.5	622	
Aug. 1-10	52,520	11	2.59	.90	1.61	.06	1.93	1.85	1.35		.01	--	320	.44	23,110	31	1.2	524	
Aug. 11-20	36,300	12	2.74	1.07	2.39	.06	2.03	2.02	2.17		.01	--	384	.52	18,880	38	1.7	639	
Aug. 21-31	32,170	12	2.94	1.15	2.78	.06	2.13	2.21	2.57		.01	--	425	.58	18,660	40	1.9	712	
Sept. 1-10	25,310	12	3.19	1.23	2.96	.05	2.13	2.29	2.90		.01	--	449	.61	15,440	40	2.0	753	
Sept. 11-20	22,310	11	3.09	1.15	2.61	.07	2.03	2.17	2.62		.01	--	416	.57	12,720	38	1.8	700	
Sept. 21-30	20,970	11	3.19	1.15	2.83	.07	2.10	2.33	2.90		.01	--	450	.61	12,790	39	1.9	761	
Total or weighted average	1,589,000	11	2.30	0.82	1.61	0.05	1.84	1.39	1.47		0.02	--	288	0.39	619,700	34	1.3	478	

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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.
DRAINAGE AREA.--24,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1953.
Water temperatures: May 1949 to September 1953.
Sediment records: May 1930 to September 1953.
EXTREMES, 1941-52.--Specific conductance: Maximum daily, 4,100 micromhos Sept. 30, 1946; minimum daily, 310 micromhos June 15, 1952.
Percent sodium (1950-52): Maximum, 49 Feb. 1-10, 1952; minimum, 19 May 1-10, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	56,230	12	6.99	5.26	7.61	0.17	3.20	12.24	4.23		0.13	--	1,300	1.77	99,530	38	3.1	1,770	
Oct. 12-14, 19-20	26,300	13	7.83	5.92	8.44	.19	3.49	13.91	4.65		.16	0.19	1,450	1.97	51,810	38	3.2	1,950	
Oct. 21-31.....	56,830	12	7.53	5.92	8.87	.21	3.33	13.74	4.94		.16	--	1,470	2.00	113,700	39	3.4	1,990	
Nov. 1-10	54,290	13	7.44	6.00	9.00	.21	3.39	13.51	5.30		.16	--	1,480	2.01	109,100	40	3.5	2,010	
Nov. 12-14, 16, 19-20.....	36,950	15	7.29	4.93	8.31	.18	3.74	12.05	4.74		.14	--	1,340	1.82	67,250	40	3.4	1,890	
Dec. 5, 12-17, 19-22	75,070	15	5.94	4.36	8.48	.18	3.28	9.81	5.61		.13	--	1,210	1.65	123,900	45	3.7	1,780	
Jan. 1-2, 11-12, 15-16, 22-23, 1953.....	49,090	13	5.69	4.03	9.18	.20	3.34	9.10	6.60		.15	.14	1,210	1.65	81,000	48	4.2	1,830	
Feb. 1-10.....	52,680	13	5.64	4.03	9.04	.20	3.31	9.18	6.15		.13	--	1,190	1.62	85,340	48	4.1	1,780	
Feb. 11-19.....	45,740	13	5.59	3.95	9.39	.21	3.31	9.01	6.60		.12	--	1,190	1.62	74,100	49	4.3	1,820	
Feb. 20-21, 23-26	27,770	14	5.69	4.03	9.57	.20	3.34	9.12	6.63		.13	--	1,220	1.66	46,100	49	4.3	1,850	
Mar. 7, 9, 13, 15, 17-20	47,580	12	5.09	3.54	9.04	.21	3.05	8.04	6.37		.12	--	1,110	1.51	71,850	51	4.4	1,710	
Mar. 21-29.....	54,130	12	5.19	3.54	9.18	.19	3.18	8.22	6.51		.11	--	1,140	1.55	83,900	51	4.4	1,740	
Apr. 1-10.....	75,750	14	4.49	3.29	6.00	.15	2.84	6.62	4.15		.01	--	868	1.18	89,380	43	3.0	1,330	
Apr. 11-22	74,840	11	4.49	3.12	6.39	.17	2.79	6.62	4.43		.01	.12	876	1.19	89,060	45	3.3	1,360	
Apr. 25-29.....	65,430	11	2.94	1.48	2.09	.09	2.21	2.85	1.44		.06	--	410	.56	36,640	32	1.4	654	

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR CISCO, UTAH--Continued

Chemical analyses, water year October 1952 to September 1953--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. 30, 1953....	16,800	--	3.74	1.73	3.48	0.12	2.43	--	--		.--	--	577	0.78	13,100	38	2.1	905	
May 1-14.....	146,200	14	3.74	2.14	3.87	.12	2.70	4.54	2.82		0.06	--	625	.85	124,300	39	2.3	980	
May 21-25, 27 ...	148,000	18	3.34	1.40	2.17	.08	2.74	2.87	1.35		.06	--	434	.59	87,320	31	1.4	668	
June 1-2, 5, 9, 16.	264,800	14	2.40	.99	1.09	.05	2.06	1.85	.59		.03	--	276	.38	100,600	24	.8	434	
June 22-27, 29...	222,900	13	2.74	1.40	2.00	.06	1.92	3.12	1.24		.03	--	394	.54	120,400	32	1.4	617	
July 1-2, 5, 7 ...	66,700	13	3.24	1.81	2.91	.08	2.13	4.16	1.72		.05	--	510	.69	46,020	36	1.8	793	
July 31.....	a10,290	--	--	--	--	--	3.21	9.24	4.40		--	--	--	--	--	--	--	1,580	
Aug. 1-3, 14, 31.	63,190	17	7.78	4.28	5.87	.19	3.15	11.97	2.57		.10	0.18	1,170	1.59	100,500	32	2.4	1,570	
Sept. 4,7-8.....	14,480	16	8.08	5.76	8.44	.16	3.28	14.72	4.06		.15	--	1,460	1.99	28,820	38	3.2	1,950	
Sept. 11-19.....	36,300	14	8.73	6.33	9.52	.18	3.34	16.63	4.51		.16	--	1,640	2.23	80,950	38	3.5	2,140	
Sept. 20-30.....	41,000	14	9.78	7.07	10.13	.19	3.56	17.82	5.02		.23	--	1,820	2.48	101,700	37	3.5	2,330	
Total or weighted average.....	b1,829,000	--	--	--	--	--	--	--	--		--	--	--	--	2,026,000	--	--	--	

a Not included in total.

b Represents 45 percent of runoff for water year October 1952 to September 1953.

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER AT LEES FERRY, ARIZ.

LOCATION.--At gaging station, at head of Marble Gorge at Lees Ferry, Coconine County, just upstream from Paria River, 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, October 1942 to October 1945, October 1947 to September 1953.
Water temperatures: July 1949 to September 1953.
Sediment records: October 1928 to December 1933, November 1942 to September 1944, October 1947 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,910 micromhos Sept. 8; minimum daily, 398 micromhos June 25.
Percent sodium: Maximum, 43 Feb. 21-28, Mar. 1-10; minimum, 22 June 11-20.
EXTREMES, 1928-30, 1942-45, 1947-53.--Specific conductance (1942-45, 1947-53): Maximum daily, 2,280 micromhos Oct. 15, 1945; minimum daily, 318 micromhos June 9, 1948.
Percent sodium: Maximum, 46 Mar. 2, 4, 7, 10, 1944; minimum, 21 June 21-30, 1949, June 1-10, 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	136,200	13	5.94	3.87	6.17	0.15	3.28	9.83	2.71	0.02	0.06	0.18	997	1.36	185,200	38	2.8	1,470	7.8
Oct. 11-20	109,100	11	5.74	4.28	6.44	.15	a3.36	10.22	2.76	.02	.06	.18	1,030	1.40	152,700	39	2.9	1,500	8.0
Oct. 21-31.....	123,000	11	6.09	4.78	7.31	.16	3.52	11.18	3.33	.02	.07	.22	1,130	1.54	189,400	40	3.1	1,640	7.8
Nov. 1-10	114,300	11	6.19	4.85	7.48	.16	3.64	11.43	3.27	.02	.07	.20	1,150	1.56	178,300	40	3.2	1,640	7.9
Nov. 11-20	132,100	11	6.24	4.77	7.48	.15	3.67	11.30	3.27	.02	.07	.16	1,150	1.56	206,100	40	3.2	1,640	8.0
Nov. 21-30	139,900	14	6.29	4.52	7.13	.15	3.87	10.85	3.16	.02	.07	.20	1,120	1.52	212,600	39	3.1	1,600	8.0
Dec. 1-10	99,570	15	6.19	4.52	7.13	.14	3.80	10.39	3.55	.02	.08	.25	1,110	1.51	150,400	40	3.1	1,620	7.9
Dec. 11-20	123,400	16	6.29	4.61	7.39	.15	4.23	10.70	3.72	.01	.09	.25	1,150	1.56	192,500	40	3.2	1,680	7.9
Dec. 21-31	155,400	14	5.64	3.95	6.44	.13	3.87	9.18	3.22	.01	.07	.23	1,000	1.36	211,300	40	2.9	1,480	7.9
Jan. 1-10, 1953..	106,800	15	5.59	4.19	6.83	.14	3.90	9.24	3.41	.02	.09	.25	1,030	1.40	149,500	41	3.1	1,540	7.9
Jan. 11-19.....	122,100	15	4.79	4.11	6.87	.15	3.90	9.12	3.72	.02	.09	.29	1,040	1.41	172,200	41	3.1	1,560	8.0
Jan. 20-31	164,700	16	5.44	3.87	6.26	.13	3.77	8.41	3.24	.02	.08	.18	959	1.30	214,100	40	2.9	1,420	7.7
Feb. 1-10	131,400	14	5.29	3.87	6.22	.13	3.79	8.54	3.19	.02	.08	.17	957	1.30	170,800	40	2.9	1,410	7.9
Feb. 11-20	137,500	14	5.24	3.78	6.35	.13	3.72	8.49	3.16	.02	.07	.18	953	1.30	178,800	41	3.0	1,420	7.9
Feb. 21-28.....	96,370	13	5.09	3.70	6.78	.13	3.70	8.47	3.47	.02	.07	.19	967	1.32	127,200	43	3.2	1,450	7.8

a Includes 0.23 equivalent per million carbonate (CO_3).

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER AT LEES FERRY, ARIZ.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953 ..	125,600	13	5.19	3.87	6.87	0.16	3.77	8.47	3.55	0.02	0.08	0.23	979	1.33	167,000	43	3.2	1,470	8.0
Mar. 11-20.....	160,500	12	5.04	3.70	6.35	.15	3.59	8.24	3.07	.02	.06	.25	927	1.26	202,200	42	8.0	1,390	8.0
Mar. 21-31.....	171,400	12	4.29	3.29	5.57	.13	3.33	7.12	2.62	.02	.06	.25	810	1.10	188,500	42	2.9	1,230	7.9
Apr. 1-10	179,100	14	4.49	3.37	5.83	.13	3.43	7.37	2.90	.02	.05	.19	848	1.15	206,000	42	2.9	1,280	7.6
Apr. 11-20	179,300	14	4.29	3.12	5.13	.12	3.44	6.97	2.23	.01	.05	.17	781	1.03	189,000	41	2.7	1,180	7.7
Apr. 21-30	171,400	14	4.19	3.12	5.00	.12	3.33	6.62	2.40	.01	.04	.17	762	1.04	178,300	40	2.6	1,150	7.8
May 1-10.....	292,700	15	3.49	2.30	3.31	.10	3.10	4.99	1.52	.02	.05	.15	585	.80	234,200	38	2.1	892	7.8
May 11-20	232,000	13	3.29	2.22	3.04	.10	2.85	4.41	1.38	.02	.04	.15	530	.72	167,000	35	1.8	817	7.7
May 21-26	149,300	13	3.44	2.22	3.39	.10	2.85	4.87	1.52	.02	.03	.12	567	.77	114,200	37	2.0	871	7.7
May 27-31	374,200	13	2.79	1.84	2.22	.09	2.67	3.16	.99	.01	.04	.11	413	.56	209,600	33	1.5	650	7.8
June 1-10	961,600	13	2.59	1.15	1.13	.06	2.61	1.89	.45	.02	.04	.08	295	.40	384,600	23	.8	472	7.8
June 11-20	1,107,000	12	2.45	1.07	1.04	.07	2.38	1.83	.42	.02	.03	.09	277	.38	420,700	22	.8	444	7.7
June 21-30	922,500	12	2.25	1.07	1.07	.07	2.26	1.73	.39	.02	.03	.08	264	.36	332,100	23	.8	424	7.7
July 1-10.....	403,700	12	2.94	1.40	1.61	.09	2.72	2.50	.85	.02	.02	.11	362	.49	197,800	27	1.1	571	7.5
July 11-20.....	281,200	13	3.59	1.81	2.39	.10	2.98	3.73	1.21	.02	.03	.14	479	.65	182,800	30	1.5	746	7.6
July 21-31.....	284,800	14	4.29	2.14	3.44	.12	3.13	5.37	1.49	.02	.05	.18	619	.84	222,400	34	1.9	939	7.7
Aug. 1-10	304,200	17	5.59	2.88	4.61	.19	3.70	8.81	1.66	.03	.03	.16	893	1.21	338,100	32	2.1	1,270	7.6
Aug. 11-20	176,200	16	5.39	2.71	4.17	.15	3.24	7.43	1.64	.02	.07	.17	776	1.06	186,800	34	2.1	1,130	7.7
Aug. 21-31	180,600	15	6.49	2.96	5.09	.18	3.47	9.31	1.97	.03	.05	.19	929	1.26	227,600	35	2.3	1,330	7.7
Sept. 1-10	114,500	14	7.93	4.11	6.70	.20	3.44	12.57	2.74	.02	.08	.22	1,190	1.62	185,500	35	2.7	1,680	7.5
Sept. 11-20.....	77,000	13	6.54	4.19	6.44	.18	3.33	11.16	2.90	.02	.07	.22	1,090	1.48	114,000	37	2.8	1,570	7.6
Sept. 21-30.....	66,410	10	6.59	4.85	7.48	.17	3.18	12.53	3.53	.02	.06	.23	1,210	1.65	109,600	39	3.1	1,730	7.7
Weighted average	8,787,000	13	4.04	2.47	3.61	0.11	3.03	5.45	1.66	0.02	0.05	0.15	627	0.85	7,467,000	35	2.0	940	--

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 1953.
Water temperatures: October 1936 to October 1942, September 1943 to September 1953.
Sediment records: October 1925 to November 1942, September 1943 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 2,070 micromhos Sept. 11; minimum daily, 430 micromhos June 20.
Percent sodium: Maximum, 45 Feb. 21-28, Mar. 1-10; minimum, 21 June 21-30.
EXTREMES, 1937-42, 43-53.--Specific conductance: Maximum daily, 2,900 micromhos Sept. 6, 1940; minimum daily, 341 micromhos June 15, 1942.
Percent sodium (1941-42, 43-53): Maximum, 48 Sept. 11-20, 1942; minimum, 16 June 11-20, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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. 1-10, 1952.	147,200	14	6.34	4.03	7.13	0.21	4.03	9.91	3.78	0.02	0.07	0.24	1,100	1.50	220,800	40	3.1	1,600	7.6
Oct. 11-20	116,200	12	5.79	4.19	7.22	.23	3.77	9.39	3.92	.02	.05	.24	1,060	1.44	167,300	41	3.2	1,580	7.6
Oct. 21-31	129,400	11	6.14	4.61	8.44	.20	3.87	10.64	4.51	.02	.09	.21	1,180	1.60	207,000	44	3.6	1,740	7.5
Nov. 1-10.....	120,200	11	6.14	4.85	8.52	.20	3.92	10.91	4.57	.02	.11	.24	1,210	1.65	198,300	43	3.6	1,760	7.7
Nov. 11-20.....	133,000	11	6.39	4.85	8.52	.18	4.08	11.18	4.43	.02	.12	.19	1,230	1.67	222,100	43	3.6	1,780	7.8
Nov. 21-30.....	143,100	12	6.29	4.77	8.17	.19	4.06	10.66	4.32	.02	.08	.23	1,180	1.60	229,000	42	3.5	1,720	7.8
Dec. 1-10.....	106,100	14	6.19	4.44	8.26	.17	4.16	9.85	4.74	.02	.10	.46	1,160	1.58	167,600	43	3.6	1,740	7.3
Dec. 11-20.....	128,000	14	6.64	4.69	8.61	.20	4.47	10.26	5.16	.02	.11	.18	1,230	1.67	213,800	43	3.6	1,860	7.6
Dec. 21-31.....	165,600	15	5.99	4.19	7.70	.18	4.28	9.10	4.32	.02	.11	.19	1,100	1.50	248,400	43	3.4	1,650	7.7
Jan. 1-10, 1953.	115,300	14	5.69	3.95	7.74	.16	4.16	8.47	4.57	.02	.11	.17	1,060	1.44	166.000	44	3.5	1,610	7.6
Jan. 11-20.....	137,800	14	5.99	4.36	8.35	.19	4.33	9.29	4.99	.02	.11	.18	1,150	1.56	215,000	44	3.7	1,720	7.5
Jan. 21-31	154,300	13	5.69	3.95	7.35	.15	4.23	8.29	4.23	.02	.07	.22	1,030	1.40	216,000	43	3.4	1,560	7.9
Feb. 1-10.....	135,600	15	5.64	3.87	7.65	.20	4.47	8.16	4.43	.02	.04	.21	1,040	1.41	191,200	44	3.5	1,590	7.6

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 11-20, 1953	140,700	12	5.49	3.87	7.39	0.17	4.15	8.29	4.26	0.02	0.09	0.24	1,020	1.39	195,600	44	3.4	1,560	7.7
Feb. 21-28.....	101,100	12	5.39	4.03	7.91	.17	4.08	8.54	4.46	.02	.10	.27	1,050	1.43	144,600	45	3.6	1,600	7.8
Mar. 1-10.....	127,700	15	5.34	3.95	7.83	.20	4.36	8.18	4.68	.02	.04	.21	1,050	1.43	182,600	45	3.6	1,600	7.6
Mar. 11-20.....	164,200	12	5.39	3.87	7.61	.24	4.23	8.16	4.32	.02	.12	.26	1,030	1.40	229,900	44	3.5	1,570	7.7
Mar. 21-31	185,500	16	5.19	3.21	6.65	.24	4.64	6.83	3.64	.02	.02	.22	919	1.25	231,900	43	3.2	1,410	7.3
April 1-10	179,500	15	5.09	3.29	6.83	.26	4.29	7.10	3.89	.02	.04	.22	935	1.27	228,000	44	3.3	1,430	7.3
April 11-20.....	187,400	16	4.89	3.21	6.17	.20	4.24	6.81	3.22	.02	.04	.22	874	1.19	223,000	43	3.1	1,320	7.2
April 21-30.....	166,300	16	4.74	3.12	6.09	.26	4.26	6.54	3.47	.02	.01	.19	865	1.18	196,200	43	3.1	1,330	7.1
May 1-10.....	290,100	15	4.39	2.47	4.48	.18	4.05	5.08	2.34	.03	.04	.20	694	.94	272,700	39	2.4	1,080	7.3
May 11-20	232,400	14	4.09	2.22	3.91	.15	3.85	4.35	2.12	.03	.03	.19	621	.84	195,200	38	2.2	970	7.2
May 21-31	465,800	17	4.29	2.22	3.61	.16	4.13	4.14	2.03	.02	.01	.18	615	.84	391,300	35	2.0	960	7.4
June 1-10	949,100	17	3.34	1.40	1.48	.12	3.69	1.81	.79	.02	.03	.09	368	.50	474,600	23	1.0	585	7.5
June 11-20	1,072,000	15	3.19	1.23	1.30	.12	3.38	1.71	.71	.02	.02	.08	338	.46	493,100	22	.9	547	7.5
June 21-30	910,400	14	3.19	1.23	1.22	.12	3.47	1.64	.68	.02	.02	.11	335	.46	418,800	21	.8	541	7.5
July 1-10	417,400	13	3.39	1.40	1.96	.11	3.38	2.33	1.16	.02	.02	.12	403	.55	229,600	29	1.3	650	7.5
July 11-20	284,400	13	4.34	1.89	2.91	.16	3.74	3.93	1.75	.02	.02	.18	561	.76	216,100	31	1.7	888	7.5
July 21-31	278,000	18	5.74	2.55	4.44	.24	4.65	6.06	2.26	.02	.05	.16	790	1.07	297,500	34	2.2	1,200	7.3
Aug. 1-10.....	314,100	18	7.49	3.04	5.09	.26	4.98	8.58	2.26	.02	.05	.18	977	1.33	417,800	32	2.2	1,420	7.5
Aug. 11-20.....	192,300	17	6.44	2.88	4.83	.24	4.44	7.52	2.40	.02	.06	.21	885	1.20	230,800	34	2.2	1,320	7.4
Aug. 21-31.....	196,600	18	6.89	3.12	5.78	.28	5.08	8.14	3.02	.03	.05	.23	992	1.35	265,400	36	2.6	1,460	7.4
Sept. 1-10.....	130,200	17	8.83	3.70	7.13	.36	4.88	11.58	3.61	.03	.03	.23	1,250	1.70	221,300	36	2.9	1,720	7.7
Sept. 11-20	86,340	13	7.68	4.36	8.39	.31	4.51	11.41	4.74	.03	.06	.25	1,280	1.74	150,200	40	3.4	1,860	7.5
Sept. 21-30.....	73,830	11	7.19	4.69	9.04	.31	4.26	11.51	5.47	.03	.05	.25	1,310	1.78	131,400	43	3.7	1,930	7.5
Weighted average	8,879,000	15	4.74	2.55	4.39	0.17	3.98	5.45	2.43	0.02	0.04	0.17	719	0.98	8,699,000	37	2.3	1,100	

COLORADO RIVER BELOW HOOVER DAM, ARIZ.-NEV.

LOCATION.--At Hoover Dam, Ariz.-Nev. 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: November 1939 to September 1953.
Water temperatures: October 1941 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,080 micromhos Apr. 6; minimum daily, 712 micromhos Nov. 25-26.
Percent sodium: Maximum, 39 Apr. 21-30; minimum, 35 during several periods October to December.
EXTREMES, 1939-53.--Specific conductance: Maximum daily, 1,250 micromhos Mar. 2, 1941; minimum daily, 712 micromhos Nov. 25-26, 1952.
Percent sodium (1941-44, 1950-53): Maximum, 41 during several periods in 1951 and 1952; minimum, 32 Jan. 21-22, 25-29, 31, June 12-17, 19-20, 1944.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953.

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, 6-10, 1952	365,200	--	3.54	1.48	2.83	--	--	--	--	--	--	--	514	0.70	255,600	36	1.8	783	--
Oct. 13-17, 20 ..	258,800	12	3.39	1.73	2.78	0.12	2.34	4.48	1.30	0.02	0.04	--	505	.69	178,600	35	1.7	744	7.7
Oct. 21-24, 27-31	385,400	--	3.44	1.48	2.65	--	--	--	--	--	--	--	497	.68	262,100	35	1.7	751	--
Nov. 3-7, 10	255,900	--	3.44	1.48	2.61	--	--	--	--	--	--	--	498	.68	174,000	35	1.7	748	--
Nov. 12-14, 17-19	260,600	--	3.44	1.48	2.61	--	--	--	--	--	--	--	492	.67	174,600	35	1.7	745	--
Nov. 21, 24-26, 28	220,400	--	3.29	1.48	2.57	--	--	--	--	--	--	--	477	.65	143,300	35	1.7	721	--
Dec. 1-5, 8-10 ..	372,900	--	3.64	1.56	2.78	--	--	--	--	--	--	--	528	.72	268,500	35	1.7	795	--
Dec. 11-12, 15-19	317,600	--	4.64	1.97	4.00	--	--	--	--	--	--	--	698	.95	301,700	38	2.2	1,060	--
Dec. 22-24, 29-31	270,700	--	4.64	1.97	3.91	--	--	--	--	--	--	--	706	.96	259,900	37	2.2	1,040	--
Jan. 2, 5-9, 1953	266,600	--	4.54	1.97	3.74	--	--	--	--	--	--	--	694	.94	250,600	36	2.1	1,030	--
Jan. 12-16, 19-20	286,600	--	4.59	1.97	3.83	--	--	--	--	--	--	--	691	.94	269,400	37	2.1	1,020	--
Jan. 21-23, 26-30	340,200	--	4.49	1.89	3.83	--	--	--	--	--	--	--	676	.92	313,000	38	2.1	1,000	--
Feb. 2-6, 9-10 ..	299,500	12	4.39	2.30	3.91	.10	2.69	5.68	2.06	.01	.03	0.16	664	.90	269,600	37	2.1	1,010	7.8
Feb. 11-13, 16-19	283,000	--	4.39	2.06	4.00	--	--	--	--	--	--	--	674	.92	260,400	38	2.2	1,000	--

COLORADO RIVER MAIN STEM--Continued

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

Chemical analyses, water year October 1952 to September 1953--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, 24-27, 1953	182,900	--	4.39	2.06	3.96	--	--	--	--	--	--	--	667	0.91	166,400	38	2.2	994	--
Mar. 2-6, 9-10	258,000	--	4.39	2.06	3.96	--	--	--	--	--	--	--	672	.91	234,800	38	2.2	1,000	--
Mar. 11-13, 16-20	307,000	--	4.49	2.14	4.09	--	--	--	--	--	--	--	695	.95	291,600	38	2.3	1,030	--
Mar. 23-27, 30-31	246,500	--	4.44	2.06	4.04	--	--	--	--	--	--	--	689	.94	231,700	38	2.2	1,020	--
Apr. 1-3, 6-10	277,700	--	4.39	2.14	4.00	--	--	--	--	--	--	--	690	.94	261,000	38	2.2	1,030	--
Apr. 13-17, 20	206,500	12	4.34	2.63	3.91	0.13	2.75	6.00	2.06	0.02	0.04	0.14	692	.94	194,100	36	2.1	1,020	7.5
Apr. 21-24, 27-30	288,400	--	4.34	2.06	4.09	--	--	--	--	--	--	--	700	.95	274,000	39	2.3	1,010	--
May 1, 4-8	211,000	--	4.19	2.14	3.78	--	--	--	--	--	--	--	672	.91	192,000	37	2.1	976	--
May 11-15, 18-20	279,100	--	4.14	1.89	3.74	--	--	--	--	--	--	--	678	.92	256,800	38	2.2	986	--
May 21-22, 25-29	271,700	--	4.09	2.22	3.83	--	--	--	--	--	--	--	670	.91	247,200	38	2.2	973	--
June 1-5, 8-10	234,600	--	4.24	1.97	3.48	--	--	--	--	--	--	--	658	.89	208,800	36	2.0	956	--
June 11-12, 15-19	214,200	--	4.09	2.14	3.74	--	--	--	--	--	--	--	660	.90	192,800	38	2.1	956	--
June 22-26, 29-30	204,700	--	4.14	1.81	3.65	--	--	--	--	--	--	--	651	.89	182,200	38	2.1	947	--
July 1-3, 6-10	240,800	--	4.29	1.89	3.83	--	2.69	--	--	--	--	--	642	.87	209,500	38	2.2	949	7.7
July 13-17, 20	187,800	13	4.09	2.14	3.74	.10	2.72	5.39	1.86	.01	.03	.16	637	.87	163,400	37	2.1	957	7.9
July 21-24, 27-31	301,900	--	4.34	1.89	3.83	--	2.72	--	--	--	--	--	647	.88	265,700	38	2.2	965	7.8
Aug. 2, 4-5, 10	118,200	--	4.14	2.06	3.74	--	2.69	--	--	--	--	--	639	.87	102,800	38	2.1	951	7.7
Aug. 11-14, 17-20	282,200	--	4.29	1.81	3.70	--	2.72	--	--	--	--	--	635	.86	242,700	38	2.1	946	7.8
Aug. 21, 24-28, 31	240,800	--	4.29	1.81	3.70	--	2.72	--	--	--	--	--	640	.87	209,500	38	2.1	953	7.8
Sept. 1-4, 8-10	257,100	--	4.29	1.81	3.65	--	2.69	--	--	--	--	--	634	.86	221,100	37	2.1	941	8.0
Sept. 11, 14-18	231,700	--	4.29	1.73	3.65	--	--	--	--	--	--	--	638	.87	201,600	38	2.1	938	--
Sept. 21-25, 28, 30	221,600	--	4.19	1.89	3.48	--	--	--	--	--	--	--	630	.86	190,600	36	2.0	941	--
Total or weighted average	a 9,448,000	--	4.14	1.89	3.57	--	--	--	--	--	--	--	632	0.86	8,125,000	37	2.1	938	--

a Represents 74 percent of runoff for water year October 1952 to September 1953.

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 power plant and a quarter of a mile downstream from highway bridge over Colorado River at Yuma, Yuma County.
RECORDS AVAILABLE.--Chemical analyses: September 1926 to September 1928. October 1942 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,110 micromhos Apr. 1, 10, May 7, 18; minimum daily, 795 micromhos Jan. 5.
Percent sodium: Maximum, 40 Oct. 1-10, July 21-31, Aug. 1-20, Sept. 21-30; minimum, 36 Dec. 11-20, Jan. 1-10.
EXTREMES, 1943-53.--Specific conductance: Maximum daily, 1,150 micromhos on several days in May and June 1944 and June 1947; minimum daily, 795 micromhos Jan. 5, 1953.
Percent sodium: Maximum, 42 several periods in 1946, 1947, and 1951; minimum, 32 several periods in 1945, 1946, 1948, and 1949.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Samples collected prior to February 1943 were from gaging station on the Colorado River at Yuma. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952	11,000	15	3.49	2.30	3.91	0.11	2.59	5.27	2.00	0.02	0.02	0.13	630	0.86	9,460	40	2.3	955	8.0
Oct. 11-20	11,200	15	3.79	2.22	3.78	.10	2.59	5.20	1.95	.02	.02	.15	624	.85	9,520	38	2.2	932	7.9
Oct. 21-31	11,350	13	3.64	2.14	3.65	.10	2.54	5.04	1.81	.02	.02	.12	606	.82	9,310	38	2.1	904	8.1
Nov. 1-10	8,280	13	3.64	2.06	3.57	.10	2.52	4.87	1.81	.02	.03	.10	593	.81	6,710	38	2.1	887	7.1
Nov. 11-20	8,050	14	3.59	1.97	3.39	.09	2.56	4.60	1.75	.02	.02	.09	572	.78	6,280	38	2.0	861	8.1
Nov. 21-30	7,020	13	3.54	1.97	3.30	.09	2.49	4.54	1.69	.02	.03	.11	559	.76	5,340	37	2.0	849	8.1
Dec. 1-10	4,390	13	3.44	1.97	3.27	.09	2.51	4.52	1.64	.02	.02	.11	566	.77	3,380	37	2.0	839	8.5
Dec. 11-20	3,620	12	3.49	1.89	3.13	.09	2.49	4.41	1.61	.02	.02	.09	543	.74	2,680	36	1.9	827	8.3
Dec. 21-31	4,570	15	3.39	1.89	3.09	.09	2.49	4.31	1.61	.02	.02	.17	546	.74	3,380	37	1.9	818	8.2
Jan. 1-10, 1953	3,670	13	3.39	1.81	2.96	.09	2.46	4.25	1.49	.02	.02	.13	532	.72	2,640	36	1.8	801	8.2
Jan. 11-20	5,950	14	3.49	1.89	3.22	.10	2.51	4.52	1.66	.02	.02	.14	564	.77	4,580	37	2.0	835	8.2
Jan. 21-31	7,940	14	3.79	2.06	3.48	.10	2.54	4.93	1.83	.02	.02	.14	608	.83	6,590	37	2.0	902	8.1
Feb. 1-10	6,940	14	4.09	2.22	3.87	.10	a 2.69	5.37	2.03	.02	.02	.15	635	.86	5,970	38	2.2	960	8.0
Feb. 11-20	8,890	13	4.19	2.38	4.00	.11	b 2.74	5.56	2.14	.02	.02	.16	657	.89	7,910	37	2.2	992	7.9
Feb. 21-28	5,280	15	4.29	2.38	4.22	.11	a 2.79	5.73	2.28	.02	.02	.18	676	.92	4,860	38	2.3	1,030	8.1

a Includes 0.27 equivalent per million carbonate (CO_3).
b Includes 0.17 equivalent per million carbonate (CO_3).

DIVERSIONS AND RETURN FLOWS AT AND BELOW IMPERIAL DAM--Continued

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

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953	11,780	13	4.39	2.36	4.22	0.11	c 2.79	5.87	2.28	0.02	0.02	0.16	684	0.93	10,960	38	2.3	1,040	8.1
Mar. 11-20	12,390	12	4.39	2.55	4.39	.11	d 2.85	6.00	2.45	.02	.02	.16	707	.96	11,890	38	2.4	1,060	8.1
Mar. 21-31	11,940	12	4.49	2.55	4.44	.11	a 2.85	6.10	2.45	.02	.02	.17	711	.97	11,580	38	2.4	1,080	8.2
Apr. 1-10	8,930	13	4.59	2.63	4.35	.11	3.06	6.18	2.48	.02	.04	.17	737	1.00	8,930	37	2.3	1,100	7.9
Apr. 11-20	10,070	13	4.59	2.63	4.35	.11	3.13	6.20	2.45	.02	.04	.23	740	1.01	10,170	37	2.3	1,100	8.0
Apr. 21-30	9,550	13	4.59	2.63	4.35	.11	3.05	6.20	2.45	.02	.04	.20	739	1.01	9,650	37	2.3	1,100	7.9
May 1-10	9,390	13	4.59	2.55	4.39	.11	3.06	6.20	2.48	.02	.04	.22	739	1.01	9,480	38	2.3	1,100	8.0
May 11-20	11,270	14	4.49	2.71	4.52	.11	2.97	6.25	2.40	.02	.02	.23	737	1.00	11,270	38	2.4	1,100	7.7
May 21-31	13,120	14	4.49	2.71	4.48	.11	2.93	6.25	2.45	.02	.02	.20	744	1.01	13,250	38	2.4	1,100	7.8
June 1-10	11,930	13	4.49	2.55	4.39	.11	2.95	6.20	2.45	.02	.02	.21	741	1.01	12,050	38	2.3	1,090	7.8
June 11-20.....	13,160	13	4.39	2.55	4.39	.11	2.90	6.14	2.45	.02	.03	.19	734	1.00	13,160	38	2.4	1,090	7.9
June 21-30.....	12,810	15	4.39	2.55	4.30	.11	c2.90	6.06	2.43	.02	.02	.27	732	1.00	12,810	38	2.3	1,080	8.1
July 1-10	11,970	17	4.24	2.55	4.39	.12	2.90	6.00	2.43	.02	.02	.19	713	.97	11,610	39	2.4	1,070	7.7
July 11-20	12,570	16	4.19	2.47	4.39	.12	2.88	5.95	2.40	.02	.02	.18	703	.96	12,070	39	2.4	1,070	7.7
July 21-31	16,190	15	4.19	2.38	4.39	.12	2.85	5.85	2.37	.02	.02	.18	701	.95	15,380	40	2.4	1,050	8.0
Aug. 1-10	14,980	16	4.14	2.38	4.39	.12	2.79	5.81	2.37	.02	.02	.20	697	.95	14,230	40	2.4	1,050	7.9
Aug. 11-20	13,180	15	4.09	2.38	4.35	.11	2.77	5.79	2.31	.02	.02	.17	704	.96	12,650	40	2.4	1,040	7.8
Aug. 21-31	13,850	16	4.14	2.47	4.26	.11	2.72	5.83	2.31	.02	.02	.18	689	.94	13,020	39	2.3	1,040	7.6
Sept. 1-10	11,410	13	4.14	2.38	4.22	.11	2.72	5.77	2.34	.02	.02	.17	689	.94	10,730	39	2.3	1,040	7.7
Sept. 11-20	13,790	12	4.09	2.47	4.17	.10	2.69	5.64	2.34	.02	.02	.16	684	.93	12,820	39	2.3	1,030	7.8
Sept. 21-30	13,350	12	4.09	2.38	4.35	.11	2.70	5.81	2.40	.02	.02	.18	689	.94	12,550	40	2.4	1,050	7.8
Weighted average	365,800	14	4.14	2.38	4.13	0.11	2.79	5.68	2.23	0.02	0.02	0.17	680	0.92	336,500	38	2.3	1,020	--

a Includes 0.27 equivalent per million carbonate (CO_3).
c Includes 0.20 equivalent per million carbonate (CO_3).
d Includes 0.33 equivalent per million carbonate (CO_3).

GUNNISON RIVER BASIN

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

LOCATION.--At road bridge about half a 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.
RECORDS AVAILABLE.--Chemical analyses: October 1931 to September 1953.
Water temperatures: April 1949 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 2,230 micromhos Sept. 24; minimum daily, 364 micromhos June 3.
Percent sodium: Maximum, 32 Dec. 21-31, Jan. 21-31, April 1-10; minimum, 18 May 25-31.
EXTREMES, 1941-53.--Specific conductance: Maximum daily, 2,680 micromhos Nov. 5, 1950; minimum daily, 280 micromhos May 23,1948.
Percent sodium (1950-53): Maximum, 34 Feb. 1-10, 1951, Jan. 21-31, Feb. 21-29, 1952; minimum, 10 June 2-5, 10, 1952.
REMARKS.--Values reported for dissolved solids are sums of 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 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	23,290	17	8.33	5.67	5.48	0.14	3.43	15.36	0.51		0.13	--	1,250	1.70	39,590	28	2.1	1,670	
Oct. 12-13, 15, 17-19	12,240	18	10.08	6.58	6.65	.15	3.79	18.47	.68		.16	0.26	1,490	2.03	24,850	28	2.3	1,890	
Oct. 21-31	23,030	18	9.73	6.58	6.70	.15	3.83	18.03	.59		.16	--	1,470	2.00	46,060	29	2.3	1,870	
Nov. 1-10	19,030	17	10.53	7.32	7.96	.19	4.31	20.19	.65		.16	--	1,640	2.23	42,440	31	2.7	2,060	
Nov. 11-20.....	23,150	19	9.48	6.58	6.48	.14	4.26	17.57	.56		.16	--	1,450	1.97	45,610	29	2.3	1,860	
Nov. 21-30.....	21,600	19	8.83	6.17	6.09	.17	4.16	16.28	.56		.16	--	1,350	1.84	39,740	29	2.2	1,780	
Dec. 1-10	23,110	22	8.58	6.17	6.52	.18	4.10	16.28	.62		.19	--	1,370	1.86	42,980	30	2.4	1,750	
Dec. 11-20.....	25,880	20	7.24	5.18	5.57	.17	3.74	13.45	.45		.18	--	1,150	1.56	40,370	31	2.2	1,520	
Dec. 21-31.....	22,630	20	7.49	5.43	6.09	.18	3.88	14.39	.48		.18	--	1,220	1.66	37,570	32	2.4	1,600	
Jan. 1-10, 1953 .	22,060	20	6.89	5.02	5.35	.19	3.61	12.85	.56		.16	--	1,100	1.50	33,090	31	2.2	1,470	
Jan. 11-20	21,360	18	6.79	5.10	5.44	.18	3.56	12.97	.48		.16	.14	1,100	1.50	32,040	31	2.2	1,480	
Jan. 21-31	21,680	18	6.59	5.02	5.44	.15	3.46	12.76	.45		.16	--	1,080	1.47	31,870	32	2.3	1,460	
Feb. 1-10.....	19,090	18	6.44	5.02	5.26	.16	3.34	12.72	.56		.12	--	1,070	1.46	27,870	31	2.2	1,430	
Feb. 11-19.....	15,580	18	6.19	4.77	5.00	.16	3.33	12.12	.56		.15	--	1,030	1.50	21,810	31	2.1	1,390	
Feb. 20, 24-28 ..	10,810	19	6.64	5.10	5.35	.15	3.51	12.91	.51		.16	--	1,100	1.50	16,220	31	2.2	1,470	

GUNNISON RIVER BASIN--Continued

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953.	18,050	18	6.29	4.85	5.09	0.15	3.29	12.24	0.56		0.15	--	1,040	1.41	25,450	31	2.2	1,400	
Mar. 11-20	19,340	16	5.49	4.03	4.30	.16	3.03	10.28	.48		.10	--	889	1.21	23,400	31	2.0	1,220	
Mar. 21-31	23,820	15	5.49	3.87	4.09	.14	3.00	9.95	.51		.11	--	864	1.18	28,110	30	1.9	1,190	
Apr. 1-10	24,480	19	5.39	4.03	4.57	.10	2.98	10.18	.68		.10	--	894	1.22	29,870	32	2.1	1,230	
Apr. 11-21.....	20,400	18	6.19	4.61	4.74	.12	3.21	11.78	.54		.10	0.21	999	1.36	27,740	30	2.0	1,350	
Apr. 22-30.....	40,960	18	3.79	2.14	2.22	.08	2.69	5.18	.24		.06	--	516	.70	28,670	27	1.3	753	
May 1-8	23,330	17	5.04	3.12	3.26	.09	2.72	8.06	.37		.08	--	721	.98	22,860	28	1.6	1,000	
May 9-12	17,300	15	3.69	2.06	1.51		2.38	4.64	.20		.04	--	453	.62	10,730	21	.9	678	
May 13-21.....	31,870	15	4.99	3.04	3.26	.10	2.70	8.39	.34		.07	--	731	.99	31,550	29	1.6	1,010	
May 23-24 a	24,650	15	4.92		--	--	2.77	--	--		.02	--	--	--	--	--	--	595	
May 25-31	125,400	14	2.69	1.15	.83	.05	2.16	2.29	.06		.04	--	282	.38	47,650	18	.6	434	
June 1-10	157,700	15	2.50	1.15	1.04	.10	1.93	2.58	.13		.04	--	296	.40	63,080	22	.8	463	
June 11-20	191,700	13	2.59	.99	.91	.10	2.03	2.46	.11		.04	--	288	.39	74,760	20	.7	438	
June 22-27	58,200	14	3.19	1.48	1.43	.08	2.11	3.79	.16		.05	--	386	.52	30,260	23	.9	570	
June 30, July 1-2, 4	18,330	14	3.99	2.22	1.96		2.33	5.58	.21		.05	--	515	.70	12,830	24	1.1	754	
July 6-10	12,350	13	5.39	3.12	3.13	.13	2.65	8.45	.28		.06	--	736	1.00	12,350	27	1.5	1,020	
July 11-20	29,170	19	6.69	3.95	3.96	.15	3.08	11.30	.34		.05	.22	949	1.29	37,630	27	1.7	1,260	
July 21-31	23,430	17	6.79	4.44	4.70	.21	3.16	12.24	.39		.03	--	1,020	1.39	32,570	29	2.0	1,360	
Aug. 1-10.....	34,330	21	7.44	4.44	4.57	.16	3.38	12.55	.42		.07	--	1,060	1.44	49,440	28	1.9	1,400	
Aug. 11-20.....	16,090	19	9.73	6.50	6.87	.23	3.31	18.55	.56		.08	--	1,480	2.01	32,340	29	2.4	1,850	
Aug. 21-31.....	16,980	17	9.93	6.50	7.04	.19	3.41	19.11	.65		.08	--	1,510	2.05	34,810	30	2.5	1,880	
Sept. 1-10	15,890	23	10.68	6.83	7.48	.20	3.38	20.59	.62		.13	--	1,620	2.20	34,960	30	2.5	2,010	
Sept. 11-20	15,110	21	10.88	6.83	7.44	.17	3.39	20.82	.62		.13	--	1,630	2.22	33,540	29	2.5	2,020	
Sept. 21-30	15,090	22	11.78	7.48	8.17	.18	3.64	22.90	.65		.18	--	1,790	2.43	36,670	30	2.6	2,170	
Total or weighted average	b 1,254,000	16	5.24	3.29	3.30	0.12	2.79	8.58	0.31		0.08	--	754	1.03	1,292,000	28	1.6	1,020	

a Not included for computation of weighted averages.

b Represents 94 percent of runoff for water year October 1952 to September 1953.

GREEN RIVER BASIN

GREEN RIVER AT GREEN RIVER, UTAH

LOCATION.--At gaging station, 1 mile southeast of 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 1953.
Water temperatures: April 1949 to September 1953.
Sediment records: May 1930 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,460 micromhos Dec. 3; minimum daily, 333 micromhos June 23.
Percent sodium: Maximum, 42 Sept. 11-20, 21-30; minimum, 21 June 21-30.
EXTREMES, 1941-53.--Specific conductance: Maximum daily, 2,420 micromhos Sept. 29, 1943; minimum daily, 321 micromhos May 30, 1948.
Percent sodium (1950-53): Maximum, 42 Oct. 11-20, 1951, Sept. 11-20, 21-30, 1953; minimum, 21 June 1-10, 1951, June 11-20, 1952, June 21-30, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	41,890	9.2	3.69	3.37	4.65	0.11	3.61	6.87	1.30		0.03	--	750	1.02	42,730	39	2.5	1,100	7.9
Oct. 11-31	87,000	9.1	4.04	3.70	5.22	.13	3.90	7.77	1.41		.02	0.15	831	1.13	98,310	40	2.7	1,210	--
Nov. 1-30	122,500	11	4.39	4.03	5.48	.10	4.20	8.35	1.47		.04	--	902	1.23	150,700	39	2.7	1,280	
Dec. 1-31	128,900	13	4.69	4.19	5.22	.11	4.61	7.31	1.49		.04	--	884	1.20	154,700	37	2.5	1,260	--
Jan. 1-31, 1953..	139,700	13	4.29	3.62	4.44	.07	4.28	6.68	1.27		.05	.27	770	1.05	146,700	36	2.2	1,110	--
Feb. 1-28	141,200	12	4.09	3.78	4.65	.08	4.13	6.93	1.27		.05	--	768	1.04	146,800	37	2.3	1,110	--
Mar. 1-10.....	56,470	13	4.14	3.54	4.70	.11	4.16	6.97	1.16		.03	--	763	1.04	58,730	38	2.4	1,140	--
Mar. 11-20.....	88,260	12	3.94	3.04	4.35	.09	3.83	6.31	1.18		.04	--	705	.96	84,730	38	2.3	1,050	--
Mar. 21-31	72,040	11	3.84	3.21	4.83	.09	3.79	6.68	1.35		.03	--	744	1.01	72,760	40	2.6	1,100	--
Apr. 1-10	81,000	13	3.89	3.21	4.65	.09	3.87	6.75	1.24		.04	--	737	1.00	81,000	39	2.5	1,080	--
Apr. 11-20	67,600	12	3.69	2.96	3.91	.12	3.70	5.93	1.10		.03	.23	668	.91	61,520	37	2.2	994	--
Apr. 21-30	72,300	12	3.84	3.37	4.00	.08	3.83	5.98	1.21		.04	--	697	.95	68,680	35	2.1	1,010	--
May 1-10.....	129,400	12	3.09	2.06	2.30	.07	3.36	3.31	.62		.04	--	452	.61	78,930	31	1.4	679	--
May 11-23.....	140,700	12	2.94	1.97	2.30	.08	3.15	3.31	.65		.04	--	442	.60	84,420	32	1.5	669	--
May 24-31.....	183,800	12	--	--	1.57	.06	2.82	2.27	.37		.04	--	340	.46	84,550	29	--	511	

GREEN RIVER BASIN--Continued

GREEN RIVER AT GREEN RIVER, UTAH--Continued

Chemical analyses, water year October 1952 to September 1953--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 1-10, 1953..	320,900	13	2.69	1.15	1.17	0.06	3.11	1.52	0.34		0.03	--	300	0.41	131,600	23	0.8	472	--
June 11-20	443,700	12	2.35	1.07	1.09	.06	2.69	1.42	.31		.03	--	268	.36	159,700	24	.8	419	--
June 21-30	402,200	11	2.30	.99	.91	.07	2.67	1.21	.25		.03	--	248	.34	136,700	21	.7	391	--
July 1-10.....	170,200	11	2.40	1.23	1.43	.08	2.56	2.00	.51		.02	--	302	.41	69,780	28	1.1	478	--
July 11-20	116,400	11	2.84	1.56	1.96	.09	3.05	2.83	.56		.02	0.10	385	.52	60,530	30	1.3	603	--
July 21-31.....	89,730	11	2.74	1.81	2.39	.09	2.97	3.23	.65		.02	--	414	.56	50,250	34	1.6	649	--
Aug. 1-10	85,920	16	4.04	2.80	3.74	.14	3.70	6.00	.87		.05	--	670	.91	78,190	35	2.0	973	--
Aug. 11-20	69,960	13	4.09	2.38	3.04	.15	3.77	4.79	.85		.03	--	582	.79	55,270	31	1.7	879	--
Aug. 21-31	55,740	11	3.39	2.55	3.61	.08	3.34	5.18	.96		.02	--	590	.80	44,590	37	2.1	886	--
Sept. 1-10	35,270	12	3.99	2.96	3.96	.11	3.67	6.20	1.21		.02	--	687	.93	32,800	36	2.1	1,000	--
Sept. 11-20.....	28,220	9.7	3.59	3.12	4.87	.10	3.41	6.70	1.33		.02	--	734	1.00	28,220	42	2.7	1,040	--
Sept. 21-30	23,840	8.6	3.79	3.29	5.13	.10	3.44	7.25	1.47		.01	--	762	1.04	24,790	42	2.7	1,110	--
Total or weighted average.....	3,395,000	12	3.19	2.22	2.70	0.08	3.31	3.91	0.73		0.03	--	496	0.67	2,275,000	33	1.6	740	--

SAN JUAN RIVER BASIN

SAN JUAN RIVER NEAR BLANCO, N. MEX.

LOCATION.--At highway bridge, half a mile downstream from gaging station which is 1 mile upstream from Canyon Largo and 1½ miles east of Blanco, San Juan County.
DRAINAGE AREA.--3,560 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1953.
Water temperatures: March 1949 to September 1953.
Sediment records: March 1949 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 615 micromhos March 9; minimum daily, 114 micromhos June 5.
Percent sodium: Maximum, 40 Sept. 21-30; minimum, 14 May 25-31.
EXTREMES, 1945-53.--Specific conductance: Maximum daily, 1,420 micromhos Aug. 16, 1947; minimum daily, 107 micromhos June 20, 1952.
Percent sodium (1945-49, 1950-53): Maximum, 52 July 11-16, 18, 20, 1947; minimum, 13 Apr. 11-20 and June 4, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952 ..	6,370	16	1.80	0.62	1.17	0.08	2.13	1.42	0.14	0.01	0.01	0.05	225	0.31	1,970	32	1.1	359	7.7
Oct. 11-20	4,510	--	2.20	.72	1.43	--	--	--	--	--	--	--	264	.36	1,620	33	1.2	419	--
Oct. 21-31	4,600	--	2.20	.76	1.57	--	--	--	--	--	--	--	276	.38	1,750	35	1.3	440	--
Nov. 1-10.....	4,080	--	2.20	.82	1.74	--	--	--	--	--	--	--	307	.42	1,710	37	1.4	476	--
Nov. 11-20.....	5,060	--	2.45	.82	1.70	--	--	--	--	--	--	--	306	.42	2,130	34	1.3	465	--
Nov. 21-30.....	3,450	--	2.84	.99	1.83	--	--	--	--	--	--	--	352	.48	1,660	32	1.3	535	--
Dec. 1-10.....	5,440	--	2.79	.99	1.78	--	--	--	--	--	--	--	344	.47	2,560	32	1.3	521	--
Dec. 11-31	11,500	--	2.45	.78	1.52	--	--	--	--	--	--	--	292	.40	4,600	32	1.2	455	--
Jan. 1-15, 1953 ..	7,680	15	2.30	.81	1.52	.07	2.33	2.10	.20	.02	.01	.09	293	.39	3,000	32	1.2	449	8.0
Jan. 16-20	2,820	--	2.40	.75	1.52	--	--	--	--	--	--	--	292	.40	1,130	33	1.2	446	--
Jan. 21-31	6,850	--	2.35	.76	1.52	--	--	--	--	--	--	--	296	.40	2,740	33	1.2	453	--
Feb. 1-10.....	7,030	--	2.35	.76	1.78	--	--	--	--	--	--	--	291	.40	2,810	36	1.4	469	--
Feb. 11-20	4,530	--	2.54	.82	1.78	--	--	--	--	--	--	--	310	.42	1,900	35	1.4	498	--
Feb. 21-28	4,050	--	2.69	.82	1.74	--	--	--	--	--	--	--	312	.42	1,700	33	1.3	502	--
Mar. 1-10	6,990	--	2.59	.82	1.83	--	--	--	--	--	--	--	338	.46	3,220	35	1.4	507	--
Mar. 11-20	12,810	--	2.89	1.32	1.43	--	--	--	--	--	--	--	330	.45	5,760	25	1.0	523	--
Mar. 21-31	17,630	--	2.30	.90	1.90	--	--	--	--	--	--	--	246	.33	5,820	24	.8	393	--

SAN JUAN RIVER BASIN--Continued

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

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953 ..	15,960	15	1.75	0.72	0.83	0.06	1.75	1.48	0.10	0.02	0.01	0.04	216	0.29	4,630	25	0.7	322	7.6
Apr. 11-14	7,140	--	2.30	.82	.96	--	--	--	--	--	--	--	247	.34	2,430	24	.8	385	--
Apr. 15-20	10,570	--	1.70	.57	.78	--	--	--	--	--	--	--	187	.25	2,640	26	.7	289	--
Apr. 21-30	38,490	--	1.30	.39	.48	--	--	--	--	--	--	--	139	.19	7,310	22	.5	208	--
May 1-10	23,230	--	1.40	.43	.70	--	--	--	--	--	--	--	159	.22	5,110	28	.7	245	--
May 11-20	19,810	--	1.40	.43	.74	--	--	--	--	--	--	--	166	.23	4,560	29	.8	248	--
May 21-24	15,470	--	1.40	.50	.61	--	--	--	--	--	--	--	166	.23	3,560	24	.6	245	--
May 25-31	54,470	--	1.00	.34	.22	--	--	--	--	--	--	--	113	.15	8,170	14	.3	153	--
June 1-10	61,020	--	.85	.24	.23	--	--	--	--	--	--	--	100	.14	8,540	17	.3	135	--
June 11-20	59,190	--	.80	.26	.33	--	--	--	--	--	--	--	102	.14	8,290	24	.5	143	--
June 21-30	21,750	--	1.15	.37	.65	--	--	--	--	--	--	--	148	.20	4,350	30	.7	220	--
July 1-8	7,720	16	1.60	.58	.91	.07	1.88	1.17	.10	.02	.01	.06	202	.27	2,080	29	.9	310	7.5
July 9-10	1,320	16	2.50	1.15	1.30	.10	2.46	2.37	.11	.02	.02	--	315	.43	568	26	1.0	474	7.8
July 11-17	5,600	--	2.15	.80	1.35	--	--	--	--	--	--	--	276	.38	2,130	31	1.1	415	--
July 18-30	22,000	--	1.85	.66	1.04	--	--	--	--	--	--	--	234	.32	7,040	29	.9	352	--
Aug. 1-10.....	13,050	--	2.05	.73	1.09	--	--	--	--	--	--	--	246	.33	4,310	28	.9	378	--
Aug. 11-20	4,900	--	2.10	.67	1.43	--	--	--	--	--	--	--	263	.36	1,760	34	1.2	409	--
Aug. 21-31	5,500	--	2.00	.72	1.43	--	--	--	--	--	--	--	257	.35	1,920	34	1.2	401	--
Sept. 1-10	3,110	--	2.00	.73	1.65	--	--	--	--	--	--	--	272	.37	1,150	38	1.4	430	--
Sept. 11-20	2,340	--	2.30	.81	1.96	--	--	--	--	--	--	--	318	.43	1,010	39	1.6	491	--
Sept. 21-30	1,740	--	2.25	.81	2.04	--	--	--	--	--	--	---	334	.45	783	40	1.6	515	--
Weighted average	509,900	--	1.55	0.53	0.78	--	--	--	--	--	--	--	185	0.25	127,400	27	0.8	278	--

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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 1952.
Water temperatures: May 1944 to September 1952.
Sediment records: August to September 1928, July 1929 to September 1952.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,620 micromhos Dec. 19; minimum daily, 208 micromhos June 17.
Percent sodium: Maximum, 40 Aug. 1-2; minimum, 13 May 11-20.
EXTREMES, 1929-52.--Specific conductance (1941-52): Maximum daily, 2,070 micromhos Aug. 26, 1943; minimum daily 208 micromhos June 17, 1952.
Percent sodium: Maximum, 52 Aug. 16-17, 1950; minimum, 11 May 21, 23-27, 29-31, July 1-10, 1944.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243. The record of water quality for the period December 1951 to September 1952 was not published in Water-Supply Paper 1362 and is included herein.

Chemical analyses, December 1951 to September 1952

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				
Dec. 16-20, 1951.	2,410	17	8.48	3.95	6.44	0.08	4.10	13.14	1.24	0.02	0.08	--	1,220	1.66	4,000	34	2.6	1,560	7.8
Dec. 21-31.....	16,930	15	6.64	2.96	5.22	.08	3.64	10.08	1.02	.03	.07	--	961	1.31	22,180	35	2.4	1,270	7.7
Jan. 1-10, 1952..	26,900	13	5.49	2.55	4.39	.09	3.02	8.66	.68	.03	.08	--	811	1.10	29,590	35	2.2	1,110	7.7
Jan. 11-20	38,160	14	5.69	2.55	4.76		3.52	8.70	.68	.02	.08	0.12	844	1.15	43,880	37	2.4	1,150	7.8
Jan. 21-31	22,900	14	6.09	2.47	5.39		3.33	9.72	.72	.02	.12	--	917	1.25	28,630	39	2.6	1,240	7.9
Feb. 1-10.....	14,240	13	6.09	3.04	4.76		3.43	9.49	.87	.02	.08	--	912	1.24	17,660	34	2.2	1,230	7.9
Feb. 11-20	14,720	12	5.89	2.80	4.69		3.20	9.26	.82	.02	.08	--	875	1.19	17,520	35	2.2	1,180	7.9
Feb. 21-29	11,420	11	5.84	2.96	4.45		3.28	9.08	.82	.02	.05	--	869	1.18	13,490	34	2.1	1,180	7.9
Mar. 1-10.....	15,790	12	6.09	3.04	4.97		3.21	9.97	.82	.02	.08	--	929	1.26	19,900	35	2.3	1,240	7.9
Mar. 11-20.....	26,140	13	5.74	2.71	4.45		3.57	8.47	.73	.02	.11	--	823	1.12	29,280	34	2.2	1,120	7.6
Mar. 21-31.....	44,930	12	5.09	2.14	3.43		3.41	6.56	.56	.02	.11	--	673	.92	41,340	32	1.8	931	7.6
Apr. 1-10	119,100	12	3.64	1.56	1.78		2.88	3.62	.37	.02	.09	--	428	.58	69,080	26	1.1	615	7.7
Apr. 11-20	144,500	11	2.50	.99	1.19		2.36	2.02	.21	.02	.07	.06	278	.38	54,910	25	.9	416	7.8
Apr. 21-30	188,800	11	2.30	.71	1.25		1.97	1.94	.27	.02	.06	--	260	.35	66,080	29	1.0	390	7.8
May 1-10	240,100	10	2.15	.82	.84		1.97	1.62	.16	.02	.04	--	228	.31	74,430	22	.7	345	7.8
May 11-20	228,400	13	2.30	.62	.45		2.16	1.08	.09	.02	.02	--	206	.28	63,950	13	.4	321	7.7
May 21-31.....	149,200	12	2.20	.67	.63		1.87	1.46	.13	.02	.02	--	218	.30	44,760	18	.5	338	7.7

SAN JUAN RIVER BASIN--Continued

SAN JUAN RIVER NEAR BLUFF, UTAH--Continued

Chemical analyses, December 1951 to September 1952--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 1-10, 1952...	292,100	13	2.20	0.60	0.55		2.05	1.17	0.09	0.02	0.02	--	205	0.28	81,790	16	0.5	319	7.8
June 11-20	312,600	12	1.60	.49	.38		1.51	.85	.07	.02	.02	--	152	.21	65,650	15	.4	237	7.9
June 21-30	164,500	13	2.00	.51	.50		1.80	1.06	.12	.02	.01	--	185	.25	41,120	17	.4	294	7.5
July 1-6, 9-10	85,010	14	2.20	.68	.92		1.88	1.73	.16	.02	.01	--	237	.32	27,200	24	.8	364	7.7
July 7-8	29,140	16	3.39	1.07	1.17		2.61	2.79	.20	--	.03	--	a345	.47	13,700	21	.8	522	--
July 11-20	72,120	13	2.59	.82	1.09		1.95	2.33	.20	.01	.01	0.06	287	.39	28,130	24	.8	439	7.7
July 21-29.....	30,740	13	2.79	1.32	1.27		2.15	2.89	.31	.02	.01	--	338	.46	14,140	24	.9	518	7.6
July 30-31.....	21,100	20	5.44	2.06	4.14		4.11	6.97	.54	--	.02	--	a728	.99	20,890	36	2.1	1,040	--
Aug. 1-2	9,040	20	4.74	1.48	4.18		3.52	6.50	.37	--	.01	--	a661	.90	8,140	40	2.4	976	--
Aug. 3-10	27,110	16	3.39	1.23	1.76		2.33	3.66	.34	.02	.03	--	398	.54	14,640	28	1.2	593	7.9
Aug. 11-20	20,360	13	3.94	1.64	2.44		2.64	4.89	.45	.02	.02	--	507	.69	14,050	30	1.5	744	7.6
Aug. 21-22,25-31..	21,150	15	3.84	1.64	2.42		2.67	4.79	.39	.02	.03	--	511	.69	14,590	31	1.5	747	7.7
Aug. 23-24	5,590	14	4.79	2.30	3.26		3.29	6.70	.34	--	.02	--	a647	.88	4,920	31	1.7	970	--
Sept. 1-10	15,350	13	4.09	1.81	2.69		2.59	5.45	.51	.02	.02	--	556	.76	11,670	31	1.6	806	7.7
Sept. 11-20.....	9,040	11	4.59	2.30	3.87	0.08	2.72	7.56	.73	.02	.03	.13	707	.96	8,680	36	2.1	1,010	7.8
Sept. 21-25.....	18,450	16	6.09	2.30	4.57	.13	3.92	8.60	.68	.02	.01	--	851	1.16	21,400	35	2.2	1,190	7.4
Sept. 26-30.....	13,570	16	4.29	1.64	2.83	.10	2.75	5.68	.51	.02	.05	--	595	.81	10,990	32	1.6	842	7.8
Total or weighted average.....	b 2,452,000	12	2.74	0.99	1.30		2.20	2.52	0.23	0.02	0.04	--	312	0.42	1,030,000	26	1.0	460	--

a Sum of determined constituents.

b Represents 96 percent of runoff for water year October 1951 to September 1952.

SAN JUAN RIVER NEAR BLUFF, UTAH--Continued

LOCATION.--At bridge on State Highway 47, 1800 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 1953.
Water temperatures: May 1944 to September 1953.
Sediment records: August to September 1928, July 1929 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,700 micromhos Sept. 1; minimum daily, 239 micromhos June 16-17.
Percent sodium: Maximum, 43 July 18-21; minimum 19 May 26-31, June 1-10.
EXTREMES, 1929-53.--Specific conductance (1941-53): Maximum daily, 2,070 micromhos Aug. 26,1943; minimum daily, 208 micromhos June 17,1952.
Percent sodium: Maximum, 52 Aug. 16-17, 1950; minimum, 11 May 21, 23-27, 29-31, July 1-10, 1944.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952.	16,220	11	4.89	1.89	3.26	0.10	2.79	6.79	0.65	0.02	0.02	--	674	0.92	14,920	32	1.8	955	7.8
Oct. 11-31	21,340	8.4	5.64	2.55	4.39	.10	2.84	9.01	.82	.03	.04	0.14	862	1.17	25,000	35	2.2	1,170	7.8
Nov. 1-30.....	40,680	11	6.44	2.80	4.83	.11	3.28	9.05	.90	.03	.05	--	956	1.30	52,880	34	2.3	1,290	8.0
Dec. 1-31.....	43,400	18	6.34	2.88	4.74	.09	3.24	9.89	.96	--	.06	--	920	1.25	54,250	34	2.2	1,270	7.8
Jan. 1-31, 1953.	42,210	14	6.34	2.71	4.39	.09	3.24	9.54	.87	--	.06	.11	906	1.23	51,920	32	2.1	1,240	7.8
Feb. 1-28.....	35,560	11	6.04	2.47	4.26	.09	3.11	9.12	.90	--	.05	--	858	1.17	41,610	33	2.1	1,180	8.0
Mar. 1-10.....	13,060	11	6.04	2.80	4.57	.11	3.11	9.66	.79	.02	.05	--	898	1.22	15,930	34	2.2	1,210	8.0
Mar. 11-20	20,190	14	5.49	2.06	3.83	.12	3.08	7.77	.68	.02	.06	--	768	1.04	21,000	33	2.0	1,060	7.8
Mar. 21-31	22,350	14	4.84	1.97	2.96	.12	2.82	6.62	.56	.02	.05	--	657	.89	19,890	30	1.6	920	7.8
Apr. 1-10.....	29,870	14	3.94	1.40	2.61	.09	2.49	5.02	.42	.02	.05	--	520	.71	21,210	32	1.6	755	7.8
Apr. 11-20	28,280	13	3.94	1.64	2.48	.09	2.39	5.31	.42	.03	.04	.08	532	.72	20,360	30	1.5	762	--
Apr. 21-30	49,090	16	3.09	1.23	1.61	.05	2.33	3.29	.28	.02	.03	--	383	.52	25,530	27	1.1	575	7.8
May 1-6	25,670	15	2.74	1.15	1.22	.04	2.00	2.79	.23	.02	.03	--	326	.44	11,290	24	.9	488	7.7
May 7-20	38,900	14	3.24	1.40	1.91	.06	2.20	3.89	.34	.02	.02	.06	424	.58	22,560	29	1.3	619	7.5
May 21-25	16,960	15	3.29	1.56	2.22	.06	2.26	4.31	.39	.02	.02	--	456	.62	10,520	31	1.4	665	7.5
May 26-31.....	74,700	14	2.30	.75	.74	.04	2.00	1.58	.14	.02	.03	--	238	.32	23,900	19	.6	361	7.8

SAN JUAN RIVER BASIN--Continued

SAN JUAN RIVER NEAR BLUFF, UTAH--Continued

Chemical analyses, water year October 1952 to September 1953--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 1-10, 1953.	107,100	12	1.80	0.57	0.57	0.03	1.51	1.31	0.14	0.02	0.02	--	191	0.26	27,850	19	0.5	296	7.6
June 11-20	114,000	11	1.65	.55	.57	.03	1.31	1.33	.14	.01	.02	0.03	180	.24	27,360	20	.5	275	7.8
June 21-30	46,330	16	2.35	.80	1.13	.05	1.85	2.27	.25	.02	.02	--	274	.37	17,140	26	.9	429	7.5
July 1-10	17,530	13	3.29	1.15	2.35	.08	2.23	4.04	.51	.02	.01	--	428	.58	10,170	34	1.6	642	7.5
July 11-17	8,650	16	4.84	1.64	3.74	.12	3.16	6.43	.76	.02	.04	.12	664	.90	7,790	36	2.1	951	7.6
July 18-21.....	17,490	22	5.44	2.14	5.91	.14	4.36	8.29	.73	.03	.01	--	847	1.15	20,110	43	3.0	1,210	8.1
July 22-30	26,670	19	3.84	1.32	3.04	.12	3.08	4.77	.48	.03	.03	--	530	.72	19,200	37	1.9	774	7.8
July 31, Aug. 1-5	36,950	22	6.24	2.38	5.13	.17	4.52	8.62	.68	.03	.01	--	881	1.20	44,340	37	2.5	1,220	7.9
Aug. 6-10.....	11,230	17	4.29	1.48	3.00	.12	2.65	5.64	.51	.03	.07	--	576	.78	8,760	34	1.8	824	7.9
Aug. 11-20.....	10,800	17	5.39	2.14	4.61	--	2.92	8.24	.79	.03	.05	--	802	1.09	11,770	38	2.4	1,080	7.9
Aug. 21-31	18,330	18	6.99	2.38	5.65	--	3.54	10.43	.90	.02	.04	--	977	1.33	24,380	38	2.6	1,320	7.5
Sept. 1-10	5,860	14	7.29	3.29	6.09	--	3.02	12.26	1.07	.02	.06	--	1,090	1.48	8,670	37	2.6	1,400	7.6
Sept. 11-20.....	2,630	9.5	6.34	3.78	7.04	--	2.52	12.99	1.33	.02	.03	--	1,140	1.55	4,080	41	3.1	1,500	7.7
Sept. 21-30	3,430	8.6	6.09	3.29	7.04	--	2.64	12.37	1.41	.02	.03	--	1,090	1.48	5.080	42	3.2	1,480	7.8
Total or weighted average.....	945,500	14	3.84	1.56	2.52	0.07	2.46	5.06	0.45	0.02	0.03	--	522	0.71	671,300	32	1.5	739	--

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 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 1953.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for station near Cameron (below Moenkopi Wash) for water year October 1952 to September 1953 given in Water-Supply Paper 1283. Appreciable inflow between sampling site and gaging station during periods of storm runoff from Moenkopi Wash and several small arroyos.

Chemical analyses, water year October 1952 to September 1953

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)	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, 1952		22	1.35	0.59	7.65	4.21	--	2.46	2.93	0.04	0.13		589	0.80		80	7.8	967	7.9
Nov. 23-30		17	1.25	.58	10.48	4.31	0.27	2.66	5.19	.03	.08		744	1.01		85	11	1,250	--
Dec. 1-15		15	1.85	.72	12.00	3.69	.20	2.81	7.90	.03	.07		873	1.19		82	11	1,530	--
Jan. 1-10, 1953		16	2.50	.99	13.31	3.87	.27	3.21	9.45	.03	.03		999	1.36		79	10	1,750	--
Jan. 11-20		18	2.69	1.23	13.57	3.92	.17	3.39	10.01	.03	.04		1,040	1.41		78	9.7	1,830	--
Jan. 21-29		23	3.49	1.48	15.92	3.67	.20	3.66	13.26	.03	.03		1,240	1.69		76	10	2,160	--
Jan. 30-31, Feb. 1-10		15	2.50	.99	10.26	2.61	--	1.89	9.17	.02	.02		809	1.10		75	7.8	1,490	7.9
Feb. 11-20		12	2.15	.90	8.52	2.33	--	1.50	7.76	.02	.02		680	.92		74	6.9	1,250	7.8
Feb. 21-28		16	2.20	.99	8.61	2.36	--	1.87	7.64	.02	.02		704	.96		73	6.8	1,280	8.0
Mar. 14-20		15	1.15	.46	5.57	3.05	--	1.12	3.07	.03	.02		427	.58		78	6.2	746	7.9
Mar. 21-31		13	.90	.32	3.87	2.41	--	.75	1.92	.02	.01		301	.41		76	5.0	517	7.9
Apr. 1-10		11	1.10	.42	3.48	2.08	--	.71	2.28	.03	.01		296	.40		70	4.0	524	7.9
Apr. 11-20		16	1.70	.59	4.35	2.11	--	1.04	3.69	.02	.01		402	.55		66	4.1	728	7.7
July 17-19		23	.50	.25	5.39	4.00	--	1.06	1.07	--	.03		371	.50		88	8.8	567	7.6
July 20-25, 29		21	4.59	1.81	12.35	6.51	--	6.10	6.49	.04	.01		1,140	1.55		66	6.9	1,820	7.4
July 30-31, Aug. 1-2		20	1.30	.48	6.57	3.82	--	3.19	1.55	.04	.01		527	.72		79	7.0	830	7.5
Aug. 3-10		21	3.29	1.32	9.48	5.69	--	4.58	3.89	.04	.01		851	1.16		67	6.3	1,340	7.4
Aug. 27-31		20	.60	.23	6.96	3.67	--	1.98	2.12	.04	.01		476	.65		89	11	770	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 1953.
Water temperatures: October 1947 to September 1953.
Sediment records: October 1947 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 3,800 micromhos July 30; minimum daily, 1,950 micromhos Aug. 27.
EXTREMES, 1949-53.--Specific conductance: Maximum daily, 3,950 micromhos Aug. 12, 1950; minimum daily, 734 micromhos Apr. 28, 1952.
REMARKS.--Values reported for dissolved solids are sums of 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 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952.	1,450	--	--	--	--		--	--	--		--	--	--	--	--	--	--	3,330	--
Oct. 11-20	1,810	24	18.46	8.31	12.61		4.77	23.73	11.85		0.04	0.95	2,490	3.39	6,140	32	3.4	3,430	7.6
Oct. 21-31	2,550	--	--	--	--		--	--	--		--	--	--	--	--	--	--	3,310	--
Nov. 1-10.....	2,640	--	--	--	--		--	--	--		--	--	--	--	--	--	--	3,190	--
Nov. 11-20.....	3,710	21	13.72	6.66	11.18		4.52	17.80	9.93		.07	--	1,980	2.69	9,980	36	3.5	2,840	7.8
Nov. 21-30.....	3,810	--	--	--	--		--	--	--		--	--	--	--	--	--	--	2,710	--
Dec. 1-10.....	4,240	--	--	--	--		--	--	--		--	--	--	--	--	--	--	2,680	--
Dec. 11-20.....	4,380	20	12.62	6.50	9.44		5.05	16.01	9.25		.05	--	1,820	2.48	10,860	32	3.1	2,590	7.7
Dec. 21-31.....	4,990	--	--	--	--		--	--	--		--	--	--	--	--	--	--	2,530	--
Jan. 1-10, 1953.	4,360	19	12.03	5.92	9.61		4.98	14.86	8.80		.05	--	1,730	2.35	10,250	35	3.2	2,490	7.8
Jan. 11-20	4,730	19	11.88	5.84	9.39		5.01	14.57	8.18		.05	.47	1,690	2.30	10,880	35	3.2	2,400	7.8
Jan. 21-31.....	4,360	19	12.72	6.25	9.48		5.16	15.34	8.97		.04	--	1,780	2.42	10,550	33	3.1	2,580	7.8
Feb. 1-10.....	3,770	--	--	--	--		--	--	--		--	--	--	--	--	--	--	2,590	--
Feb. 11-20.....	3,080	22	13.87	6.66	10.39		4.42	18.30	9.87		.04	--	1,980	2.69	8,290	34	3.2	2,770	7.9
Feb. 21-28.....	2,150	--	--	--	--		--	--	--		--	--	--	--	--	--	--	2,960	--
Mar. 1-10.....	3,420	--	--	--	--		--	--	--		--	--	--	--	--	--	--	2,760	--
Mar. 11-20	2,040	24	16.62	7.57	11.65		5.03	21.03	10.77		.01	--	2,260	3.07	6,260	33	3.3	3,100	7.6
Mar. 21-31.....	1,740	--	--	--	--		--	--	--		--	--	--	--	--	--	--	3,260	--

Apr. 1-10, 1953..	2,020	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,210	--
Apr. 11-20.....	1,800	22	18.61	8.14	11.65	5.59	23.32	11.06	0.04	0.97	2,450	3.33	5,990	30	3.2	3,290	7.6
Apr. 21-30.....	2,190	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,150	--
May 1-10.....	1,710	24	16.92	8.47	11.61	4.39	23.11	10.66	.03	--	2,360	3.21	5,490	31	3.3	3,180	7.6
May 11-20	1,440	22	17.86	8.72	11.57	4.56	24.15	10.38	.02	--	2,420	3.29	4,740	30	3.2	3,230	7.8
May 21-31	1,630	22	18.01	8.96	11.57	4.83	23.94	10.58	.02	--	2,430	3.30	5,380	30	3.1	3,260	7.8
June 1-10.....	1,450	22	18.31	8.88	11.87	5.18	23.73	10.49	.03	--	2,440	3.32	4,810	30	3.2	3,250	7.5
June 11-20	1,320	23	18.86	8.31	11.87	4.90	24.15	10.58	.02	--	2,460	3.35	4,420	30	3.2	3,270	7.6
June 21-30	1,320	22	18.66	8.88	11.87	5.31	23.94	10.44	.03	--	2,460	3.35	4,420	30	3.2	3,280	7.5
July 1-10.....	1,320	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,260	--
July 11-20.....	2,550	26	21.01	8.14	11.48	5.90	24.98	10.01	.02	1.0	2,540	3.45	8,800	28	3.0	3,330	7.9
July 21-31	4,390	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,400	--
Aug. 1-10.....	5,350	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,240	--
Aug. 11-20.....	1,370	27	17.91	8.88	11.74	4.38	24.15	10.58	.02	--	2,430	3.30	4,520	30	3.2	3,270	7.7
Aug. 21-26,28-31.	4,140	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,220	--
Aug. 27.....	2,260	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,950	--
Sept. 1-10	1,390	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,300	--
Sept. 11-20.....	1,320	24	18.46	9.13	12.52	4.90	24.15	10.29	.02	--	2,470	3.36	4,440	31	3.4	3,360	7.8
Sept. 21-30.....	1,290	--	--	--	--	--	--	--	--		--	--	--	--	--	3,310	--
Total or weighted average.....	99,470	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,940	--

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.--At gaging station, 18,011 square miles of which 5,125 square miles is below Coolidge Dam (revised).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 2,790 micromhos June 12; minimum daily, 649 micromhos July 16.
Percent sodium: Maximum, 63, May 21-31, Aug. 5-10; minimum, 16, Sept. 21-30.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 2,790 micromhos June 12, 1953; minimum daily, 407 micromhos Jan. 20, 1952.
Percent sodium: Maximum, 63, May 21-31, Aug. 5-10, 1953; minimum, 16, Sept. 21-30, 1953.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283. No appreciable inflow from Mineral Creek between sampling point and gaging station, except during periods of heavy local runoff.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	1,800	28	5.14	2.80	18.70		4.00	5.04	7.33	0.06	0.03		990	1.35	243	52	4.4	1,630	7.7
Oct. 11-20	311	35	7.68	3.12	9.00		4.16	8.68	7.22	.09	.01		1,230	1.67	519	45	3.9	1,890	7.8
Oct. 21-31	208	37	8.03	3.21	9.91		4.23	9.17	7.73	.09	.02		1,310	1.78	370	47	4.2	1,990	7.8
Nov. 1-10	307	34	7.83	3.12	10.18		4.21	8.83	7.84	.10	.02		1,290	1.75	537	48	4.3	1,980	7.8
Nov. 11-20	512	29	6.49	2.88	9.04		4.21	7.20	6.99	.07	.02		1,120	1.52	778	49	4.2	1,760	7.8
Nov. 21-30	355	37	6.99	3.04	8.35		4.54	7.89	5.92	.07	.06		1,140	1.55	550	45	3.7	1,730	7.9
Dec. 1-10	754	35	6.79	2.88	8.17		4.49	7.68	5.53	.07	.09		1,100	1.50	1,130	46	3.7	1,690	7.9
Dec. 11-20	1,170	36	6.89	3.29	10.35		4.52	7.66	8.18	.07	.08		1,250	1.70	1,990	50	4.6	1,980	7.8
Dec. 21-31	2,640	28	6.19	3.54	12.52		4.51	5.66	11.90	.07	.06		1,320	1.80	4,750	56	5.7	2,220	7.9
Jan. 1-11, 1953..	1,060	33	7.24	2.88	9.04		4.33	8.27	6.94	.08	.02		1,200	1.63	1,730	47	4.0	1,860	7.7
Jan. 12-20	1,490	28	6.39	3.29	13.22		4.29	6.04	12.75	.06	.03		1,370	1.86	2,770	58	6.0	2,310	7.8
Jan. 21-31	1,770	27	6.19	3.29	12.96		4.28	5.87	12.41	.06	.02		1,340	1.82	3,220	58	5.9	2,250	7.8
Feb. 1-10	1,420	28	6.14	3.04	11.57		4.15	6.06	10.77	.08	.03		1,250	1.70	2,410	56	5.4	2,080	7.9
Feb. 11-20	1,320	29	6.49	3.04	11.65		4.08	6.60	10.77	.08	.02		1,290	1.75	2,310	55	5.3	2,110	7.8
Feb. 21-28	1,220	28	5.99	3.04	11.65		3.88	5.83	11.00	.07	.02		1,240	1.69	2,060	56	5.5	2,100	7.9
Mar. 1-10.....	6,590	31	6.14	2.63	8.52		4.00	6.58	6.83	.09	.02		1,060	1.44	9,490	49	4.1	1,700	7.8
Mar. 11-20.....	2,700	29	5.49	2.71	10.96		4.10	4.93	10.32	.08	.03		1,150	1.56	4,210	57	5.4	1,940	7.8
Mar. 21-30.....	4,650	30	4.79	2.38	10.61		3.90	3.81	10.27	.08	.03		1,070	1.46	6,790	60	5.6	1,830	8.0

Mar. 31, Apr. 1-10 1953	4,340	35	4.54	2.38	9.31		3.90	3.58	9.05	0.08	0.02		982	1.34	5,820	57	5.0	1,690	7.7
Apr. 11-20	2,430	33	4.44	2.47	10.00		3.72	3.93	9.53	.07	.02		1,020	1.39	3,380	59	5.4	1,760	7.9
Apr. 21-30	2,140	33	4.69	2.63	10.96		3.54	4.21	10.38	.07	.02		1,090	1.48	3,170	60	5.7	1,870	7.9
May 1-10	1,680	31	5.09	2.80	11.83		3.62	4.75	11.68	.07	.03		1,190	1.62	2,720	60	6.0	2,040	8.0
May 11-20	1,600	33	5.29	3.12	13.05		3.69	5.00	12.92	.07	.02		1,280	1.75	2,800	61	6.4	2,190	8.0
May 21-31	2,000	26	5.49	3.29	14.83		3.70	5.35	14.67	.08	.03		1,410	1.92	3,840	63	7.1	2,410	7.7
June 1-10	2,000	23	6.49	4.11	16.35		3.54	6.33	16.64	.08	.04		1,580	2.15	4,300	61	7.1	2,670	7.3
June 11-20	814	23	7.29	4.19	16.13		3.52	7.81	15.79	.08	.02		1,630	2.22	1,810	58	6.7	2,680	7.3
June 21-30	48	40	10.58	5.18	11.52		4.05	12.35	10.72	.06	.03		1,680	2.28	109	42	4.1	2,490	7.3
July 1-7	500	45	17.76	7.40	6.48		4.79	21.86	4.94	.04	.02		2,010	2.73	1,360	20	1.8	2,510	7.4
July 8-12	6,180	37	5.64	1.81	2.96		5.54	3.96	.93	.05	.02		631	.86	5,310	28	1.5	948	7.5
July 13-20	4,490	35	4.39	1.56	2.57		6.26	1.02	1.16	.04	.00		480	.65	2,920	30	1.5	775	7.3
July 21-22, 30	3,260	35	3.99	1.48	2.87		4.61	2.25	1.47	.04	.02		499	.68	2,220	34	1.7	763	7.3
July 23-29, 31	3,800	29	5.69	2.06	6.83		4.15	4.46	5.92	.04	.03		876	1.19	4,520	47	3.5	1,420	7.2
Aug. 1-4	942	32	5.19	1.97	4.44		5.59	3.29	2.99	.05	.02		696	.95	895	38	2.3	1,120	7.7
Aug. 5-10	1,970	28	4.19	1.73	10.00		3.47	3.85	8.35	.06	.11		956	1.30	2,560	63	5.8	1,620	7.6
Aug. 11-20	3,720	28	3.64	1.56	8.48		3.28	3.68	6.49	.06	.08		826	1.12	4,170	62	5.3	1,390	7.6
Aug. 21-25, 27-31.	2,890	52	3.84	1.48	8.00		3.95	3.44	6.04	.05	.04		832	1.13	3,270	60	4.9	1,350	7.7
Aug. 26	436	47	2.40	1.07	4.44		4.33	1.10	2.59	--	.03		487	.66	288	56	3.4	783	7.8
Sept. 1-10	365	77	5.24	2.96	9.52		3.93	6.72	7.45	.06	.03		1,140	1.55	566	54	4.7	1,780	7.9
Sept. 11-20	47	53	12.67	5.51	7.13		4.23	15.68	6.04	.04	.03		1,630	2.22	104	28	2.3	2,240	7.8
Sept. 21-30	28	41	18.76	7.32	4.87		5.11	23.11	3.10	.03	.01		1,990	2.71	76	16	1.3	2,390	7.6
Weighted average	75,970	32	5.39	2.47	8.87		4.26	4.77	7.76	0.07	0.03		1,010	1.37	104,100	53	4.5	1,660	--

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 (revised).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 9,570 micromhos Oct. 12; minimum daily, 858 micromhos Nov. 21.
Percent sodium: Maximum 68 Oct. 11-20, 21-31, June 21-30, July 1-11, Sept. 21-30; minimum, 53 Aug. 2.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 10,200 micromhos Oct. 1, 1951; minimum daily, 420 micromhos Sept. 1, 1951.
Percent sodium: Maximum, 69 Aug. 6-10, 1951, June 11-20, 1952; minimum, 36 Jan. 24, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. 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 specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of separate and combined discharge for the river and canals for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952	502	30	17.96	13.90	65.23	0.28	5.41	25.82	65.15	0.13	0.66	2.7	5,830	7.93	3,980	67	16	9,020	7.6
Oct. 11-20	428	30	19.16	13.98	69.57	.28	5.74	26.86	67.97	.13	.61	3.6	6,110	8.31	3,560	68	17	9,350	7.6
Oct. 21-31	434	28	18.76	14.39	69.57	.28	5.57	26.86	68.82	.13	.50	3.6	6,120	8.32	3,610	68	17	9,450	7.5
Nov. 1-10	452	30	18.76	14.06	67.83	.28	5.77	26.65	67.12	.13	.65	3.1	6,020	8.19	3,700	67	17	9,270	7.6
Nov. 11-18	583	32	18.56	13.82	65.23	.28	5.83	25.61	64.87	.13	.68	3.2	5,830	7.93	4,620	67	16	9,020	7.6
Nov. 19-20	736	20	2.45	1.40	7.39	.11	2.92	2.54	5.50	.06	.13	.30	675	.92	677	65	5.3	1,170	8.0
Nov. 21	333	15	2.30	.99	4.97		3.26	1.71	3.19	--	.10	--	486	.66	220	60	3.9	858	7.7
Nov. 22-30	1,430	29	13.02	9.37	40.87	.24	5.28	16.82	40.89	.08	.45	2.1	3,800	5.17	7,390	64	12	6,060	7.9
Dec. 1-10	1,180	36	17.47	13.98	56.96	.31	6.06	22.69	58.94	.11	.74	3.1	5,290	7.19	8,480	64	14	8,200	7.9
Dec. 11-20	995	33	19.16	14.39	65.23	.31	6.08	25.82	65.15	.12	.77	3.1	5,890	8.01	7,970	66	16	9,060	7.9
Dec. 21-31	1,380	30	18.66	14.80	62.18	.31	6.01	24.77	63.46	.12	.76	2.8	5,700	7.75	10,700	65	15	8,760	7.8
Jan. 1-10, 1953	1,170	32	18.76	14.97	61.31	.28	6.05	24.36	63.18	.12	.65	2.6	5,640	7.67	8,970	64	15	8,770	7.7
Jan. 11-20	997	31	19.26	14.31	65.66	.31	6.26	25.82	66.00	.12	.68	2.8	5,930	8.06	8,040	66	16	9,100	7.8
Jan. 21-31	1,240	32	18.56	13.98	63.49	.28	6.16	26.44	62.61	.14	.87	2.7	5,780	7.86	9,750	66	16	8,810	7.8
Feb. 1-10	1,180	36	18.56	14.72	62.18	.28	a6.26	26.23	61.48	.14	.77	2.5	5,710	7.77	9,170	65	15	8,700	7.8
Feb. 11-20	1,120	36	18.56	14.64	63.92	.28	b6.08	26.65	62.33	.14	.87	2.6	5,800	7.89	8,840	66	16	8,790	8.0
Feb. 21-28	888	35	18.36	13.98	60.88	.28	c6.38	24.98	60.92	.13	.68	2.7	5,580	7.59	6,740	65	15	8,560	8.0

a Includes 0.60 equivalent per million carbonate (CO_3).
b Includes 0.30 equivalent per million carbonate (CO_3).
c Includes 0.47 equivalent per million carbonate (CO_3).

Mar. 1-10, 1953..	1,350	31	17.56	13.40	58.27	0.28	6.18	22.48	58.94	0.11	0.58	3.0	5,290	7.19	9,710	65	15	8,080	7.8
Mar. 11-20	1,050	31	18.66	14.39	65.23	.28	6.28	25.19	64.59	.12	.61	3.8	5,820	7.92	8,320	66	16	8,770	7.9
Mar. 21-31	1,150	32	18.66	14.06	61.75	.28	6.21	25.19	63.46	.12	.69	4.0	5,700	7.75	8,910	65	15	8,680	7.9
Apr. 1-10.....	873	32	18.66	13.65	60.44	.28	6.42	24.57	61.48	.12	.69	3.3	5,570	7.58	6,620	65	15	8,490	7.8
Apr. 11-20	748	33	18.96	13.98	60.01	.28	6.24	24.98	62.61	.13	.61	2.8	5,620	7.64	5,710	64	15	8,710	7.8
Apr. 21-30.....	736	31	19.36	13.98	63.05	.28	6.57	25.40	63.46	.13	.60	3.0	5,760	7.83	5,760	65	15	8,790	7.7
May 1-10.....	726	34	18.36	13.98	64.36	.31	6.28	25.40	63.74	.13	.60	3.2	5,770	7.85	5,700	66	16	8,730	7.7
May 11-20	823	32	17.56	13.40	60.44	.28	6.06	23.94	60.07	.13	.65	3.7	5,450	7.41	6,100	66	15	8,390	7.7
May 21-31.....	823	30	17.47	13.32	61.31	.28	5.95	24.36	60.64	.14	.60	3.2	5,500	7.48	6,160	66	16	8,370	7.7
June 1-10.....	601	33	17.47	13.49	61.75	.33	5.74	24.77	62.61	.13	.48	2.4	5,590	7.60	4,570	66	16	8,610	7.5
June 11-20.....	480	30	17.27	13.73	62.67	.33	5.38	25.19	62.33	.13	.47	2.8	5,610	7.63	3,660	67	16	8,650	7.6
June 21-30.....	446	28	16.77	12.99	62.62	.31	5.16	25.19	61.77	.14	.48	3.1	5,560	7.56	3,370	68	16	8,560	7.7
July 1-11.....	571	29	16.17	12.83	61.75	.31	4.80	24.77	60.64	.14	.47	2.6	5,460	7.43	4,240	68	16	8,440	7.2
July 12, 13.....	125	37	10.93	6.58	30.00	.31	5.29	12.91	29.61	.08	.26	1.6	2,880	3.92	490	63	10	4,600	7.8
July 14-16	155	34	16.17	11.84	55.22	.33	5.33	22.48	55.28	.13	.56	2.6	5,020	6.83	1,060	66	15	7,850	7.9
July 17-21	547	28	8.98	5.92	30.00	.31	4.34	11.62	28.20	.07	.31	1.3	2,690	3.66	2,000	66	11	4,390	7.9
July 22-31, Aug. 1	845	33	14.27	10.61	48.27	.31	5.15	19.51	47.10	.11	.50	2.0	4,360	5.93	5,010	66	14	6,820	7.9
Aug. 2	176	28	7.49	3.04	12.35	.28	4.49	5.37	12.69	--	.12	.83	1,360	1.85	326	53	5.4	2,300	--
Aug. 3, 4.....	139	29	12.38	7.48	33.48	.31	4.61	15.82	32.15	.07	.48	.94	3,220	4.38	609	62	11	5,070	--
Aug. 5-10	268	29	16.17	12.66	55.66	.33	5.10	23.53	55.28	.12	.56	1.9	5,080	6.91	1,850	66	15	7,830	7.8
Aug. 11-20	405	25	16.47	11.84	57.83	.31	4.98	23.53	57.82	.12	.52	3.2	5,200	7.07	2,860	67	15	7,970	7.6
Aug. 21-31.....	426	38	15.77	11.68	56.09	.31	4.98	23.32	55.84	.13	.53	3.2	5,080	6.91	2,940	67	15	7,780	7.7
Sept. 1-10	414	34	15.87	11.84	56.96	.28	4.65	23.73	56.12	.13	.60	3.5	5,130	6.98	2,890	67	15	7,850	7.7
Sept. 11-20	403	45	15.37	12.42	56.09	.28	4.64	23.73	56.12	.14	.60	3.4	5,110	6.95	2,800	67	15	7,830	7.7
Sept. 21-30	276	39	16.87	13.40	63.92	.31	4.39	26.44	64.30	.13	.53	3.6	5,740	7.81	2,160	68	16	8,720	7.6
Weighted average	29,610	32	16.92	12.83	57.40	0.29	4.72	23.11	57.53	0.12	0.61	2.8	5,220	7.10	210,200	66	15	8,030	--

GILA RIVER BASIN--Continued

SALT RIVER AT STEWART MOUNTAIN DAM, ARIZ.

LOCATION.--Just below dam, 3½ miles above gaging station which is 6 miles upstream from Verde River, Maricopa County.
DRAINAGE AREA.--6,230 square miles (revised), approximately, above gaging station, of which 22 square miles are below Stewart Mountain Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,090 micromhos Oct. 16; minimum daily, 620 micromhos Mar. 28.
Percent sodium: Maximum, 59 Oct. 11-20; minimum, 53 Mar. 21-31, Apr. 11-20, 21-30.
EXTREMES, 1950-53.--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. 11-20, 21-26, 1951; minimum, 53 Mar. 21-31, Apr. 11-20, 21-30, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in in district office at Albuquerque, N. Mex. Records of discharge for gaging station below Stewart Mountain Dam for water year October 1952 to September 1953 given in Water-Supply Paper 1283. No inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1952 to September 1953

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, 1952.	3,430	27	2.59	1.15	5.17		2.95	1.04	4.85		0.15		547	0.74	2,540	58	3.8	936	7.6
Oct. 11-20	396	30	2.74	1.15	5.65		3.34	1.10	4.96		.08		582	.79	313	59	4.1	1,000	7.6
Oct. 21-31	101	20	2.30	.99	4.39		2.59	.96	4.12		.05		466	.63	64	57	3.4	810	7.7
Nov. 1-10a	11	21	2.40	.90	4.39		2.62	1.00	4.06		.06		472	.64	7	57	3.4	815	7.6
Nov. 11-20 a...	333	19	2.30	.90	4.39		2.52	1.00	4.06		.05		466	.63	21	58	3.5	806	7.6
Nov. 21-30a ...	37	18	2.35	.99	4.26		2.59	1.00	4.00		.06		465	.63	23	56	3.3	804	7.6
Dec. 1-10 a....	2.6	21	2.35	.99	4.17		2.57	1.02	3.95		.05		462	.63	1.6	56	3.2	808	7.6
Feb. 11-20,1953	10,170	15	2.20	.90	3.87		2.41	.92	3.69		.02		418	.57	580	56	3.1	746	7.6
Feb. 21-28.....	5,310	18	2.10	.90	3.74		2.41	.87	3.53		.02		408	.55	2,920	55	3.1	720	7.7
Mar. 1-10.....	5,730	16	2.15	.90	3.65		2.34	.87	3.44		.02		401	.55	3,150	54	3.0	693	7.7
Mar. 11-20	19,940	17	2.15	.82	3.52		2.31	.87	3.33		.02		402	.55	1,100	54	2.9	693	7.7
Mar. 21-31.....	33,890	16	2.00	.80	3.17		2.23	.81	2.96		.02		361	.49	16,610	53	2.7	634	7.6
Apr. 1-10.....	25,920	17	1.95	.82	3.30		2.29	.75	3.19		.01		376	.51	13,220	54	2.8	658	7.5
Apr. 11-20	19,150	19	2.20	.90	3.48		2.44	.81	3.24		.01		379	.52	9,960	53	2.8	679	7.7
Apr. 21-30	15,020	21	2.20	.90	3.44		2.44	.81	3.22		.01		382	.52	7,810	53	2.8	671	7.7
May 1-10	12,810	16	2.00	.90	3.35		2.33	.77	3.16		.02		376	.51	6,530	54	2.8	668	7.9
May 11-20	12,510	17	2.00	.90	3.35		2.31	.79	3.16		.01		376	.51	6,380	54	2.8	668	7.9
May 21-31.....	21,980	16	2.05	.90	3.44		2.34	.77	3.33		.02		382	.52	11,430	54	2.8	681	8.0

a No flow at gaging station Nov. 2-8, 12-15, 22, Dec. 4 to Feb. 10.

June 1-10, 1953..	23,750	17	2.05	0.90	3.61		2.39	0.77	3.44		0.01		394	0.54	12,830	55	3.0	702	8.2
June 11-20	32,280	16	2.10	.90	3.74		2.36	.79	3.61		.01		398	.54	17,430	55	3.1	716	8.2
June 21-30	32,640	17	2.05	..90	3.91		2.36	.79	3.78		.01		414	.56	18,280	57	3.2	734	8.2
July 1-10	32,360	15	2.05	.90	3.96		2.44	.79	3.84				415	.56	18,120	57	3.3	740	8.2
July 11-20	25,730	20	2.10	.99	4.00		2.46	.79	3.86		.01		416	.57	14,670	56	3.2	752	7.7
July 21-31.....	33,970	18	2.05	.90	3.96		2.46	.79	3.84		.01		414	.56	19,020	57	3.3	744	7.7
Aug. 1-12.....	39,100	21	2.10	.90	4.09		2.52	.79	3.86		.01		424	.58	22,680	58	3.3	754	7.7
Aug. 13-20.....	25,400	18	2.10	.90	4.09		2.43	.73	3.89		.02		425	.58	14,730	58	3.3	752	7.6
Aug. 21-31.....	32,400	17	2.10	.90	4.17		2.44	.77	3.89		.01		418	.57	18,470	58	3.4	752	7.6
Sept. 1-10.....	30,640	17	2.10	.99	4.00		2.44	.77	3.95		.01		431	.57	17,460	56	3.2	752	7.2
Sept. 11-20.....	27,250	19	2.05	.99	4.09		2.46	.79	4.00		.01		431	.59	16,080	57	3.4	759	7.3
Sept. 21-30.....	21,760	16	2.00	.99	4.17		2.28	.85	4.12		.02		428	.58	12,620	58	3.4	767	7.3
Weighted average	543,900	18	2.10	0.90	3.78		2.39	0.79	3.64		0.01		406	0.55	299,100	56	3.1	721	--

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 (revised).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 695 micromhos July 21; minimum daily, 401 micromhos Sept. 7.
Percent sodium: Maximum, 28, July 21-31, Sept. 21-30; minimum, 19, Feb. 11-20.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 725 micromhos June 28, 1951; minimum daily, 234 micromhos Jan. 13, 15, 1952.
Percent sodium: Maximum, 31, July 21-31, 1951; minimum, 12, Jan. 4-10, 11-20, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952 .	14,980	18	2.00	2.06	1.22	--	3.49	1.25	0.56		0.05		307	0.42	6,290	23	0.9	497	7.9
Oct. 11-20	10,120	17	2.00	2.30	1.35	--	a3.74	1.33	.62		.02		324	.44	4,450	24	.9	533	8.1
Oct. 21-31	11,080	16	2.00	2.38	1.39	--	3.67	1.39	.68		.02		328	.45	4,990	24	.9	547	7.6
Nov. 1-10	6,180	17	2.05	2.47	1.48	--	3.82	1.42	.71		.02		337	.46	2,840	25	1.0	552	8.0
Nov. 11-20	3,860	17	2.00	2.38	1.43	--	b3.87	1.46	.65		.03		336	.46	1,780	25	1.0	549	8.2
Nov. 21-30	3,020	17	2.05	2.30	1.43	--	c3.77	1.48	.68		.02		333	.45	1,360	25	1.0	542	8.2
Dec. 1-10	3,250	17	2.05	2.30	1.48	--	3.83	1.42	.68		.03		339	.46	1,500	25	1.0	554	7.9
Dec. 11-20	7,200	15	2.10	2.38	1.48	--	3.87	1.46	.65		.03		338	.46	3,310	25	1.0	554	8.0
Dec. 21-31	9,120	18	2.15	2.38	1.57	--	4.00	1.46	.71		.05		342	.47	4,290	26	1.0	568	7.9
Jan. 1-10, 1953 .	3,890	22	2.79	2.80	1.57	---	4.98	1.42	.73		.06		395	.54	2,100	22	.9	642	7.9
Jan. 11-20	8,060	23	2.79	2.71	1.43	--	4.92	1.33	.65		.03		372	.51	4,110	21	.9	632	7.9
Jan. 21-31	10,960	22	2.50	2.55	1.26	--	4.61	1.19	.56		.01		353	.48	5,260	20	.8	574	7.9
Feb. 1-10	9,190	23	2.54	2.47	1.22	--	c4.57	1.10	.56		.01		338	.46	4,230	20	.8	560	8.1
Feb. 11-20	2,850	21	2.59	2.63	1.26	--	a4.72	1.21	.56		.01		351	.48	1,370	19	.8	579	8.1
Feb. 21-28	571	25	2.59	2.71	1.48	--	4.88	1.33	.62		.02		374	.51	291	22	.9	622	8.0

a Includes 0.27 equivalent per million of carbonate (CO_3).
b Includes 0.20 equivalent per million of carbonate (CO_3).
c Includes 0.17 equivalent per million of carbonate (CO_3).

Mar. 1-10, 1953 .	631	26	2.54	2.96	1.70	--	4.92	1.58	0.73		0.02		402	0.55	347	24	1.0	663	8.0
Mar. 11-20	567	21	2.74	2.96	1.61	--	5.03	1.58	.71		.03		397	.54	306	22	1.0	658	7.9
Mar. 21-31	9,740	22	2.69	2.80	1.52	--	4.88	1.46	.71		.02		387	.53	5,160	22	.9	639	8.0
Apr. 1-10	4,110	22	2.59	2.88	1.43	--	b4.92	1.42	.68		.02		384	.52	2,140	21	.9	633	7.9
Apr. 11-20	2,470	23	2.59	2.80	1.43	--	c4.95	1.37	.68		.01		381	.52	1,280	21	.9	628	8.0
Apr. 21-30	2,340	23	2.59	2.88	1.48	--	c4.90	1.39	.68		.02		382	.52	1,220	21	.9	630	8.0
May 1-10.....	2,340	27	2.59	2.80	1.48	--	a4.90	1.39	.68		.01		387	.53	1,240	22	.9	632	8.0
May 11-20	2,160	21	2.54	2.80	1.39	--	d4.87	1.39	.68		.01		379	.52	1,120	21	.9	619	8.0
May 21-31	2,230	22	2.50	2.80	1.43	--	d4.85	1.42	.68		.01		377	.51	1,140	21	.9	621	8.1
June 1-10	1,860	25	2.45	2.80	1.52	--	4.77	1.44	.71		.01		380	.52	967	22	.9	630	7.9
June 11-20	6,060	26	2.40	2.88	1.57	--	4.75	1.44	.71		.03		380	.52	3,150	23	1.0	629	7.9
June 21-30	15,530	24	2.40	2.88	1.70	--	4.77	1.52	.76		.02		388	.53	8,230	24	1.0	647	7.8
July 1-10.....	12,000	24	2.20	3.04	1.83	0.09	4.69	1.64	.85		.02		400	.54	6,480	26	1.1	656	8.0
July 11-20	9,090	24	2.10	3.21	2.00	.09	4.65	1.83	.85		.02		408	.55	5,000	27	1.2	677	8.0
July 21-31	5,730	26	2.10	3.04	2.04	--	4.49	1.81	.87		.02		410	.56	3,210	28	1.3	665	8.0
Aug. 1-10	8,790	26	2.15	2.30	1.52	--	3.97	1.46	.62		.02		343	.47	4,180	25	1.0	557	7.4
Aug. 11-20	17,240	26	2.10	2.30	1.52	--	3.93	1.42	.62		.02		339	.46	7,930	26	1.0	546	7.4
Aug. 21-31	10,280	27	1.90	2.47	1.65	--	3.95	1.50	.68		.03		348	.47	4,830	27	1.1	565	7.5
Sept. 1-10	8,130	24	1.85	1.73	1.00	--	3.33	.90	.39		.04		265	.36	2,940	22	.7	430	7.5
Sept. 11-20	4,500	24	2.10	1.97	1.22	--	3.87	1.06	.51		.03		308	.42	1,890	23	.9	494	7.6
Sept. 21-30.....	2,370	38	2.00	2.47	1.70	--	4.05	1.39	.68		.01		363	.49	1,160	28	1.1	562	7.8
Weighted average	232,600	22	2.25	2.55	1.48	--	4.24	1.39	0.68		0.02		354	0.45	104,700	24	1.0	580	--

a Includes 0.27 equivalent per million of carbonate (CO_3).
b Includes 0.20 equivalent per million of carbonate (CO_3).
c Includes 0.17 equivalent per million of carbonate (CO_3).
d Includes 0.23 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.--1,460 square miles, approximately (above Lake Pleasant Dam).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 500 micromhos Sept. 13; minimum daily, 316 micromhos Oct. 8.
Percent sodium: Maximum, 25 Sept. 11-18; minimum, 19 July 1-10.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 500 micromhos Sept 13, 1953; minimum daily, 241 micromhos Jan. 29, 1952.
Percent sodium: Maximum, 26 Feb. 21-29, 1952; minimum, 14 Jan. 29-31, Feb. 1-10, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Values shown as extremes are canal samples only. Samples for which no discharge is shown were collected at surface of the lake at the dam during periods of no release. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge furnished by Surface Water Branch, Tucson District for water year October 1952 to September 1953. Monthly diversions to canal below Lake Pleasant diversion dam are published as Agua Fria River at Lake Pleasant Dam in Water-Supply Paper 1283.

Chemical analyses, water year October 1952 to September 1953

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, 1952 .	580	30	1.95	0.90	0.70	--	2.87	0.35	0.34		0.06		223	0.30	174	20	0.6	342	7.3
Oct. 17, 24, 31...	--	--	1.70	.90	.78	--	--	--	--		--		194	.26	--	23	.7	328	--
Nov. 7, 14, 21, 28 .	--	--	1.75	.82	.70	--	--	--	--		--		196	.27	--	21	.6	323	--
Dec. 5, 12, 19, 26	--	--	1.85	.90	.70	--	--	--	--		--		190	.26	--	20	.6	322	--
Jan. 12-26, 1953.	520	--	1.90	.90	.70	--	--	--	--		--		190	.26	135	20	.6	330	--
Feb. 6, 13, 20, 27, Mar. 6.....	--	--	1.95	.99	.70	--	--	--	--		--		198	.27	--	19	.6	342	--
Mar. 11-20.....	1,580	6.7	1.90	1.07	.74	--	2.79	.65	.37		.01		217	.30	474	20	.6	364	7.3
Mar. 21-31.....	1,980	5.7	1.90	.99	.74	--	2.80	.62	.34		.02		212	.29	574	20	.6	358	7.4
Apr. 1-10	1,510	6.9	1.90	.99	.74	--	2.84	.62	.34		.01		212	.29	438	20	.6	356	7.6
Apr. 11-21.....	730	6.1	2.00	.99	.78	--	2.92	.62	.39		.02		221	.30	219	21	.6	375	7.5
Apr. 24, May 1, 8, 15, 22	--	--	2.00	.99	.87	--	--	--	--		--		209	.28	--	23	.7	368	--
May 23-31	1,070	10	2.15	1.15	1.00	--	3.20	.67	.48	0.02	.05		249	.34	364	23	.8	418	8.0

June 1-10, 1953...	2,010	6.9	2.00	1.07	0.78	0.11	2.92	0.58	0.39	0.05	222	0.30	603	20	0.6	374	8.0
June 11-20	3,310	6.0	1.95	.99	.78	.11	2.85	.58	.34	.04	216	.29	960	20	.6	367	8.1
June 21-30	5,370	8.5	1.95	1.15	.78	--	2.92	.54	.42	.04	218	.30	1,610	20	.6	372	7.2
July 1-10.....	6,010	12	2.00	1.07	.74	--	3.00	.52	.39	.03	224	.30	1,800	19	.6	374	7.5
July 11-20	4,310	11	2.00	1.07	.78	--	3.05	.54	.37	.03	224	.30	1,290	20	.6	378	7.5
July 21-31	5,280	7.5	2.00	1.07	.78	--	3.06	.52	.39	.03	224	.30	1,580	20	.6	383	7.5
Aug. 1-10.....	4,820	11	2.10	1.07	.91	--	3.24	.54	.42	.04	232	.32	1,540	22	.7	392	7.5
Aug. 11-20.....	4,300	14	2.15	1.07	.96	--	3.34	.56	.42	.04	239	.33	1,420	23	.8	402	7.5
Aug. 21-31.....	4,550	14	2.15	1.07	1.00	--	3.33	.58	.45	.04	244	.33	1,500	24	.8	408	7.5
Sept. 1-10	2,120	12	2.20	1.23	1.04	--	3.36	.69	.51	.03	254	.35	742	23	.8	428	7.6
Sept. 11-18.....	1,030	22	2.45	1.40	1.26	--	3.97	.67	.62	.02	297	.40	412	25	.9	484	7.7
Sept. 25.....	--	--	2.10	1.16	1.04	--	--	--	--	--	245	.33	--	24	.8	418	--
Weighted average	51,070	10	2.05	1.06	0.83	--	3.10	0.56	0.39	0.03	228	0.31	15,830	21	0.7	385	--

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PART 10. THE GREAT BASIN

SEVIER LAKE BASIN

SEVIER RIVER NEAR LYNNDYL, UTAH

LOCATION.--At county highway bridge, 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 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 5,630 micromhos Mar. 13; minimum daily, 1,520 micromhos Oct. 9.
Percent sodium: Maximum, 56 Jan. 1-10, Aug. 21-31; minimum, 39 Oct. 5-6, 8-9.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 5,630 micromhos Mar. 13, 1953; minimum daily, 1,340 micromhos Mar. 30, 1952.
Percent sodium: Maximum, 60 Sept. 11-20, 1951; minimum, 39 Oct. 5-6, 8-9, 1952.
REMARKS.--Values reported for dissolved solids are sums of 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 1952 to September 1953 given in Water-Supply Paper 1284.

Chemical analyses, water year October 1952 to September 1953

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, 7, 1952	563	21	4.69	8.31	14.05	0.17	5.15	8.66	13.82		0.05	--	1,610	2.19	1,230	52	5.5	2,580	8.1
Oct. 5-6, 8-9....	492	16	3.84	5.84	6.31	.12	4.88	4.18	7.05		.06	--	915	1.24	610	39	2.9	1,550	8.0
Oct. 10-20	2,410	19	4.69	7.65	12.39	.17	5.67	7.47	11.56		.07	0.41	1,440	1.96	4,720	50	5.0	2,310	8.1
Oct. 21-31.....	1,270	17	4.54	7.57	10.52	.17	5.21	7.00	11.00		.07	--	1,340	1.82	2,310	46	4.3	2,200	8.1
Oct. 29.....	129	16	4.14	6.33	--	--	4.79	4.73	7.90		.07	--	992	1.35	174	40	3.1	1,610	8.0
Nov. 1-10	3,800	17	4.19	6.99	9.48	.17	5.47	6.35	9.31		.08	--	1,210	1.65	6,270	46	4.0	1.980	8.1
Nov. 11-20	4,510	20	4.34	7.15	13.26	.17	5.60	7.49	11.42		.06	--	1,440	1.96	8,840	53	5.5	2,990	8.1
Nov. 21-30	1,490	19	5.54	8.88	14.52	.17	5.44	8.83	14.38		.05	--	1,680	2.28	3,400	50	5.4	2,660	8.0
Dec. 1-9	855	20	6.24	9.13	17.26	.17	5.51	9.97	16.50		.04	--	1,890	2.57	2,200	53	6.2	3,000	7.8
Dec. 10-20	579	19	7.58	11.84	23.66	.20	5.74	14.45	22.99		.03	--	2,550	3.47	2,010	55	7.6	4,010	8.0
Dec. 21-31	458	20	7.68	11.92	23.83	.20	5.80	14.45	23.27		.03	--	2,570	3.50	1,600	55	7.6	4,030	7.9
Jan. 1-10, 1953..	387	21	7.24	13.24	25.92	.22	5.16	16.13	25.38		.05	--	2,760	3.75	1,450	56	8.1	4,350	8.1
Jan. 11-20	385	19	7.78	13.08	24.48	.22	5.54	15.95	24.82		.05	.59	2,720	3.70	1,420	54	7.6	4,270	8.1
Jan. 21-31	385	20	8.18	13.65	26.87	.24	5.93	16.91	26.37		.04	--	2,910	3.96	1,520	55	8.1	4,510	7.9
Feb. 1-10	331	22	7.78	13.65	26.09	.22	5.74	16.51	26.09		.07	--	2,850	3.88	1,280	55	8.0	4,470	8.0
Feb. 11-20	333	22	8.13	13.08	24.79	.21	6.03	15.59	24.40		.05	.59	2,720	3.70	1,230	54	7.6	4,250	7.9
Feb. 21-28	292	22	8.73	12.83	25.31	.21	6.00	15.61	24.82		.05	--	2,760	3.75	1,100	54	7.7	4,270	--

Mar. 1-10, 1953 .	395	21	8.43	12.83	26.09	0.22	5.85	15.95	25.38		0.04	--	2,800	3.81	1,500	55	8.0	4,370	--
Mar. 11-16.....	232	22	9.13	14.23	28.26	.24	6.16	17.65	27.50		.05	--	3,050	4.15	963	54	8.3	4,700	--
Mar. 17.....	89	21	6.69	8.14	---	--	5.75	8.85	14.16		.03	--	1,660	2.26	201	48	5.1	2,720	--
Mar. 18-27.....	1,540	18	4.69	6.74	8.83	.15	5.08	5.81	9.53		.06	--	1,180	1.60	2,460	43	3.7	1,950	--
Mar. 28-31.....	1,760	22	4.74	7.98	12.31	.18	5.64	8.60	11.22		.09	--	1,490	2.03	3,570	49	4.9	2,380	--
Apr. 1-10.....	4,120	20	4.69	7.32	11.57	.16	5.64	7.41	10.49		.08	--	1,380	1.88	7,750	49	4.7	2,240	--
Apr. 11-20.....	3,900	21	4.19	7.07	11.26	.18	5.52	7.12	10.38		.06	0.39	1,340	1.82	7,100	50	4.7	2,160	--
Apr. 21-30.....	11,410	23	4.29	7.32	12.39	.18	5.72	7.81	10.86		.08	--	1,430	1.94	22,140	51	5.1	2,300	--
May 1-10.....	6,370	22	4.19	7.32	12.44	.18	5.60	7.85	11.00		.08	--	1,430	1.94	12,360	52	5.2	2,320	--
May 11-20.....	9,690	22	3.84	7.07	12.65	.19	5.60	7.62	10.72		.08	--	1,400	1.90	18,410	53	5.4	2,280	--
May 21-31.....	13,600	22	4.04	6.83	12.65	.19	5.75	7.47	9.87		.08	--	1,370	1.86	25,300	53	5.4	2,260	--
June 1-10	8,980	21	4.19	7.32	13.31	.20	5.70	7.93	11.14		.08	--	1,460	1.99	17,870	53	5.6	2,370	--
June 11-20	7,590	21	4.04	7.15	12.91	.20	5.59	7.62	11.42		.09	--	1,440	1.96	14,880	53	5.5	2,290	--
June 21-30	10,900	19	4.04	7.07	12.91	.20	5.67	7.68	11.14		.09	--	1,430	1.94	21,150	53	5.5	2,300	--
July 1-10.....	14,730	19	3.94	7.32	13.31	.19	5.67	7.85	11.56		.09	--	1,460	1.99	29,310	54	5.6	2,320	--
July 11-20	10,250	22	3.99	7.65	13.44	.18	5.52	8.04	11.56		.10	.44	1,480	2.01	20,600	53	5.6	2,350	--
July 21-31	8,270	23	4.19	7.89	14.05	.19	5.62	8.22	12.13		.09	--	1,530	2.08	17,200	53	5.7	2,410	--
Aug. 1-10	3,950	24	4.59	7.48	12.91	.22	5.08	7.87	11.70		.07	--	1,460	1.99	7,860	51	5.2	2,330	--
Aug. 11-20.....	9,650	23	4.19	7.81	14.44	.20	5.51	8.29	12.41		.10	--	1,550	2.11	20,360	54	5.9	2,430	--
Aug. 21-31.....	11,510	22	3.99	8.22	15.65	.19	5.57	8.87	13.26		.09	--	1,640	2.23	25,670	56	6.3	2,580	--
Sept. 1-10	4,650	24	3.94	8.55	15.22	.21	5.54	9.14	12.83		.12	--	1,630	2.22	10,320	55	6.1	2,650	--
Sept. 11-20.....	3,150	22	4.19	8.80	15.22	.21	5.39	9.14	13.26		.08	--	1,650	2.24	7,060	54	6.0	2,650	--
Sept. 21-30.....	2,380	21	4.09	8.55	14.44	.19	5.28	8.66	12.83		.14	--	1,590	2.16	5,140	53	5.8	2,550	--
Total or weighted average.....	167,800	21	4.24	7.57	13.44	0.19	5.59	8.08	11.73		0.09	--	1,490	2.03	340,600	53	5.5	2,390	--

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 1952.
Water temperatures: December 1951 to September 1952.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 883 micromhos May 17, 24; minimum daily, 784 micromhos Dec. 31, Sept. 10.
Percent sodium: Maximum, 58 May 11-20; minimum, 48 Aug. 11-20, Sept. 1-10, 11-20.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Discharge records for gaging station near Rye Patch for water year October 1951 to September 1952 given in Water-Supply Paper 1244. No appreciable inflow between gaging station and sampling point except during periods of local rains. The record of water quality for the period December, 1951 to September 1952 was not published in Water-Supply Paper 1362, and is included herein.

Chemical analyses, December 1951 to September 1952

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				
Dec. 11-20, 1951.	41	47	2.25	1.40	4.57	0.36	4.93	1.50	1.89	0.04	0.01	0.43	517	0.70	29	53		798	7.9
Dec. 21-31	48	45	2.20	1.40	4.78	.38	5.18	1.44	1.89	.04	.01	--	512	.70	34	55		793	7.9
Jan. 1-10, 1952..	44	47	2.30	1.40	4.87	.38	5.24	1.54	1.92	.04	.00	--	520	.71	31	54		802	8.1
Jan. 11-21	49	48	2.30	1.40	4.39	.36	5.28	1.42	1.89	.04	.01	.44	535	.73	36	52		810	7.7
Mar. 1-10	45	49	2.20	1.48	4.65	.36	5.24	1.46	2.09	.04	.00	--	548	.75	34	54		831	7.9
Mar. 11-20.....	771	47	2.10	1.48	4.74	.36	5.21	1.46	2.12	.04	.01	.48	541	.74	571	55		827	8.0
Mar. 21-31.....	1,450	41	2.15	1.40	4.65	.36	5.15	1.46	2.12	.04	.01	--	538	.73	1,060	54		827	7.8
Apr. 1-10	2,000	42	2.20	1.40	4.78	.36	5.16	1.46	2.09	.04	.01	--	536	.73	1,460	55		833	7.8
Apr. 11-20	7,520	40	2.15	1.40	5.04	.38	5.16	1.48	2.14	.04	.00	--	544	.74	5,560	56		840	7.8
Apr. 21-30	22,530	42	2.10	1.40	4.91	.38	5.05	1.52	2.23	.04	.00	--	545	.74	16,670	56		836	7.9
May 1-10	55,520	42	2.10	1.32	4.96	.33	5.03	1.60	2.09	.05	.01	--	524	.71	39,420	57		863	8.0
May 11-20.....	88,150	43	2.20	1.23	5.22	.38	4.82	2.12	1.97	.04	.01	.53	560	.76	66,990	58		873	7.8
May 21-31.....	62,600	43	2.50	1.23	4.96	.41	5.31	1.81	1.75	.04	.01	--	561	.76	47,580	55		859	8.0
June 1-10	32,570	46	2.30	1.23	5.17	.43	5.00	2.12	1.89	.04	.01	--	570	.78	25,400	57		878	7.8
June 11-20	31,040	44	2.50	1.23	4.96	.43	5.24	2.00	1.81	.04	.01	.48	559	.76	23,590	54		862	7.9
June 21-30	25,940	48	2.74	1.40	4.65	.41	5.80	1.69	1.64	.05	.03	--	564	.77	19,970	51		853	7.7

July 1-10, 1952 ..	19,310	51	2.64	1.40	4.65	0.41	5.83	1.58	1.58	0.05	0.03	--	563	0.77	14,870	51		852	7.9
July 11-20.....	13,210	48	2.79	1.40	4.61	.41	6.06	1.46	1.49	.04	.03	--	557	.76	10,040	50		841	7.9
July 21-31.....	11,140	45	2.69	1.40	4.44	.38	5.87	1.37	1.49	.04	.03	--	546	.74	8,240	50		830	7.9
Aug. 1-10.....	4,380	45	2.69	1.40	4.44	.36	5.87	1.35	1.52	.04	.03	--	538	.73	3,200	50		819	8.0
Aug. 11-20	6,220	49	2.69	1.48	4.21	.38	5.92	1.35	1.55	.05	.01	0.50	546	.74	4,600	48		830	7.7
Aug. 21-31	7,710	49	2.64	1.56	4.35	.41	5.90	1.35	1.55	.05	.01	--	544	.74	5,710	49		820	8.0
Sept. 1-10.....	8,410	46	2.69	1.56	4.26	.41	5.93	1.37	1.58	.05	.01	--	540	.73	6,140	48		824	8.0
Sept. 11-20.....	1,730	44	2.69	1.56	4.35	.41	5.90	1.33	1.64	.04	.01	.53	544	.74	1,280	48		823	8.2
Sept. 21-30.....	1,610	45	2.69	1.56	4.39	.41	5.93	1.35	1.66	.05	.01	--	546	.74	1,190	49		826	8.1
Weighted average	a 404,000	44	2.40	1.32	4.91	0.38	5.26	1.79	1.86	0.04	0.01	--	553	0.75	303,000	54		858	--

a Represents 99 percent of runoff for water year October 1951 to September 1952.

HUMBOLDT RIVER BASIN--Continued

HUMBOLDT RIVER NEAR RYE PATCH, NEV.--Continued

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 1953.
Water temperatures: December 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,120 micromhos Aug. 15, Sept. 3; minimum daily, 798 micromhos Oct. 8.
Percent sodium: Maximum, 61 Sept. 11-20, 21-30; minimum, 50 Oct. 1-10, 11-20, 21-31, Nov. 1-10.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 1,120 micromhos Aug. 15, Sept. 3, 1953; minimum daily, 784 micromhos Dec. 31, 1951, Sept. 10, 1952.
Percent sodium: Maximum, 61 Sept. 11-20, 21-30, 1953; minimum, 48 Aug. 11-20, Sept. 1-10, 11-20, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for gaging station near Rye Patch for water year October 1952 to September 1953 given in Water-Supply Paper 1284. No appreciable inflow between gaging station and sampling point except during periods of local rains.

Chemical analyses, water year October 1952 to September 1953

Date of collection	Runoff (acre-feet)	Silica (SiO_3)	Iron (Fe)	Equivalents per million										Boron (B)	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, 1952	1,210	43		2.59	1.56	4.48	0.38	5.90	--	1.37	1.64	0.05	0.02	--	548	0.75	908	50	3.1	833	8.1
Oct. 11-20	2,310	43		2.59	1.56	4.52	.38	5.90	--	1.35	1.66	.05	.02	0.53	548	.75	1,730	50	3.1	835	8.2
Oct. 21-31	1,310	41		2.59	1.56	4.52	.38	5.93	--	1.35	1.69	.05	.02	--	548	.75	982	50	3.1	842	8.0
Nov. 1-10	1,770	40		2.54	1.56	4.52	.38	5.46	0.40	1.35	1.69	.05	.01	--	545	.74	1,310	50	3.2	835	8.4
Nov. 11-20	1,940	40		2.50	1.56	4.57	.38	5.08	.80	1.39	1.69	.05	.02	.52	543	.74	1,440	51	3.2	831	8.5
Nov. 21-30	1,460	51		2.59	1.64	4.83	.24	5.97	--	1.48	1.75	.04	.01	--	562	.76	1,110	52	3.3	859	8.3
Dec. 1-25	212	52		2.79	1.64	4.83	.24	5.97	--	1.46	1.78	.04	.01	.48	561	.76	161	51	3.3	865	8.2
Feb. 5-19, 1953	103	40		2.64	1.64	4.83	.23	5.87	--	1.48	1.86	.04	.01	.49	550	.75	77	52	3.3	862	8.3
Feb. 20-28	49	45		2.40	1.56	4.78	.36	5.57	.27	1.42	1.83	.05	.01	--	549	.75	37	53	3.4	858	8.3
Mar. 1-10	1,750	44		2.50	1.56	4.78	.36	5.52	.40	1.42	1.86	.05	.01	--	552	.75	1,310	52	3.4	862	8.4
Mar. 11-20	2,820	42		2.50	1.56	4.78	.36	5.21	.67	1.44	1.89	.05	.01	.48	554	.75	2,120	52	3.4	870	8.3
Mar. 21-31	2,870	42		2.50	1.56	4.78	.36	5.64	.27	1.44	1.92	.05	.01	--	554	.75	2,150	52	3.4	872	8.3
Apr. 1-10	5,000	40		2.40	1.56	5.04	.38	5.31	.53	1.50	2.00	.05	.00	--	556	.76	3,800	54	3.6	879	8.4
Apr. 11-20	5,700	45		2.50	1.64	5.22	.23	5.87	--	1.56	2.09	.04	.01	.51	578	.79	4,500	54	3.6	905	8.1
Apr. 21-30	9,470	42		2.50	1.64	5.26	.23	5.80	--	1.60	2.14	.04	.01	--	582	.79	7,480	55	3.7	912	8.2
May 1-10	7,090	42		2.50	1.64	5.31	.41	5.83	--	1.64	2.31	.04	.01	--	592	.81	5,740	54	3.7	931	8.1

May 11-20, 1953 ...	6,510	41		2.54	1.64	5.44	0.43	5.38	0.40	1.67	2.43	0.04	0.01	0.57	597	0.81	5,270	54	3.8	939	8.3
May 21-31	7,050	47		2.25	1.64	5.70	.38	5.47	.30	1.71	2.43	.04	.02	--	606	.82	5,780	57	4.1	945	8.3
June 1-10	4,970	47		2.40	1.64	5.70	.38	5.65	.17	1.73	2.48	.04	.02	--	612	.83	4,130	56	4.0	964	8.3
June 11-20	7,500	44		2.30	1.64	5.91	.41	5.69	--	1.77	2.71	.04	.02	.57	617	.84	6,300	58	4.2	983	8.1
June 21-30	6,580	44		2.30	1.64	6.04	.41	5.52	.20	1.83	2.90	.04	.02	--	632	.86	5,660	58	4.3	1,010	8.2
July 1-10	7,140	44		2.30	1.64	6.09	.43	5.44	.30	1.87	3.05	.04	.02	--	648	.88	6,280	58	4.3	1,030	8.2
July 11-20	10,100	49		2.30	1.73	6.78	.49	5.83	--	1.98	3.22	.04	.01	.54	669	.91	9,190	60	4.8	1,070	7.7
July 21-31	11,060	51		2.35	1.81	6.87	.49	5.60	.33	2.04	3.27	.04	.01	--	688	.94	10,400	60	4.7	1,090	8.2
Aug. 1-10	5,370	51		2.40	1.73	6.87	.51	5.67	.27	2.06	3.27	.04	.01	--	692	.94	5,050	60	4.8	1,100	8.2
Aug. 11-20	5,310	49		2.30	1.81	6.96	.54	5.90	--	2.10	3.36	.04	.01	.74	694	.94	4,990	60	4.9	1,110	7.9
Aug. 21-31	4,930	50		2.30	1.81	6.96	.54	5.60	.33	2.12	3.33	.04	.01	--	695	.95	4,680	60	4.9	1,110	8.2
Sept. 1-10	5,110	47		2.25	1.81	6.96	.51	5.51	.40	2.14	3.33	.04	.01	--	694	.94	4,800	60	4.9	1,110	8.2
Sept. 11-20	5,530	47		2.20	1.81	6.96	.51	5.21	.67	2.17	3.38	.05	.01	.78	697	.95	5,250	61	4.9	1,100	8.3
Sept. 21-30	3,220	53		2.20	1.81	7.17	.49	5.54	.40	2.17	3.27	.04	.01	--	703	.96	3,090	61	5.1	1,110	8.3
Total or weighted average	a135,400	46		2.40	1.64	5.96	0.41	5.62	--	1.79	2.68	0.04	0.01	--	628	0.85	115,100	57	4.2	992	--

a Represents 99.8 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: November 1952 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 170 micromhos Jan. 3; minimum daily, 40.1 Sept. 27.
Percent sodium: Maximum, 49 Nov. 1-5, 7-10; minimum, 30 Jan. 3-13.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1285. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, November 1952 to September 1953

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				
Nov. 1-5, 7-10, 1952	8,060	--	0.14	0.06	0.24	0.05	0.33	0.04	0.13	--	0.02	--	38	0.05	403	49	0.7	50.5	7.3
Nov. 11-20	8,090	8.1	.25	.07	.25	.03	.38	.04	.18	0.00	.01	0.14	40	.05	404	42	.6	69.9	7.1
Nov. 21-28	4,020	--	.28	.12	.26	.03	.46	.05	.18	--	.00	--	46	.06	241	38	.6	67.3	7.0
Dec. 16-23	2,330	--	.70	.34	.52	.07	1.18	.14	.26	--	.03	--	115	.16	373	32	.7	164	7.3
Jan. 3-10, 1953	2,370	--	.65	.36	.48	.08	1.18	.14	.27	--	.04	--	117	.16	379	30	.7	169	7.2
Jan. 11-13	904	--	.70	.37	.48	.07	1.16	.16	.28	--	.02	--	116	.16	145	30	.7	161	7.6
Jan. 14-20	2,040	--	.30	.14	.30	.04	.49	.06	.20	--	.00	--	56	.08	163	39	.6	77.1	6.5
Jan. 21-31	5,140	6.2	.28	.12	.32	.04	.48	.06	.17	.01	.02	.14	56	.08	411	43	.7	77.3	6.8
Feb. 1-10	8,280	5.5	.28	.10	.26	.02	.43	.04	.16	.00	.00	.11	45	.06	497	40	.6	60.4	6.9
Feb. 11-20	11,930	13	.30	.11	.20	.03	.43	.05	.18	.00	.02	.13	48	.07	835	32	.4	63.3	6.9
Feb. 21-28	12,900	12	.26	.12	.26	.04	.43	.06	.19	.00	.00	.12	48	.07	903	39	.6	63.5	7.0
Mar. 1-8, 10	15,940	--	.27	.12	.26	.04	.39	.08	.19	--	.02	--	52	.07	1,120	38	.6	69.6	6.8
Mar. 9	1,750	--	--	--	.36	.06	.30	--	.56	--	--	--	--	--	--	--	--	102	5.6
Mar. 11-20	17,550	12	.34	.10	.26	.04	.44	.05	.25	.00	.01	.11	51	.07	1,230	35	.6	69.5	6.9
Mar. 21-31	19,280	11	.30	.14	.36	.08	.36	.05	.34	.00	.15	.00	67	.09	1,740	41	.8	94.3	6.2

May 15-20, 1953 .	4,590	--	0.27	0.13	0.30	0.04	0.46	0.05	0.21	--	0.01	--	51	0.07	321	41	0.7	66.1	7.0
May 21-31.....	8,660	15	.25	.09	.32	.03	.44	.04	.18	0.00	.01	0.11	49	.07	606	46	.8	68.5	6.8
June 1-10	7,840	13	.25	.11	.26	.03	.43	.04	.16	.00	.00	.12	48	.07	549	41	.6	64.5	7.1
June 11-20	7,280	14	.25	.11	.30	.03	.46	.05	.16	.00	.00	.01	48	.07	510	44	.7	65.3	7.0
June 21-30	6,590	14	.26	.08	.30	.03	.44	.05	.18	.00	.01	.05	48	.07	461	45	.7	67.0	7.0
July 1-10	3,990	7.7	.29	.13	.36	.03	.56	.04	.20	.00	.01	.19	54	.07	279	44	.8	80.7	7.0
July 11-20	2,920	4.1	.29	.13	.38	.03	.61	.05	.18	.00	.00	.14	53	.07	204	46	.8	79.8	7.4
July 21-31	2,780	8.0	.33	.12	.38	.03	.64	.05	.17	.00	.00	.08	54	.07	195	45	.8	87.8	7.4
Aug. 1-10	2,600	9.0	.32	.14	.34	.03	.64	.06	.16	.00	.00	.08	54	.07	182	41	.7	78.6	7.6
Aug. 11-20	3,300	8.7	.29	.12	.32	.03	.56	.05	.17	.00	.00	.10	53	.07	231	42	.7	77.7	7.3
Aug. 21-31	9,830	11	.23	.13	.20	.02	.39	.04	.14	.00	.02	.06	43	.06	590	34	.5	58.8	7.1
Sept. 1-10.....	13,690	10	.21	.09	.21	.02	.38	.04	.12	.00	.01	.10	37	.05	684	40	.5	53.2	7.1
Sept. 11-20	14,450	10	.21	.09	.20	.03	.36	.05	.11	.00	.02	.14	41	.06	867	37	.5	49.9	6.8
Sept. 21-30.....	20,970	8.6	.15	.13	.16	.03	.33	.04	.10	.00	.01	.18	38	.05	1,050	35	.4	45.8	6.7
Total or weighted average [a]	230,100	--	b0.26	b0.12	0.27	0.04	0.43	b0.05	0.19	--	b0.02	--	b49	b0.07	b15,980	b39	b0.6	68.2	--

a Represents 68 percent of runoff for water year October 1952 to September 1953.
b Represents 67 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 1,070 micromhos Apr. 2; minimum daily, 60.0 micromhos June 21.
Percent sodium: Maximum, 51 Mar. 11-20; minimum, 39 June 21-23, 25-26.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 1,070 micromhos Apr. 2, 1953; minimum daily, 60.0 micromhos June 21, 1953.
Percent sodium: Maximum, 51 Mar. 11-20, 1953; minimum, 34 Apr. 1-10, May 1-10, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1285.

Chemical analyses, water year October 1952 to September 1953

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. 1-9, 1952 .	28,260	--	1.85	1.40	3.00	0.11	2.43	0.90	2.90	--	0.04	0.34	391	0.53	14,980	47	2.4	648	7.6
Oct. 10-20	46,550	25	1.35	.99	2.30	.08	1.85	.77	2.03	0.01	.03	.20	291	.40	18,620	49	2.1	495	7.6
Oct. 21-31	39,910	22	1.55	1.23	2.83	.09	1.97	1.00	2.82	.01	.03	.23	380	.52	20,750	50	2.4	608	7.7
Nov. 1-10.....	33,820	24	1.65	1.32	2.91	.10	1.92	1.00	2.85	.01	.02	.30	359	.49	16,570	49	2.4	618	7.4
Nov. 11-17.....	26,480	--	1.55	1.15	2.70	.07	1.80	.94	2.57	--	.02	--	335	.46	12,180	49	2.3	562	7.5
Nov. 18-20	15,270	--	1.40	.82	1.87	.08	1.36	.64	1.86	--	.02	--	242	.33	5,040	45	1.8	413	7.2
Nov. 21-29	48,710	23	1.00	.76	1.48	.07	1.23	.58	1.58	.00	.02	.22	213	.29	14,130	45	1.6	363	7.2
Nov. 30-Dec. 10	62,080	18	1.05	.82	1.74	.07	1.28	.67	1.69	.00	.02	.18	229	.31	19,240	47	1.8	394	7.2
Dec. 11-20.....	69,280	22	1.00	.74	1.39	.06	1.28	.60	1.35	.00	.02	.19	202	.27	18,710	44	1.5	346	7.3
Dec. 21-31.....	99,110	17	.80	.59	1.13	.06	1.06	.46	1.02	.00	.02	.17	157	.21	20,810	44	1.4	267	7.2
Jan. 1-10, 1953.	110,100	14	.85	.63	1.22	.06	1.21	.46	.99	.00	.02	.17	171	.23	25,320	44	1.4	281	7.3
Jan. 11-20	119,900	15	.65	.65	1.09	.06	1.23	.44	.96	.01	.03	.19	169	.23	27,580	41	1.3	279	7.0
Jan. 21-31	135,700	12	.80	.63	1.09	.05	1.13	.46	.96	.01	.03	.19	168	.23	31,210	42	1.3	273	7.1
Feb. 1-10.....	103,100	12	.95	.69	1.30	.05	1.15	.52	1.35	.01	.02	.12	193	.26	26,810	44	1.4	327	7.0
Feb. 11-13, 20 .	28,200	--	1.25	.99	1.91	.06	1.34	.83	1.92	--	.02	--	263	.36	10,150	45	1.8	445	7.2
Feb. 14-19	32,530	--	1.60	1.23	2.78	.09	1.44	1.12	3.05	--	.01	--	366	.50	16,260	49	2.3	615	6.6
Feb. 21-28	40,224	13	1.15	.90	2.13	.06	1.30	.83	2.00	.00	.02	.23	257	.35	14,080	50	2.1	444	7.3
Mar. 1-6	17,300	17	1.75	1.32	3.13	.08	1.77	1.25	3.05	.00	.02	.38	387	.53	9,170	50	2.5	648	7.5
Mar. 7-10.....	7,408	--	2.45	1.81	4.26	.10	2.26	1.46	4.68	--	.10	--	558	.76	5,630	49	2.9	891	7.7

Mar. 11-20, 1953 .	23,250	30	2.30	1.73	4.35	0.11	2.33	1.54	4.46	0.00	0.07	0.36	507	0.69	16,040	51	3.1	854	7.7
Mar. 21-31.....	23,530	33	2.30	1.64	4.09	.13	2.39	1.29	4.32	.01	.06	.33	539	.73	17,180	50	2.9	842	7.5
Apr. 1-10.....	13,970	40	2.64	1.89	4.35	.15	2.62	1.15	5.22	.01	.04	.31	578	.79	11,040	48	2.9	942	7.6
Apr. 11-20.....	18,040	30	2.05	1.40	3.44	.11	2.29	.92	3.64	.01	.04	.19	451	.61	11,000	49	2.6	727	7.2
Apr. 21-22, 25-26, 28.....	18,430	27	1.85	1.32	3.26	.12	2.13	.85	3.36	.01	.03	.17	401	.55	10,140	50	2.6	676	7.4
Apr. 23-24, 27 ...	8,650	--	1.35	.74	2.04	.08	1.49	.58	2.03	--	.03	--	261	.35	3,100	48	2.0	445	7.2
Apr. 29-30.....	31,160	--	.60	.31	.70	.05	.82	.19	.68	--	.02	--	112	.15	4,670	42	1.0	177	7.1
May 1-10.....	94,250	12	.70	.48	1.00	.05	.95	.29	.96	.00	.02	.06	139	.19	17,910	45	1.3	232	7.1
May 11-12	11,720	--	.95	.64	1.48	.05	1.15	.46	1.47	--	.01	--	199	.27	3,160	47	1.7	333	7.2
May 13, 18-20	15,290	--	1.35	.82	2.17	.07	1.51	.64	2.20	--	.02	--	275	.37	5,660	49	2.1	470	7.2
May 14-17.....	11,760	--	1.90	1.23	2.96	.09	2.08	.87	3.02	--	.02	--	380	.52	6,120	48	2.4	634	7.4
May 21, 24-31	43,020	14	1.20	.90	1.91	.07	1.57	.56	1.80	.01	.02	.10	245	.33	14,200	47	1.9	416	7.4
May 22-23.....	12,060	--	.85	.49	1.26	.05	1.05	.38	1.21	--	.01	--	165	.22	2,650	48	1.5	285	7.5
June 1-10	76,740	21	.80	.47	1.22	.05	1.03	.35	1.07	.01	.01	.23	155	.21	16,880	48	1.5	261	7.1
June 11-20	88,880	12	.65	.44	.96	.04	.84	.27	.93	.01	.00	.14	130	.18	16,000	46	1.3	219	6.9
June 21-23, 25-26 .	82,550	--	.29	.19	.32	.03	.44	.08	.28	--	.02	--	59	.08	6,600	39	0.7	82.3	7.0
June 24, 27-30....	44,250	--	.50	.36	.74	.03	.72	.27	.68	--	.02	--	105	.14	6,200	45	1.1	171	7.1
July 1, 6-8, 10 ...	26,860	---	.70	.47	.96	.04	.92	.27	.67	--	.02	--	131	.18	4,830	44	1.3	218	7.2
July 2-5, 9	33,500	--	.48	.36	.65	.03	.70	.18	.62	--	.02	--	97	.13	4,360	43	1.0	159	7.2
July 11-12	7,780	--	.80	.51	1.13	.04	1.06	.27	1.07	--	.02	--	160	.22	1,710	46	1.4	260	7.3
July 13-14	5,630	--	1.10	.73	1.65	.06	1.33	.42	1.72	--	.02	--	226	.31	1,750	47	1.7	373	7.7
July 15-20	10,230	--	1.90	1.32	2.83	.10	2.13	.65	3.24	--	.02	--	395	.54	5,520	46	2.2	637	8.0
July 21-31	14,640	28	2.15	1.56	3.44	.11	2.44	.75	3.95	.01	.01	.28	467	.64	9,370	47	2.5	756	7.9

SAN JOAQUIN RIVER BASIN--Continued

SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953...	14,560	28	2.15	1.48	3.35	0.10	2.36	0.85	3.69	0.01	0.02	0.21	460	0.63	9,170	47	2.5	730	7.5
Aug. 11-20	13,660	34	2.20	1.48	3.61	.11	2.44	.85	3.84	.01	.02	.23	472	.64	8,740	49	2.7	756	7.5
Aug. 21-31	17,750	29	2.00	1.40	3.52	.10	2.36	.92	3.58	.01	.03	.23	450	.61	10,830	50	2.7	723	7.4
Sept. 1-10.....	18,890	30	2.05	1.40	3.44	.11	2.43	.96	3.47	.01	.03	.24	432	.59	11,150	49	2.6	712	7.6
Sept. 11-20.....	19,800	26	2.05	1.48	3.61	.11	2.56	1.00	3.58	.01	.03	.23	446	.61	12,080	50	2.7	741	7.6
Sept. 21-30.....	26,340	31	1.75	1.23	3.09	.10	2.46	.79	2.82	.01	.04	.14	373	.51	13,430	50	2.5	694	7.5
Total or weighted average[a].....	1,891,000	b18	1.10	0.79	1.70	0.06	1.34	0.56	1.66	b0.01	0.02	c0.19	229	0.31	586,200	47	1.7	381	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.
b Represents 75 percent of runoff for water year October 1952 to September 1953.
c Represents 76 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 202 micromhos Dec. 15; minimum daily, 35.1 micromhos Sept. 13.
Percent sodium: Maximum, 33 Nov. 21-30; minimum, 10 Dec. 22-23.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 202 micromhos Dec. 15, 1952; minimum daily, 29.4 micromhos July 9, 1952.
Percent sodium: Maximum, 33 Nov. 21-30, 1952; minimum, 10 Dec. 22-23, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1285.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	6,620	7.4	0.20	0.12	0.16	0.03	0.33	0.07	0.08	0.01	0.00	0.17	40	0.05	331	20	0.4	41.4	6.9
Oct. 11-20	6,590	6.3	.21	.12	.14	.02	.33	.09	.06	.01	.00	.07	38	.05	330	28	.3	42.7	7.0
Oct. 21-31	7,750	7.1	.22	.12	.15	.03	.34	.08	.06	.01	.00	.08	38	.05	388	29	.4	47.5	7.1
Nov. 1-10	8,550	8.1	.31	.12	.12	.03	.25	.10	.19	.00	.01	.14	39	.05	428	21	.3	54.6	6.5
Nov. 11-20	11,110	9.5	.25	.09	.14	.03	.25	.09	.20	.00	.01	.11	35	.05	556	27	.3	51.4	6.6
Nov. 21-30	11,750	--	.18	.07	.14	.02	.30	.06	.12	--	.00	--	31	.04	470	33	.4	43.9	7.3
Dec. 1-4, 6-8, 10	9,320	--	.18	.10	.14	.03	.23	.08	.20	--	.01	--	40	.05	466	30	.4	52.3	7.2
Dec. 5, 9	2,420	--	.25	.16	.16	.05	.10	.14	.40	--	.01	--	48	.07	169	26	.4	77.2	6.5
Dec. 11, 20	2,810	--	.30	.19	.18	.08	.07	.23	.37	--	.02	--	64	.09	253	24	.4	89.8	5.6
Dec. 12, 15	2,090	--	.29	.16	.16	.05	a .00	.16	.68	--	.01	--	68	.09	188	19	.3	198	3.7
Dec. 13-14, 16-19	7,300	--	.24	.12	.15	.04	.33	.20	.11	--	.01	--	57	.08	584	27	.4	56.4	6.6
Dec. 21	843	--	--	--	.10	.07	.13	--	.62	--	--	--	--	--	--	--	--	100	5.8
Dec. 22-23	1,600	--	.34	.26	.07	.03	.31	.27	.10	--	.00	--	54	.07	112	10	.1	67.9	6.8
Dec. 24-31	9,270	--	.25	.14	.14	.02	.33	.10	.11	--	.00	--	39	.05	464	25	.3	48.8	6.7
Jan. 1-10, 1953..	12,200	7.8	.28	.16	.09	.03	.34	.13	.10	.00	.01	.09	42	.06	732	16	.2	53.9	7.0
Jan. 11-20	14,820	6.2	.30	.16	.15	.03	.34	.14	.14	.00	.02	.18	47	.06	889	24	.3	72.5	6.8
Jan. 21-31	27,640	9.2	.32	.12	.15	.03	.38	.08	.13	.01	.01	.11	45	.06	1,660	24	.3	57.0	6.9

a 0.20 equivalents per million free mineral acidity as H_2SO_4.

SAN JOAQUIN RIVER BASIN--Continued

MOKELUMNE RIVER AT WOODBRIDGE, CALIF.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1, 3, 5, 1953	3,750	--	--	--	0.09	0.03	0.38	--	0.18	--	--	--	--	--	--	--	--	84.4	6.7
Feb. 2, 4, 6-10 ..	8,380	--	0.34	0.16	.16	.02	.36	0.10	.21	--	0.00	--	50	0.07	587	24	0.3	64.1	6.7
Feb. 11-20	12,860	5.3	.27	.12	.14	.03	.38	.08	.12	0.00	.00	0.13	40	.05	643	24	.3	52.5	7.0
Feb. 21	1,250	--	--	--	.11	.03	.20	--	.40	--	--	--	--	--	--	--	--	106	5.8
Feb. 22-28	6,350	6.0	.28	.12	.15	.03	.36	.10	.15	.00	.00	.11	43	.06	381	25	.3	53.9	6.7
Mar. 1-2, 4-10 ..	6,600	5.8	.28	.11	.16	.03	.38	.10	.12	.00	.00	.14	41	.06	396	28	.4	53.9	7.0
Mar. 3	774	--	--	--	.20	.03	.38	--	.31	--	--	--	--	--	--	--	--	141	6.9
Mar. 11-20	7,540	16	.30	.15	.17	.03	.38	.12	.13	.00	.01	.08	41	.06	452	27	.4	55.7	7.3
Mar. 21-31	8,080	12	.30	.13	.15	.02	.38	.10	.13	.00	.00	.14	42	.06	485	25	.3	55.4	7.0
Apr. 1-10	4,430	13	.32	.14	.15	.02	.39	.08	.16	.01	.00	.12	41	.06	266	23	.3	54.6	7.3
Apr. 11-20	3,840	10	.26	.14	.15	.02	.39	.07	.11	.00	.01	.05	40	.05	192	26	.3	53.6	6.9
Apr. 21-30	4,590	9.4	.28	.18	.15	.02	.38	.10	.15	.00	.01	.06	42	.06	275	24	.3	64.7	6.9
May 1-10	5,640	11	.24	.16	.16	.03	.39	.09	.11	.00	.01	.05	42	.06	338	28	.4	60.1	6.9
May 11-20	6,500	9.9	.28	.12	.15	.03	.41	.07	.11	.01	.00	.07	39	.05	325	26	.3	52.2	7.2
May 21-31	18,650	15	.25	.13	.15	.02	.38	.06	.11	.00	.00	.11	42	.06	1,120	27	.3	52.4	6.9
June 1-10	24,070	16	.24	.12	.14	.02	.39	.05	.09	.00	.00	.09	40	.05	1,200	26	.3	50.1	7.0
June 11-20	26,440	8.4	.24	.12	.12	.02	.34	.05	.12	.01	.01	.06	39	.05	1,320	24	.3	47.7	6.9
June 21-30	32,110	8.1	.22	.10	.12	.02	.36	.04	.07	.00	.01	.02	36	.05	1,610	26	.3	42.3	6.8
July 1-10	11,030	9.1	.22	.12	.12	.02	.34	.04	.10	.00	.00	.04	37	.05	552	25	.3	43.3	7.1
July 11-20	2,280	8.2	.22	.10	.15	.02	.36	.04	.08	.00	.00	.06	45	.06	137	30	.4	44.0	7.1
July 21-31	1,020	12	.23	.13	.11	.02	.34	.05	.11	.00	.01	.04	37	.05	51	23	.3	58.9	7.0
Aug. 1-10	1,450	11	.23	.13	.09	.02	.34	.06	.10	.00	.00	.05	36	.05	72	18	.2	50.4	7.2
Aug. 11-20	1,530	8.9	.23	.13	.09	.02	.33	.07	.09	.00	.00	.04	36	.05	76	19	.2	44.2	7.1
Aug. 21-31	2,370	9.5	.21	.13	.10	.02	.34	.05	.06	.00	.01	.06	36	.05	118	23	.2	44.3	7.2

Sept. 1-2, 4, 8-10 1953	1,720	--	0.21	0.13	0.10	0.01	0.31	0.06	0.09	--	0.00	--	37	0.05	86	23	0.2	42.9	7.1
Sept. 3, 5-7	1,480	--	.19	.13	.10	.02	.31	.08	.06	--	.01	--	36	.05	74	24	.2	39.2	7.4
Sept. 11-20	4,660	7.1	.19	.13	.09	.02	.30	.07	.08	0.01	.00	0.07	33	.04	186	20	.2	38.0	7.1
Sept. 21-30	5,020	9.0	.17	.11	.10	.02	.28	.06	.04	.01	.00	.14	31	.04	201	24	.3	38.3	6.7
Total or weighted average[b]	357,097	c9.6	d0.25	d0.12	0.13	0.03	0.34	d0.08	0.13	c0.00	d0.00	c0.09	d41	d0.06	d21,030	d25	d0.3	54.1	--

b Represents 100 percent of runoff for water year October 1952 to September 1953.
c Represents 82 percent of runoff for water year October 1952 to September 1953.
d Represents 98 percent of runoff for water year October 1952 to September 1953.

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 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 441 micromhos May 12; minimum daily, 105 micromhos Dec. 29.
Percent sodium: Maximum, 46 May 12, 19, 21, 23-29; minimum 15 Dec. 21-23, 29.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 447 micromhos Sept. 9, 1952; minimum daily, 99.1 micromhos Mar. 17, 1952.
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. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1285. 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 1952 to September 1953

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, 1952 ..	135,600	25	0.70	0.69	0.48	0.05	1.52	0.21	0.23	0.01	0.00	0.25	125	0.17	23,050	25	0.6	165	7.7
Oct. 11-20	129,200	20	.65	.57	.39	.04	1.33	.16	.16	.01	.01	.10	115	.16	20,670	24	.5	162	7.6
Oct. 21-31	137,900	26	.65	.56	.44	.05	1.33	.18	.18	.01	.00	.09	116	.16	22,060	26	.6	164	7.8
Nov. 1-10	120,900	26	.75	.58	.44	.04	1.34	.19	.23	.00	.01	.18	115	.16	19,340	24	.5	170	7.5
Nov. 11-20	141,900	--	.65	.54	.52	.04	1.31	.16	.24	--	.01	--	115	.16	22,700	30	.7	165	7.8
Nov. 21-30	132,800	--	.65	.48	.56	.04	1.38	.23	.25	--	.01	--	123	.17	22,580	33	.7	178	8.0
Dec. 1, 4	41,300	--	.50	.58	.44	.05	1.11	.20	.22	--	.06	--	117	.16	6,610	28	.6	151	7.9
Dec. 2-3, 5-6	83,420	--	.50	.51	.61	.05	1.21	.27	.28	--	.03	--	122	.17	14,180	36	.9	181	8.0
Dec. 7-10	167,400	--	.44	.62	.34	.05	.84	.19	.18	--	.07	--	116	.16	26,780	24	.5	120	7.7
Dec. 11, 14-16 ...	159,500	--	.60	.62	.42	.05	1.05	.38	.18	--	.04	--	100	.14	22,330	25	.5	155	7.7
Dec. 12-13, 20 ...	117,000	--	.48	.48	.36	.04	.85	.33	.15	--	.04	--	97	.13	15,210	26	.5	124	7.2
Dec. 17-19	92,230	--	.75	.67	.70	.05	1.34	.52	.26	--	.03	--	137	.19	17,520	32	.8	198	7.4
Dec. 21-23, 29 ...	162,900	--	.60	.43	.19	.04	.84	.18	.18	--	.02	--	95	.13	23,780	15	.3	117	7.2
Dec. 24-28, 30-31	278,300	--	.65	.55	.41	.04	1.15	.21	.24	--	.01	--	112	.15	41,740	25	.5	160	7.3
Jan. 1-10, 1953...	451,400	22	.65	.58	.35	.05	1.10	.27	.27	.00	.01	.16	114	.16	72,220	21	.4	158	7.3
Jan. 11-20	483,600	22	.65	.52	.31	.04	1.00	.25	.25	.01	.00	.17	106	.14	67,700	21	.4	146	7.4
Jan. 21-31	523,400	19	.65	.50	.28	.04	1.08	.18	.19	.01	.00	.14	101	.14	73,280	19	.4	140	7.5
Feb. 1-10	408,200	22	.70	.54	.26	.03	1.21	.18	.18	.01	.01	.11	106	.14	57,150	17	.3	151	7.4

Feb. 11-19, 1953	315,000	--	0.70	0.53	0.27	0.04	1.18	0.18	0.20	--	0.01	--	106	0.14	44,100	18	0.3	148	7.2
Feb. 20	24,000	--	--	--	.65	.04	1.67	--	.45	--	--	--	--	--	--	--	--	263	7.1
Feb. 21-28	163,900	24	.90	.82	.83	.03	1.62	.50	.42	0.00	.00	0.15	160	.22	36,060	32	.9	252	7.6
Mar. 1-10	184,200	36	.95	.90	.78	.04	1.67	.50	.45	.00	.01	.23	163	.22	40,520	29	.8	260	7.6
Mar. 11, 14-17, 20	114,000	--	.80	.80	.74	.04	1.49	.50	.40	--	.00	--	146	.20	22,800	31	.8	226	7.7
Mar. 12-13, 18-19	71,960	--	1.00	.81	.61	.04	1.52	.44	.40	--	.01	--	149	.20	14,390	25	.6	185	7.7
Mar. 21, 26.....	55,740	--	.75	.54	.52	.03	1.31	.29	.24	--	.00	--	120	.16	8,920	28	.6	176	7.6
Mar. 22-25	121,590	--	.55	.44	.29	.03	.95	.20	.16	--	.01	--	99	.13	15,810	22	.4	124	7.4
Mar. 27-31	115,400	--	.85	.73	.70	.05	1.52	.44	.34	--	.01	--	146	.20	23,080	30	.8	222	7.4
Apr. 1-2	40,860	--	1.00	.82	.87	.04	1.77	.58	.40	--	.00	--	170	.23	9,400	32	.9	268	7.5
Apr. 3-10	138,050	15	.75	.56	.43	.03	1.38	.21	.22	.00	.01	.18	116	.16	22,090	24	.5	174	7.5
Apr. 11-12, 15, 18	50,780	--	.85	.63	.61	.04	1.52	.33	.28	--	.00	--	133	.18	9,140	29	.7	205	7.5
Apr. 13-14, 16-17, 19-20	68,230	--	.95	.90	1.13	.04	1.85	.69	.56	--	.01	--	189	.26	17,740	37	1.2	303	7.6
Apr. 21-28.....	78,840	16	.75	.64	.61	.04	1.41	.33	.31	.01	.01	.12	130	.18	14,190	30	.7	200	7.1
Apr. 29-30.....	65,060	--	.60	.42	.40	.03	.98	.25	.23	--	.01	--	102	.14	9,110	28	.6	144	7.0
May 1-5	123,700	--	.60	.50	.44	.03	1.08	.23	.20	--	.01	--	103	.14	17,320	28	.6	152	7.2
May 6-7	36,950	--	.75	.68	.83	.04	1.48	.50	.34	--	.01	--	146	.20	7,390	36	1.0	226	7.6
May 8-10	56,330	--	.90	.99	1.56	.05	2.00	.98	.59	--	.02	--	220	.30	16,900	45	1.6	357	7.5
May 11, 13-18, 20	145,000	14	.80	.76	1.04	.04	1.62	.54	.40	.01	.02	.08	159	.22	31,900	40	1.2	253	7.5
May 12, 19	37,630	--	1.00	1.15	1.87	.05	2.26	1.08	.70	--	.02	--	244	.33	12,420	46	1.8	398	7.7
May 21, 23-29...	184,070	9.7	.85	.90	1.52	.05	1.93	.81	.59	.01	.02	.02	203	.28	51,540	46	1.6	328	7.5
May 22, 30-31...	68,030	--	.75	.56	.65	.04	1.38	.33	.28	--	.01	--	127	.17	11,570	33	.8	192	7.5
June 1-10	211,500	32	.70	.72	.87	.04	1.52	.38	.34	.01	.00	.20	140	.19	40,190	37	1.0	219	7.4
June 11-20	193,000	17	.65	.58	.61	.04	1.25	.35	.28	.01	.00	.05	120	.16	30,880	33	.8	183	7.2
June 21-30	158,900	20	.65	.51	.52	.04	1.21	.23	.23	.01	.01	.05	108	.15	23,840	30	.7	162	7.4

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SACRAMENTO RIVER BASIN--Continued

SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.--Continued

Chemical analyses, water year October 1952 to September 1953--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 1-10, 1953..	120,300	20	0.65	0.63	0.61	0.04	1.36	0.27	0.28	0.01	0.01	0.06	123	.17	20,450	32	0.8	188	7.5
July 11-20	117,200	23	.70	.72	.70	.04	1.48	.31	.34	.00	.01	.17	125	.17	19,920	32	.8	205	7.8
July 21-31	143,600	32	.70	.65	.83	.04	1.51	.33	.34	.01	.00	.15	134	.18	25,850	37	1.0	209	8.0
Aug. 1-10.....	146,100	24	.75	.82	.96	.03	1.69	.44	.42	.00	.00	.14	159	.22	32,140	37	1.1	254	7.7
Aug. 11-20	144,300	25	.75	.74	.83	.04	1.61	.38	.40	.00	.00	.13	145	.20	28,860	35	1.0	229	7.8
Aug. 21-31	167,400	26	.70	.76	.83	.03	1.62	.38	.37	.01	.00	.15	146	.20	33,480	36	1.0	231	7.7
Sept. 1-10	184,600	23	.80	.82	1.04	.04	1.80	.42	.45	.01	.01	.16	162	.22	40,610	39	1.2	258	7.9
Sept. 11-20.....	194,900	24	.80	.80	1.00	.04	1.80	.38	.42	.01	.01	.18	157	.21	40,930	38	1.1	246	8.1
Sept. 21-30	193,400	25	.75	.82	.87	.04	1.75	.38	.34	.01	.01	.05	154	.21	40,610	35	1.0	242	7.7
Total or weighted average [a].....	8,021,000	b22	0.70	0.63	0.57	0.04	1.33	0.31	0.28	b0.01	0.01	b0.13	128	0.17	1,363,000	29	0.7	188	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.
b Represents 66 percent of runoff for water year October 1952 to September 1953.

FEATHER RIVER AT NICOLAUS, CALIF.

LOCATION.--At highway bridge at Nicolaus, Sutter County, just 0.4 mile upstream from gaging station and 1.2 miles downstream from Bear River.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 207 micromhos Dec. 24; minimum daily, 56.8 micromhos Apr. 29.
Percent sodium: Maximum, 27 Dec. 1-2, 4, 7; minimum, 8 Jan. 11-20.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 207 micromhos Dec. 24, 1952; minimum daily 50.0 micromhos May 28, 1952.
Percent sodium: Maximum, 27 Dec. 1-2, 4, 7, 1952; minimum, 8 June 21-30, 1951, Jan. 11-20, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1282.

Chemical analyses, water year October 1952 to September 1953

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, 1952...	55,560	13	0.55	0.44	0.20	0.02	1.06	0.08	0.09	0.00	0.00	0.19	78	0.11	6,110	15	0.3	115	7.5
Oct. 11-20.....	55,480	14	.60	.42	.17	.04	1.08	.08	.07	.00	.01	.08	76	.10	5,550	14	.2	116	7.7
Oct. 21-31.....	59,780	12	.60	.44	.19	.04	1.08	.08	.07	.00	.00	.08	68	.09	5,380	15	.3	117	7.7
Nov. 1-10.....	51,130	14	.65	.42	.17	.04	1.06	.08	.08	.00	.01	.16	76	.10	5,110	14	.2	117	7.4
Nov. 11-20.....	63,210	12	.65	.43	.18	.03	1.03	.11	.10	.00	.00	.19	79	.11	6,950	14	.2	122	7.3
Nov. 21-30.....	61,310	15	.65	.44	.17	.04	1.06	.10	.09	.00	.00	.15	78	.11	6,740	13	.2	120	7.5
Dec. 1-2, 4, 7.....	31,620	--	.50	.42	.36	.04	1.00	.25	.15	--	.01	--	94	.13	4,110	27	.5	149	7.2
Dec. 3, 5-6, 8-10.	69,540	--	.50	.42	.28	.04	.93	.27	.01	--	.02	--	81	.11	7,650	23	.4	115	7.3
Dec. 11-19.....	99,490	--	.48	.36	.26	.04	.87	.20	.11	--	.01	--	75	.10	9,950	23	.4	110	7.3
Dec. 20.....	16,800	--	1.40	.60	.26	.05	1.74	--	.14	--	--	--	--	--	--	11	.3	195	7.8
Dec. 21-23, 25-31.	144,100	16	.65	.43	.14	.03	.95	.12	.12	.01	.00	.10	79	.11	15,850	11	.2	113	7.4
Dec. 24.....	10,270	--	--	--	.15	.03	.95	--	.17	--	--	--	--	--	--	--	--	207	7.0
Jan. 1-9, 1953....	216,500	--	.60	.41	.10	.03	.92	.12	.13	--	.01	--	80	.11	23,820	9	.1	113	7.5
Jan. 10.....	206,300	--	--	--	.06	.05	.52	--	.11	--	--	--	--	--	--	--	--	72.3	7.6
Jan. 11-20.....	1,126,000	9.7	.40	.29	.06	.02	.61	.06	.07	.01	.00	.13	60	.08	90,080	8	.1	70.1	7.4
Jan. 21-31.....	710,900	9.7	.41	.29	.09	.03	.66	.08	.10	.00	.00	.11	60	.08	56,870	11	.2	86.9	7.2
Feb. 1-10.....	242,400	8.9	.47	.30	.16	.02	.79	.08	.11	.01	.01	.16	65	.09	21,820	17	.3	89.4	7.2
Feb. 11-20.....	175,800	13	.55	.32	.11	.03	.82	.10	.11	.00	.01	.09	68	.09	15,820	11	.2	104	7.2
Feb. 21-28.....	108,300	10	.50	.34	.22	.03	.85	.12	.11	.00	.00	.12	70	.10	10,830	20	.3	96.2	7.4

SACRAMENTO RIVER BASIN--Continued

FEATHER RIVER AT NICOLAUS, CALIF.--Continued

Chemical analyses, water year October 1952 to September 1953

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. 1-10, 1953	134,500	16	0.50	0.34	0.21	0.02	0.85	0.10	0.11	0.00	0.00	0.09	69	0.09	12,110	19	0.3	98.0	7.5
Mar. 11-20	200,400	23	.48	.33	.20	.02	.80	.12	.12	.00	.01	.12	67	.09	18,040	19	.3	93.4	7.5
Mar. 21-31	315,400	16	.46	.31	.16	.02	.75	.09	.13	.00	.01	.12	65	.09	28,390	16	.3	85.9	7.3
Apr. 1-10	266,600	20	.45	.29	.14	.02	.70	.07	.11	.00	.00	.14	60	.08	21,330	16	.2	78.1	7.4
Apr. 11-20	207,100	14	.41	.26	.18	.02	.72	.08	.08	.01	.00	.08	60	.08	16,570	20	.3	81.6	7.0
Apr. 21-30	445,700	14	.38	.20	.14	.02	.61	.06	.06	.01	.01	.00	53	.07	31,200	19	.3	69.7	6.9
May 1-10	385,200	11	.36	.24	.14	.02	.62	.06	.08	.01	.01	.04	55	.07	26,960	18	.3	69.7	7.1
May11-20	263,600	15	.39	.22	.15	.02	.61	.06	.11	.00	.02	.04	55	.07	18,450	19	.3	81.5	7.0
May21-31	326,500	13	.34	.24	.15	.02	.61	.05	.07	.00	.00	.14	53	.07	22,860	20	.3	68.2	7.0
June 1-10	279,300	15	.36	.24	.15	.02	.62	.04	.08	.01	.00	.06	53	.07	19,550	19	.3	72.1	7.0
June 11-20	278,300	9.2	.34	.20	.14	.03	.59	.06	.08	.01	.00	.04	50	.07	19,480	19	.3	67.4	7.0
June 21-30	193,300	15	.35	.21	.12	.02	.59	.05	.06	.01	.00	.07	49	.07	13,530	17	.2	63.9	7.3
July 1-10	93,880	17	.45	.26	.18	.02	.75	.06	.07	.01	.00	.08	60	.08	7,510	20	.3	83.7	7.4
July 11-20	40,820	16	.55	.38	.17	.03	.93	.07	.11	.00	.00	.10	74	.10	4,080	15	.2	108	7.6
July 21-31	24,410	18	.60	.48	.24	.03	1.13	.10	.10	.00	.01	.08	82	.11	2,690	18	.3	131	7.7
Aug. 1-10	20,020	18	.65	.44	.22	.03	1.11	.10	.14	.00	.01	.09	82	.11	2,200	16	.3	132	7.4
Aug. 11-20	21,280	17	.65	.47	.24	.03	1.10	.10	.18	.01	.01	.05	85	.12	2,550	17	.3	131	7.2
Aug. 21-31	24,850	15	.65	.50	.25	.03	1.16	.09	.14	.01	.01	.03	86	.12	2,980	18	.3	133	7.4
Sept. 1-10	26,840	16	.65	.47	.25	.03	1.16	.10	.14	.00	.01	.07	84	.11	2,950	18	.3	134	7.7
Sept. 11-20	35,440	16	.65	.44	.25	.04	1.11	.09	.13	.00	.01	.11	82	.11	3,900	18	.3	125	7.6
Sept. 21-30	56,830	14	.55	.46	.23	.03	1.06	.08	.08	.01	.01	.04	76	.10	5,680	18	.3	120	7.2
Total or weighted average a	7,144,000	b 13	c 0.44	c 0.30	0.13	0.03	0.72	c 0.08	0.09	b0.01	c 0.00	b 0.10	c 62	c 0.08	c 562,100	c 14	c 0.2	84.7	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.
b Represents 91 percent of runoff for water year October 1952 to September 1953.
c Represents 97 percent of runoff for water year October 1952 to September 1953.

SACRAMENTO RIVER BASIN--Continued

AMERICAN RIVER AT FAIR OAKS, CALIF.

LOCATION.--At highway bridge just downstream from gaging station at Fair Oaks, Sacramento County, 10 miles downstream from South Fork, and about 19 miles from mouth.
DRAINAGE AREA.--1,921 square miles.
RECORDS AVAILABLE.--Chemical analyses: January to December 1906, March 1951 to September 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 102 micromhos Nov. 13; minimum daily, 29.5 micromhos June 21.
Percent sodium: Maximum, 28 June 1-10; minimum, 8 Jan. 21-31.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 112 micromhos Aug. 28, 1951; minimum daily, 29.1 micromhos June 3, 1952.
Percent sodium: Maximum, 28 June 1-10, 1953; minimum, 8 Jan. 21-31, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1285.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	10,080	12	0.40	0.21	0.20	0.03	0.62	0.08	0.11	0.00	0.00	0.11	54	0.07	706	17	0.4	74.6	7.4
Oct. 11-20.....	8,770	9.7	.48	.23	.13	.03	.62	.08	.14	.00	.00	.08	54	.07	614	15	.2	78.6	7.3
Oct. 21-31.....	9,340	10	.44	.24	.14	.02	.64	.08	.13	.01	.00	.11	56	.08	747	17	.2	81.9	7.3
Nov. 1-10.....	6,430	11	.55	.26	.16	.03	.74	.10	.17	.00	.02	.07	65	.09	579	17	.3	96.1	7.4
Nov. 11-20.....	15,790	11	.50	.25	.22	.03	.70	.12	.15	.00	.00	.10	64	.09	1,420	22	.4	99.4	7.2
Nov. 21-30.....	10,800	13	.50	.33	.11	.03	.70	.10	.13	.00	.00	.03	61	.08	864	12	.2	91.9	7.4
Dec. 1-10.....	39,680	15	.50	.29	.11	.03	.66	.13	.14	.00	.00	.12	61	.08	3,170	12	.2	87.8	7.3
Dec. 11-20.....	37,030	10	.48	.29	.11	.02	.66	.14	.13	.00	.00	.15	58	.08	2,960	13	.2	84.6	7.2
Dec. 21-31.....	43,340	11	.45	.29	.16	.02	.66	.13	.14	.00	.00	.05	60	.08	3,470	18	.3	88.1	7.4
Jan. 1-9, 1953 ..	77,020	--	.45	.31	.19	.02	.69	.14	.14	--	.01	--	66	.09	6,930	19	.3	94.0	7.2
Jan. 10.....	35,500	--	--	--	.04	.02	.46	--	.08	--	--	--	--	--	--	--	--	56.8	7.2
Jan. 11-20.....	209,200	14	.37	.22	.12	.02	.52	.09	.09	.00	.00	.08	50	.07	14,640	17	.2	64.5	7.3
Jan. 21-31.....	148,000	15	.40	.24	.06	.02	.56	.08	.09	.00	.00	.10	51	.07	10,360	8	.1	65.7	7.3
Feb. 1-10.....	69,900	9.5	.35	.21	.12	.02	.56	.08	.09	.00	.00	.05	48	.07	4,890	18	.2	66.0	7.4
Feb. 11-20.....	53,300	8.6	.36	.18	.06	.02	.49	.07	.08	.01	.00	.12	46	.06	3,200	10	.1	62.0	7.1
Feb. 21-28.....	33,860	8.9	.36	.19	.15	.03	.52	.08	.11	.00	.00	.06	49	.07	2,370	20	.3	63.9	7.4

SACRAMENTO RIVER BASIN--Continued

AMERICAN RIVER AT FAIR OAKS, CALIF.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953..	48,000	13	0.36	0.19	0.14	0.03	0.52	0.08	0.11	0.00	0.00	0.06	46	0.06	2,880	19	0.3	62.7	7.3
Mar. 11-20	70,290	11	.34	.21	.16	.03	.54	.08	.11	.00	.00	.12	48	.07	4,920	21	.3	63.5	7.2
Mar. 21-31	113,600	17	.33	.20	.14	.02	.51	.10	.09	.00	.00	.08	46	.06	6,820	20	.3	60.0	7.4
Apr. 1-10.....	115,300	15	.28	.12	.10	.01	.41	.05	.07	.00	.01	.13	38	.05	5,760	19	.2	46.5	7.3
Apr. 11-20.....	78,660	12	.32	.14	.12	.02	.44	.05	.11	.01	.00	.14	41	.06	4,720	20	.3	51.8	7.2
Apr. 21-30.....	273,500	9.9	.24	.12	.09	.01	.36	.04	.06	.01	.01	.23	34	.05	13,680	19	.2	44.4	7.1
May 1-10	175,500	12	.26	.12	.10	.02	.39	.05	.07	.01	.00	.04	38	.05	8,780	21	.2	48.8	7.2
May 11-20	161,200	7.9	.24	.14	.09	.01	.38	.05	.06	.01	.00	.06	35	.05	8,060	18	.2	45.6	6.8
May 21-31	152,500	9.6	.22	.12	.09	.02	.36	.04	.06	.01	.00	.08	34	.05	7,620	20	.2	42.2	6.9
June 1-10	173,800	8.5	.22	.10	.14	.02	.38	.03	.06	.00	.00	.09	34	.05	8,690	28	.4	38.6	7.0
June 11-20	187,900	11	.22	.10	.08	.01	.28	.03	.11	.00	.00	.08	32	.04	7,520	19	.2	35.5	6.8
June 21-30	138,200	5.6	.19	.09	.09	.01	.31	.03	.05	.00	.00	.02	29	.04	5,530	23	.2	32.4	7.2
July 1-10	85,450	7.1	.21	.12	.09	.02	.36	.03	.05	.00	.00	.02	32	.04	3,420	20	.2	38.8	6.9
July 11-20	49,860	8.1	.25	.11	.12	.02	.38	.04	.08	.00	.00	.06	35	.05	2,490	24	.3	45.5	7.3
July 21-31	23,050	11	.36	.14	.15	.02	.52	.05	.11	.00	.00	.07	49	.07	1,610	22	.3	61.3	7.4
Aug. 1-10	11,190	11	.44	.20	.14	.02	.62	.08	.11	.00	.00	.02	55	.07	783	17	.2	75.8	7.5
Aug. 11-20.....	8,380	10	.48	.23	.15	.03	.69	.08	.15	.00	.00	.05	60	.08	670	17	.3	87.6	7.4
Aug. 21-31.....	7,940	12	.48	.26	.16	.03	.70	.08	.17	.01	.00	.10	61	.08	635	18	.3	88.8	7.3
Sept. 1-10	7,950	13	.46	.23	.16	.02	.67	.08	.15	.01	.01	.07	59	.08	636	19	.3	86.4	7.3
Sept. 11-20	7,850	10	.39	.18	.14	.02	.54	.08	.08	.01	.01	.13	51	.07	550	18	.3	74.6	7.1
Sept. 21-30	8,240	11	.42	.18	.15	.03	.61	.07	.09	.01	.01	.10	54	.07	577	19	.3	80.8	7.0
Total or weighted average [a]	2,706,000	b 11	c 0.30	c 0.16	0.11	0.02	0.44	c 0.06	0.08	b 0.00	c 0.00	b 0.10	c 43	c 0.06	c 160,200	c 19	c 0.2	53.8	--

a Represents 100 percent of runoff for water year October 1952 to September 1953.
b Represents 96 percent of runoff for water year October 1952 to September 1953.
c Represents 99 percent of runoff for water year October 1952 to September 1953.

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

UPPER COLUMBIA RIVER BASIN

COLUMBIA RIVER MAIN STEM

COLUMBIA RIVER AT INTERNATIONAL BOUNDARY

LOCATION.--At cableway 2.2 miles downstream from international gaging station, which is 0.5 mile downstream from Pend Oreille River, and about 10 miles upstream from Northport, Stevens County, Wash.
DRAINAGE AREA.--59,700 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: February 1910 to January 1911, November 1951 to September 1952.
Water temperatures: November 1951 to September 1952.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 180 micromhos Apr. 6; minimum daily, 132 micromhos Aug. 14.
Percent sodium: Maximum, 6 Dec. 11-20, Jan. 11-24, 26, 29, Feb. 11-20, Apr. 1-30, May 1-31; minimum, 4 Nov. 21-30, July 1-31, Aug. 1-31, Sept. 1-30.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1246. The record of water quality for the period November 1951 to September 1952 was not published in Water-Supply Paper 1362 and is included herein.

Chemical analyses, November 1951 to September 1952

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				
Nov. 15-20, 1951	563,300	7.5	1.15	0.40	0.08	0.08	1.31	0.31	0.01	0.01	0.01	--	101	0.14	78,860	5		160	7.4
Nov. 21-30.....	909,600	7.4	1.15	.44	.07	.10	1.33	.33	.03	.01	.02	0.08	97	.13	118,200	4		161	7.8
Dec. 1-10	1,048,000	9.3	1.10	.42	.08	.09	1.34	.31	.02	.01	.01	--	97	.13	136,200	5		162	7.8
Dec. 11-20.....	862,400	7.7	1.10	.43	.10	.09	1.33	.33	.04	.02	.01	.09	98	.13	112,100	6		167	6.9
Dec. 21-31.....	814,800	7.1	1.15	.43	.08	.08	1.38	.33	.03	.02	.00	--	100	.14	114,100	5		169	7.1
Jan. 1-10, 1952 .	708,300	7.5	1.20	.43	.09	.07	1.38	.35	.03	.02	.00	--	100	.14	99,200	5		170	7.3
Jan. 11-20.....	765,800	7.2	1.25	.45	.10	.02	1.38	.37	.02	.01	.02	.03	105	.14	107,200	6		173	7.8
Jan. 21-24, 26,29	499,200	7.1	1.20	.45	.10	.02	1.36	.35	.03	.01	.01	--	102	.14	69,900	6		168	7.8
Feb. 1-10	760,300	7.4	1.25	.46	.10	.02	1.38	.37	.03	.01	.01	--	105	.14	106,400	5		171	7.8
Feb. 11-20.....	805,900	7.9	1.25	.51	.10	.02	1.43	.37	.02	.01	.01	.02	104	.14	112,800	6		174	7.7
Feb. 21-29.....	725,800	8.3	1.25	.49	.10	.03	1.46	.40	.03	.02	.01	--	107	.15	108,900	5		177	7.6
Mar. 1-10	777,300	7.3	1.25	.50	.09	.03	1.44	.40	.02	.01	.01	--	105	.14	108,800	5		176	7.7
Mar. 11-20	756,100	6.8	1.25	.49	.09	.02	1.44	.40	.02	.01	.01	.03	105	.14	105,900	5		175	7.7
Mar. 21-31	855,700	7.9	1.20	.49	.09	.02	1.39	.40	.02	.02	.01	--	104	.14	119,800	5		171	7.6

UPPER COLUMBIA RIVER BASIN--Continued

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT INTERNATIONAL BOUNDARY--Continued

Chemical analyses, November 1951 to September 1952--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. 1-10, 1952.	870,500	8.8	1.20	0.47	0.11	0.03	1.41	0.35	0.02	0.01	0.01	--	102	0.14	121,900	6		174	7.2
Apr. 11-20.....	1,196,000	9.8	1.15	.48	.11	.03	1.34	.33	.03	.01	.02	--	102	.14	167,400	6		168	7.4
Apr. 21-30.....	2,187,000	9.0	1.05	.41	.10	.03	1.26	.27	.02	.01	.01	0.06	90	.12	262,400	6		150	7.4
May 1-10.....	3,396,000	7.8	1.05	.40	.09	.02	1.26	.25	.03	.01	.02	--	92	.13	441,500	6		153	7.6
May 11-20.....	4,124,000	7.4	1.00	.40	.08	.02	1.25	.23	.02	.01	.02	.02	87	.12	494,900	6		147	7.5
May 21-31.....	6,256,000	7.0	1.00	.39	.09	.02	1.25	.27	.02	.01	.02	--	85	.12	750,700	6		146	7.5
June 1-10.....	5,428,000	6.4	1.00	.42	.07	.02	1.21	.25	.02	.01	.01	--	85	.12	651,400	5		147	7.5
June 11-20.....	4,913,000	7.2	1.00	.39	.07	.02	1.21	.23	.03	.01	.01	.01	85	.12	589,600	5		143	7.5
June 21-30.....	4,211,000	6.4	.95	.38	.07	.02	1.18	.23	.02	.01	.01	--	84	.11	463,200	5		140	7.3
July 1-10.....	4,319,000	6.5	.95	.38	.06	.02	1.18	.23	.02	.01	.01	--	84	.11	475,100	4		140	7.5
July 11-20.....	3,644,000	6.0	.90	.37	.06	.02	1.18	.23	.02	.01	.01	.00	83	.11	400,800	4		138	7.3
July 21-31.....	3,229,000	5.4	1.05	.38	.06	.02	1.15	.25	.03	.01	.01	--	82	.11	355,200	4		137	7.4
Aug. 1-10.....	2,364,000	6.0	1.00	.39	.06	.03	1.18	.25	.03	.01	.01	--	82	.11	260,000	4		139	7.3
Aug. 11-20.....	1,858,000	5.9	.95	.38	.05	.02	1.15	.27	.05	.01	.01	.06	80	.11	204,400	4		136	7.3
Aug. 21-31.....	1,705,000	5.3	1.00	.39	.06	.02	1.18	.27	.04	.01	.01	--	84	.11	187,600	4		143	7.2
Sept. 1-10.....	1,152,000	4.9	1.00	.38	.06	.02	1.21	.27	.05	.02	.01	--	84	.11	126,700	4		154	7.4
Sept. 11-20.....	1,091,000	4.8	1.05	.39	.06	.02	1.26	.27	.01	.02	.01	.05	85	.12	130,900	4		151	7.4
Sept. 21-30.....	1,051,000	7.0	1.10	.40	.07	.03	1.31	.31	.01	.02	.01	--	91	.12	126,100	4		154	7.3
Weighted average.....	a63,850,000	6.9	1.05	0.40	0.07	0.03	1.25	0.27	0.03	0.01	0.01	--	88	0.12	7,662,000	5		149	--

a Represents 91 percent of runoff for water year October 1951 to September 1952.

UPPER COLUMBIA RIVER BASIN--Continued

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT INTERNATIONAL BOUNDARY--Continued

LOCATION.--At cableway 2.2 miles downstream from gaging station, which is 0.5 mile downstream from Pend Oreille River, and about 10 miles upstream from Northport, Stevens County, Wash.
DRAINAGE AREA.--59,700 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: February 1910 to January 1911, November 1951 to September 1953.
Water temperatures: November 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 190 micromhos Mar. 10; minimum daily, 131 micromhos July 27-30.
Percent sodium: Maximum, 6 Dec. 1-31, Jan. 1-31, Feb. 1-28, June 21-30; minimum, 4 during several periods.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 190 micromhos Mar. 10, 1953; minimum daily, 131 micromhos July 27-30, 1953.
Percent sodium: Maximum, 6 during several periods; minimum, 4 during several periods.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1286.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	1,003,000	4.8	1.05	0.39	0.06	0.02	1.26	0.27	0.01	0.02	0.00	--	85	0.12	120,400	4	0.1	148	7.4
Oct. 11-20	969,700	5.4	1.10	.42	.07	.02	1.28	.29	.01	.02	.01	0.05	91	.12	116,400	5	.1	158	7.5
Oct. 21-31	1,058,000	5.5	1.15	.47	.07	.04	1.31	.33	.02	.01	.01	--	98	.13	137,500	4	.1	162	7.5
Nov. 1-30	2,863,000	5.7	1.20	.51	.09	.03	1.34	.35	.03	.01	.01	.06	103	.14	400,800	5	.1	174	7.4
Dec. 1-31	2,039,000	6.8	1.25	.46	.10	.03	1.46	.37	.02	.01	.01	.02	105	.14	285,500	6	.1	180	7.6
Jan. 1-31, 1953..	1,983,000	6.7	1.25	.47	.10	.03	1.43	.37	.03	.01	.01	.03	104	.14	277,600	6	.1	180	7.7
Feb. 1-28	2,147,000	7.1	1.20	.44	.10	.03	1.44	.35	.03	.02	.01	.03	102	.14	300,600	6	.1	177	7.7
Mar. 1-10	706,700	11	1.35	.50	.10	.02	1.41	.42	.02	.01	.01	--	109	.15	106,000	5	.1	182	7.6
Mar. 11-20.....	751,700	8.1	1.25	.49	.10	.02	1.38	.37	.02	.01	.01	.01	107	.15	112,800	5	.1	179	7.8
Mar. 21-31.....	841,800	8.1	1.30	.47	.10	.02	1.41	.40	.03	.01	.01	--	108	.15	126,300	5	.1	180	7.5
Apr. 1-10	724,200	8.1	1.25	.49	.10	.02	1.38	.35	.03	.01	.01	--	108	.15	108,600	5	.1	179	7.4
Apr. 11-20	718,400	7.5	1.30	.49	.10	.02	1.41	.37	.02	.01	.01	.03	110	.15	107,800	5	.1	180	7.4
Apr. 21-30	934,000	7.5	1.20	.44	.09	.02	1.29	.37	.02	.01	.01	--	103	.14	130,800	5	.1	167	7.5
May 1-10	1,756,000	8.0	1.15	.44	.09	.01	1.25	.33	.02	.01	.01	--	96	.13	228,300	5	.1	160	7.1
May 11-20	2,840,000	7.5	1.10	.43	.08	.01	1.25	.29	.02	.01	.01	.05	89	.12	340,800	5	.1	150	7.2
May 21-31	4,284,000	7.0	1.05	.47	.08	.02	1.21	.27	.02	.01	.01	--	87	.12	514,100	5	.1	147	7.2

UPPER COLUMBIA RIVER BASIN--Continued

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT INTERNATIONAL BOUNDARY--Continued

Chemical analyses, water year October 1952 to September 1953--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 1-10, 1953..	5,076,000	7.7	1.05	0.40	0.07	0.01	1.26	0.31	0.01	0.01	0.01	--	88	0.12	609,100	5	0.1	149	7.6
June 11-20.....	6,804,000	8.1	1.05	.40	.08	.01	1.25	.23	.03	.01	.01	0.04	89	.12	816,500	5	.1	149	7.5
June 21-30	5,426,000	7.8	1.00	.39	.08	.01	1.25	.27	.01	.01	.01	--	86	.12	651,100	6	.1	144	7.4
July 1-10	4,648,000	7.0	1.00	.37	.07	.01	1.21	.27	.02	.01	.01	--	83	.11	511,300	5	.1	140	7.5
July 11-20	4,712,000	6.3	1.00	.43	.08	.02	1.18	.23	.03	.01	.01	.05	82	.11	518,300	5	.1	137	7.8
July 21-31	4,149,000	5.7	.95	.40	.06	.02	1.15	.23	.03	.01	.01	--	78	.11	456,400	4	.1	134	7.3
Aug. 1-10	2,581,000	6.0	1.00	.41	.06	.02	1.18	.25	.02	.01	.01	--	81	.11	283,900	4	.1	137	7.4
Aug. 11-20	1,929,000	4.9	1.00	.39	.06	.02	1.16	.27	.03	.01	.01	.03	80	.11	212,200	4	.1	138	7.5
Aug. 21-31	2,172,000	5.9	1.00	.39	.06	.03	1.16	.27	.03	.01	.01	--	82	.11	238,900	4	.1	140	7.5
Sept. 1-10	1,600,000	4.7	1.05	.37	.05	.02	1.18	.27	.01	.01	.01	--	81	.11	176,000	4	.1	143	7.2
Sept. 11-20.....	1,443,000	5.0	1.10	.39	.06	.02	1.21	.29	.02	.01	.01	.04	84	.11	158,700	4	.1	146	7.5
Sept. 21-30.....	1,399,000	6.1	1.15	.43	.07	.02	1.33	.29	.02	.01	.01	--	91	.12	167,900	4	.1	156	7.4
Total or weighted average	67,560,000	6.8	1.10	0.42	0.08	0.02	1.26	0.29	0.02	0.01	0.01	--	89	0.12	8,107,000	5	0.1	151	--

UPPER COLUMBIA RIVER BASIN--Continued

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT GRAND COULEE DAM, WASH.

LOCATION.--At Grand Coulee Dam, Grant-Okanogan County line, 2,500 feet upstream from gaging station which is 14 miles upstream from Nespelem River.
DRAINAGE AREA.--74,100 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1953.
Water temperatures: November 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 183 micromhos May 11, 13; minimum daily, 132 micromhos Aug. 27.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 183 micromhos Apr. 13, 21, 1952; May 11, 13, 1953; minimum daily, 128 micromhos May 31, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1286.

Chemical analyses, water year October 1952 to September 1953

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, 1952 ..	1,058,000	--	--	--	--		--	--	--		--	--	82	0.11	116,400	--	--	144	--
Oct. 11-31	2,156,000	5.4	1.05	0.41	0.08		1.23	0.25	0.03		0.01	0.07	82	.11	237,200	5	0.1	145	7.5
Nov. 10-30	2,148,000	4.6	1.05	.43	.08		1.28	.25	.03		.01	--	85	.12	257,800	5	.1	150	7.3
Dec. 1-31	2,946,000	5.1	1.15	.44	.07		1.31	.29	.02		.01	--	90	.12	353,500	4	.1	158	7.6
Jan. 1-31, 1953 ..	2,727,000	6.2	1.20	.39	.10		1.36	.29	.03		.01	.05	96	.13	354,500	6	.1	166	7.3
Feb. 1-28	3,564,000	6.1	1.20	.40	.11		1.36	.29	.03		.01	--	98	.13	463,300	6	.1	168	7.3
Mar. 1-10	1,392,000	8.0	1.15	.39	.12		1.39	.33	.05		.03	--	100	.14	194,900	7	.1	170	7.8
Mar. 11-20	1,501,000	7.9	1.20	.43	.11		1.36	.44	.04		.00	.05	106	.14	210,100	6	.1	178	7.6
Mar. 21-31	1,650,000	8.2	1.15	.39	.11		1.33	.37	.03		.02	--	101	.14	231,000	7	.1	169	7.1
Apr. 1-10	1,513,000	8.6	1.20	.37	.13		1.36	.37	.05		.02	--	103	.14	211,800	7	.1	172	7.3
Apr. 11-20	1,523,000	9.5	1.20	.40	.11		1.36	.35	.04		.00	.05	108	.15	228,400	6	.1	174	7.7
Apr. 21-30	1,435,000	9.1	1.20	.43	.12		1.48	.35	.03		.01	--	105	.14	200,900	7	.1	174	7.4
May 1-10	1,383,000	8.9	1.25	.41	.13		1.43	.35	.04		.02	--	105	.14	193,600	7	.1	176	7.3
May 11-20	1,439,000	9.5	1.15	.44	.12		1.36	.35	.04		.00	.07	110	.15	215,800	7	.1	178	7.8
May 21-31	4,692,000	9.5	1.05	.39	.09		1.26	.33	.04		.01	--	100	.14	656,900	6	.1	161	7.8

UPPER COLUMBIA RIVER BASIN--Continued

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT GRAND COULEE DAM, WASH.--Continued

Chemical analyses, water year October 1952 to September 1953--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 1-10, 1953 ..	5,829,000	8.0	1.00	0.30	0.07		1.13	0.25	0.04		0.01	--	87	0.12	699,500	5	0.1	143	7.6
June 11-20	6,965,000	8.4	.90	.34	.10		1.10	.23	.04		.01	--	84	.11	766,200	7	.1	137	7.6
June 21-30	5,548,000	--	--	--	--		--	--	--		--	--	85	.12	665,800	--	--	140	---
July 1-10	4,837,000	--	--	--	--		--	--	--		--	--	85	.12	580,400	--	--	143	--
July 11-20	4,842,000	7.7	.95	.39	.09		1.20	.23	.03		.01	0.05	86	.12	581,000	6	.1	142	7.6
July 21-31	4,256,000	--	--	--	--		--	--	--		--	--	84	.11	468,200	--	--	140	--
Aug. 1-10	2,669,000	--	--	--	--		--	--	--		--	--	82	.11	293,600	--	--	139	--
Aug. 11-20	1,976,000	7.8	.95	.32	.10		1.13	.21	.05		.01	--	83	.11	217,400	7	.1	138	7.6
Aug. 21-31	2,229,000	--	--	--	--		--	--	--		--	--	81	.11	245,200	--	--	138	--
Sept. 1-10	1,788,000	--	--	--	--		--	--	--		--	--	81	.11	196,700	--	--	139	--
Sept. 11-20	1,555,000	6.8	.95	.40	.05		1.13	.21	.04		.02	--	81	.11	171,000	4	.1	135	7.6
Sept. 21-30	1,487,000	--	--	--	--		--	--	--		--	--	83	.11	163,600	--	--	141	--
Total or weighted average	a76,000,000	--	--	--	--		--	--	--		--	--	90	0.12	9,120,000	--	--	150	--

a Represents 99 percent of runoff for water year October 1952 to September 1953.

UPPER COLUMBIA RIVER BASIN--Continued

YAKIMA RIVER BASIN

YAKIMA RIVER AT KIONA, WASH.

LOCATION.--At gaging station at highway bridge 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 1953.
Water temperatures: December 1952 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 385 micromhos Sept. 18; minimum daily, 123 micromhos Feb. 3.
Percent sodium: Maximum, 28 Dec. 30-31, Jan. 1-9, Apr. 11-20, Sept. 1-10; minimum, 23 Feb. 1-14, May 4-7, 21-31.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1286.

Chemical analyses, December 1952 to September 1953

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				
Dec. 30-31, 1952, Jan. 1-9, 1953	36,730	33	1.50	0.99	1.00	0.09	2.80	0.46	0.22	0.01	0.06	--	215	0.29	10,650	28	0.9	339	7.7
Jan. 10-31	257,500	27	.85	.63	.52	.07	1.57	.25	.12	.02	.05	0.04	135	.18	46,350	25	.6	193	7.7
Feb. 1-14	204,700	23	.70	.49	.37	.05	1.28	.17	.09	.02	.03	.04	105	.14	28,660	23	.5	152	7.8
Feb. 15-28	107,700	25	.90	.58	.52	.05	1.64	.21	.12	.02	.03	.01	128	.17	18,310	26	.6	193	7.8
Mar. 1-10.....	58,790	28	1.00	.64	.57	.05	1.87	.25	.13	.02	.03	--	139	.19	11,170	25	.6	216	7.8
Mar. 11-20.....	59,900	24	.95	.59	.52	.05	1.74	.23	.12	.02	.03	.04	129	.18	10,780	25	.6	204	7.5
Mar. 21-31.....	48,200	25	1.05	.67	.61	.05	2.00	.27	.15	.02	.03	--	147	.20	9,640	26	.7	231	7.5
Apr. 1-10	34,000	24	1.15	.73	.70	.06	2.20	.31	.15	.02	.03	--	157	.21	7,140	26	.7	254	7.9
Apr. 11-20	27,790	24	1.40	.82	.87	.07	2.57	.42	.19	.02	.03	.05	187	.25	6,950	28	.8	301	7.9
Apr. 21-28	43,220	24	1.10	.67	.61	.05	1.90	.29	.17	.02	.03	--	147	.20	8,640	25	.6	228	7.8
Apr. 29-30, May 1-3, 8-10	81,300	23	.85	.51	.44	.05	1.44	.19	.11	.02	.02	--	116	.16	13,010	24	.5	170	7.7
May 4-7	27,510	27	1.20	.72	.61	.07	2.00	--	--	--	--	--	160	.22	6,050	23	.6	237	7.8
May 11-20	60,930	26	1.20	.67	.61	.07	2.07	.29	.14	.01	.03	.03	156	.21	12,800	24	.6	241	7.5
May 21-31	100,100	24	1.05	.63	.52	.06	1.77	.27	.12	.01	.02	--	138	.19	19,020	23	.6	207	7.9

UPPER COLUMBIA RIVER BASIN--Continued

YAKIMA RIVER BASIN--Continued

YAKIMA RIVER AT KIONA, WASH.--Continued

Chemical analyses, December 1952 to September 1953--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 1-10, 1953	113,400	26	0.85	0.58	0.52	0.05	1.64	0.23	0.09	0.01	0.02	--	127	0.17	19,280	26	0.6	190	7.5
June 11-20.....	171,900	21	.70	.46	.37	.05	1.23	.19	.08	.01	.02	0.03	98	.13	22,350	24	.5	147	7.6
June 21-30.....	71,660	26	1.05	.66	.61	.06	1.88	.29	.13	.01	.02	--	143	.19	13,620	26	.7	220	7.7
July 1-10	63,990	25	1.10	.68	.65	.06	1.97	.31	.14	.01	.02	--	148	.20	12,800	26	.7	232	7.4
July 11-20.....	43,660	27	1.20	.75	.74	.06	2.20	.35	.16	.01	.02	.05	167	.23	10,040	27	.7	261	7.6
July 21-31.....	34,570	34	1.65	.99	1.00	.09	3.02	.48	.20	.02	.03	--	224	.30	10,370	27	.9	347	7.9
Aug. 1-10	35,620	34	1.50	.99	.96	.10	2.82	.44	.18	.02	.04	--	210	.29	10,330	27	.9	330	7.8
Aug. 11-20.....	31,380	29	1.65	1.07	1.04	.10	3.08	.50	.19	.02	.04	.06	219	.30	9,410	27	.9	352	7.8
Aug. 21-31	45,960	32	1.50	.99	.96	.10	2.85	.46	.19	.02	.03	--	208	.28	12,870	27	.9	327	7.9
Sept. 1-10.....	38,020	32	1.65	1.07	1.09	.10	3.05	.48	.21	.02	.03	--	220	.30	11,410	28	.9	350	7.9
Sept. 11-20.....	33,040	32	1.75	1.15	1.09	.11	3.28	.52	.23	.02	.03	.04	236	.32	10,570	27	.9	376	7.9
Sept. 21-30.....	33,700	32	1.75	1.15	1.09	.11	3.20	.50	.21	.02	.04	--	234	.32	10,780	27	.9	369	8.0
Total or weighted average	a 1,865,000	26	1.00	0.67	0.61	0.06	1.87	0.27	0.13	0.02	0.03	--	144	0.20	373,000	26	0.7	220	--

a Represents 85 percent of runoff for water year October 1952 to September 1953.

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 miles downstream from Anderson canal headgate, 1¾ miles 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 to September 1953.
Water temperatures: January to September 1953.
EXTREMES, January to September 1953.--Specific conductance: Maximum daily, 609 micromhos Feb. 22; minimum daily, 255 micromhos June 24.
Percent sodium: Maximum, 16 Sept. 11-20; minimum, 7 June 11-20.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1287. About 2.5 percent of normal annual stream flow of 5,000,000 acre feet is diverted by Anderson canal between sampling point and gaging station. This diversion occurs during the months May to November except for leakage through the headgate. No other diversion or appreciable inflow between sampling point and gaging station except during periods of local rains.

Chemical analyses, January to September 1953

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. 8-31, 1953	120,100	11	3.39	1.56	0.83	0.08	3.51	1.67	0.65	0.02	0.08	0.11	338	0.46	55,250	14	0.5	550	7.8
Feb. 1-28	130,000	11	3.59	1.64	.87	.08	3.67	1.77	.68	.02	.07	.10	353	.48	62,400	14	.5	572	7.9
Mar. 1-10	44,330	12	3.69	1.73	.83	.07	3.70	1.81	.73	.02	.03	--	353	.48	21,280	13	.5	571	7.6
Mar. 11-20	45,200	12	3.64	1.73	.83	.07	3.67	1.75	.73	.02	.02	.12	352	.48	21,700	13	.5	570	7.8
Mar. 21-31	53,850	12	3.39	1.73	.83	.07	3.61	1.69	.73	.02	.02	--	342	.47	25,310	14	.5	557	8.0
Apr. 1-10	60,990	11	3.34	1.56	.78	.05	3.56	1.50	.68	.02	.02	--	321	.44	26,840	14	.5	531	8.1
Apr. 11-20	56,010	9.7	3.49	1.64	.83	.06	3.61	1.56	.73	.02	.01	.10	333	.45	25,200	14	.5	549	8.1
Apr. 21-30	133,900	12	2.74	1.15	.52	.04	3.02	1.00	.39	.02	.03	--	252	.34	45,530	12	.4	420	7.7
May 1-10	129,100	10	2.79	1.15	.52	.04	3.00	1.00	.34	.02	.02	--	248	.34	45,890	12	.4	411	7.9
May 11-20	169,900	12	2.54	1.07	.48	.04	2.79	.85	.31	.02	.02	.10	229	.31	52,670	12	.4	381	7.5
May 21-31	211,600	10	2.50	.99	.40	.04	2.77	.79	.28	.02	.02	--	218	.30	63,480	10	.3	365	7.6
June 1-10	267,800	10	2.30	.99	.32	.03	2.59	.67	.21	.02	.02	--	198	.27	72,310	9	.3	330	7.7
June 11-20	454,800	11	2.35	..69	.23	.04	2.69	.50	.14	.02	.02	.02	188	.26	118,200	7	.2	311	7.5
June 21-30	386,800	12	2.05	.67	.29	.04	2.25	.58	.17	.02	.02	--	168	.23	88,960	10	.2	281	7.4
July 1-10	200,700	11	1.90	.70	.30	.05	2.11	.62	.20	.02	.02	--	169	.23	69,160	10	.3	284	7.3

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR HEISE, IDAHO--Continued

Chemical analyses, January to September 1953--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 11-20, 1953 ..	248,700	13	1.95	0.72	0.36	0.04	2.15	0.71	0.23	0.02	0.01	0.04	177	0.24	59,690	12	0.3	292	7.3
July 21-31	259,200	14	1.85	.72	.42	.06	2.10	.73	.25	.03	.01	--	176	.24	62,210	14	.4	287	7.4
Aug. 1-7, 9-10....	189,200	14	1.95	.74	.44	.06	2.15	.75	.27	.03	.00	--	183	.25	47,300	14	.4	305	7.5
Aug. 8 a	12,060	--	3.80		--	--	2.93	--	--	--	--	--	254	.35	4,220	--	--	417	7.7
Aug. 11-20	192,200	14	1.90	.82	.48	.06	2.21	.69	.25	.03	.01	.12	184	.25	48,050	15	.4	310	7.2
Aug. 21-31	182,100	14	2.05	.82	.48	.06	2.23	.79	.27	.03	.01	--	191	.26	47,350	14	.4	323	7.3
Sept. 1-10	153,100	14	2.05	.90	.52	.06	2.26	.83	.28	.03	.01	--	196	.27	41,340	15	.4	330	7.3
Sept. 11-20	155,600	15	1.95	.82	.52	.06	2.16	.79	.28	.03	.01	.10	191	.26	40,460	16	.4	320	7.4
Sept. 21-30	121,000	13	2.15	.99	.52	.06	2.39	.94	.31	.03	.01	--	208	.28	33,880	14	.4	352	7.5
Total or weighted average	b4,066,000	12	2.35	0.90	0.44	0.05	2.56	0.83	0.28	0.02	0.02	--	211	0.29	1,179,000	12	0.3	351	--

a Not included for computation of weighted averages.

b Represents 88 percent of runoff for water year October 1952 to September 1953.

SNAKE RIVER AT KING HILL, IDAHO

LOCATION.--At county highway bridge about 400 yards downstream from gaging station, which is 300 feet east of railroad station at King Hill, Elmore County, and 20 miles downstream from Big Wood (Malad) River.
DRAINAGE AREA.--35,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1953.
Water temperatures: March 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 594 micromhos Oct. 3; minimum daily, 432 micromhos Jan. 20.
Percent sodium: Maximum, 28 Sept. 21-30; minimum, 23 June 11-20.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 594 micromhos Oct. 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 are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1287.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	206,800	34	2.35	1.81	1.61	0.13	3.67	1.25	0.85		0.07	--	347	0.47	97,200	27	1.1	547	--
Oct. 11-20.....	216,400	36	2.40	1.81	1.61	.13	3.74	1.25	.79		.07	0.16	348	.47	101,700	27	1.1	549	--
Oct. 21-31.....	215,400	35	2.40	1.81	1.57	.13	3.70	1.23	.79		.07	--	347	.47	101,200	27	1.1	546	--
Nov. 1-10.....	181,400	38	2.35	1.89	1.57	.13	3.70	1.25	.79		.07	--	352	.48	87,070	26	1.1	550	--
Nov. 11-20.....	185,500	39	2.30	1.81	1.57	.13	3.72	1.25	.85		.07	--	358	.49	90,900	27	1.1	550	--
Nov. 21-30.....	176,700	35	2.40	1.81	1.57	.12	3.67	1.27	.71		.05	--	357	.49	86,580	27	1.1	554	8.1
Dec. 1-10.....	180,800	33	2.45	1.81	1.61	.12	3.70	1.29	.79		.04	--	355	.48	86,780	27	1.1	558	8.2
Dec. 11-20.....	189,800	34	2.30	1.81	1.57	.12	3.64	1.25	.82		.05	--	351	.48	91,100	27	1.1	556	7.9
Dec. 21-31.....	220,700	31	2.40	1.81	1.57	.12	3.64	1.23	.85		.05	--	347	.47	103,700	27	1.1	551	8.1
Jan. 1-31, 1953..	675,800	35	2.30	1.64	1.43	.10	3.47	1.19	.79		.06	.10	331	.45	304,100	26	1.0	526	7.8
Feb. 1-28	667,200	32	2.45	1.73	1.39	.10	3.47	1.23	.79		.04	--	330	.45	300,200	25	1.0	527	7.8
Mar. 1-10	247,700	32	2.45	1.64	1.30	.12	3.49	1.19	.79		.04	--	322	.44	109,000	24	.9	520	--
Mar. 11-20	265,200	31	2.40	1.64	1.30	.12	3.46	1.15	.79		.04	--	316	.43	114,000	24	.9	510	--
Mar. 21-31	294,700	31	2.45	1.64	1.30	.12	3.46	1.08	.79		.04	--	313	.43	126,700	24	.9	508	--

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SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER AT KING HILL, IDAHO--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953..	261,000	29	2.25	1.56	1.26	0.11	3.31	1.00	0.73		0.04	--	296	0.40	104,400	24	0.9	484	--
Apr. 11-20	218,200	32	2.35	1.56	1.30	.12	3.33	1.10	.82		.04	0.13	309	.42	91,640	24	.9	502	--
Apr. 21-30.....	165,400	34	2.20	1.56	1.30	.12	3.26	1.06	.79		.04	--	302	.41	67,810	25	.9	485	--
May 1-10	169,300	34	2.20	1.64	1.39	.12	3.29	1.12	.82		.05	--	308	.42	71,110	26	1.0	496	--
May 11-20	155,200	36	2.25	1.73	1.48	.09	3.41	1.17	.79		.04	--	324	.44	68,290	27	1.0	515	--
May 21-31	198,600	35	2.25	1.64	1.48	.10	3.41	1.19	.76		.05	--	326	.44	87,380	27	1.1	521	--
June 1-10	243,400	34	2.35	1.73	1.48	.10	3.44	1.21	.79		.04	--	327	.44	107,100	26	1.0	523	--
June 11-20	385,600	27	2.40	1.56	1.22	.08	3.29	1.08	.73		.03	--	305	.41	158,100	23	.9	491	--
June 21-30	222,400	33	2.40	1.56	1.39	.11	3.41	1.12	.73		.04	--	315	.43	95,630	25	1.0	506	7.7
July 1-10	159,900	36	2.30	1.56	1.39	.11	3.38	1.12	.73		.05	--	316	.43	68,760	26	1.0	507	7.8
July 11-20	155,400	39	2.35	1.64	1.48	.12	3.46	1.19	.79		.05	.08	328	.45	69,930	26	1.0	519	8.0
July 21-31	172,800	38	2.35	1.73	1.48	.12	3.49	1.21	.79		.05	--	330	.45	77,760	26	1.0	523	7.9
Aug. 1-10	166,800	44	2.35	1.73	1.52	.12	3.61	1.21	.76		.04	--	339	.46	76,730	27	1.1	532	7.9
Aug. 11-20	165,100	42	2.35	1.81	1.52	.12	3.61	1.21	.79		.04	--	337	.46	75,950	26	1.0	535	7.8
Aug. 21-31.....	183,400	43	2.35	1.81	1.61	.12	3.62	1.23	.79		.05	--	346	.47	86,200	27	1.1	540	7.9
Sept. 1-10	178,700	38	2.35	1.81	1.61	.12	3.61	1.25	.79		.05	--	337	.46	82,200	27	1.1	540	7.7
Sept. 11-20	178,600	37	2.35	1.81	1.61	.12	3.64	1.25	.76		.05	--	336	.46	82,160	27	1.1	540	7.9
Sept. 21-30	176,400	41	2.35	1.81	1.65	.12	3.67	1.27	.79		.06	--	350	.48	84,670	28	1.1	549	--
Total or weighted average	7,481,000	34	2.35	1.73	1.43	0.11	3.51	1.19	0.79		0.05	--	330	0.45	3,366,000	25	1.0	525	--

SNAKE RIVER NEAR CLARKSTON, WASH.

LOCATION.--One mile downstream from gaging station, 1 mile upstream from Alpowa Creek, 8 miles downstream from Clarkston, Asotin County, and 133 miles upstream from mouth.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1951 to September 1952.
Water temperatures: November 1951 to September 1952.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 463 micromhos Nov. 20; minimum daily, 118 micromhos May 28.
Percent sodium: Maximum, 34 July 21-31; minimum, 25 May 1-10, 11-20.
REMARKS.--Values reported for dissolved solids are residues on evaporation. 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 1951 to September 1952 available in Water-Supply paper 1247. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains.

Chemical analyses, November 1951 to September 1952

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				
Nov. 14, 16-17, 19-20, 1951	305,300	35	1.85	1.15	1.26	0.16	3.11	0.79	0.39	0.03	0.05	0.24	a271	0.37	113,000	29		398	7.5
Nov. 21, 26-29	313,600	30	1.70	.99	1.17	.13	2.59	.83	.42	.03	.04	--	a244	.33	103,500	29		372	7.8
Dec. 1-10	883,400	30	1.60	.90	1.04	.14	2.41	.77	.37	.03	.04	--	225	.31	273,900	28		344	7.6
Dec. 12-15, 17	326,900	34	1.85	.99	1.17	.17	2.90	.75	.39	.02	.05	.13	a258	.35	114,400	28		385	7.0
Jan. 4-10, 1952	414,500	29	1.70	.90	1.13	.16	2.47	.83	.45	.02	.03	--	231	.31	128,500	29		366	7.2
Jan. 11-20	627,000	27	1.70	.99	1.13	.08	2.47	.85	.42	.03	.05	.08	236	.32	200,600	29		365	7.7
Jan. 21-31	730,100	27	1.70	.99	1.09	.08	2.49	.83	.42	.03	.05	--	235	.32	233,600	28		361	7.8
Feb. 1-10	894,000	27	1.45	.90	.96	.08	2.16	.71	.34	.03	.06	--	212	.29	259,300	28		311	7.7
Feb. 11-20	770,000	27	1.50	.82	.96	.08	2.20	.75	.37	.03	.05	.06	215	.29	223,300	29		321	7.7
Feb. 21-29	664,900	26	1.70	.99	1.00	.08	2.47	.81	.42	.03	.04	--	231	.31	206,100	27		354	7.8
Mar. 1-10	711,500	26	1.75	.99	1.09	.08	2.54	.83	.45	.03	.04	--	240	.33	234,800	28		368	7.6
Mar. 11-20	865,000	25	1.70	.99	1.04	.08	2.47	.79	.39	.03	.05	.08	236	.32	276,800	27		358	7.6
Mar. 21-31	1,653,000	25	1.40	.76	.83	.08	2.03	.60	.31	.03	.06	--	197	.27	446,300	27		295	7.6
Apr. 1-10	2,073,000	25	1.10	.62	.65	.07	1.64	.46	.23	.03	.05	--	160	.22	456,100	27		234	7.4
Apr. 11-20	2,938,000	24	1.05	.68	.65	.07	1.59	.40	.21	.03	.04	.06	162	.22	646,400	27		219	7.0
Apr. 21-30	3,858,000	23	.90	.56	.55	.06	1.36	.31	.17	.03	.03	--	137	.19	733,000	26		186	7.3

a Sum of determined constituents.

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SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

Chemical analyses, November 1951 to September 1952--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, 1952	3,642,000	18	0.80	0.48	0.43	0.05	1.23	0.27	0.15	0.03	0.02	--	123	0.17	619,100	25		167	7.3
May 11-20	3,901,000	19	.75	.40	.40	.05	1.10	.27	.14	.02	.03	0.03	113	.15	585,200	25		157	7.3
May 21-31	3,834,000	16	.70	.35	.38	.04	.98	.23	.11	.02	.01	--	96	.13	498,400	26		137	7.4
June 1-12	3,701,000	15	.70	.32	.41	.04	1.03	.25	.13	.02	.02	--	97	.13	481,100	28		144	7.4
June 13-20	1,665,000	20	.90	.46	.57	.06	1.34	.37	.20	.02	.01	.04	128	.17	283,000	28		190	7.6
June 21-30	1,673,000	19	.90	.46	.57	.05	1.41	.40	.17	.02	.01	--	127	.17	284,400	29		193	7.6
July 1-10	1,406,000	20	1.05	.58	.65	.07	1.70	.48	.25	.02	.01	--	154	.21	295,300	28		238	7.4
July 11-20	838,000	18	1.05	.54	.70	.07	1.64	.50	.24	.02	.01	.07	149	.20	167,600	30		232	7.4
July 21-31	661,300	20	1.25	.72	1.04	.09	1.97	.67	.34	.03	.01	--	185	.25	165,300	34		291	7.6
Aug. 1-10	505,800	24	1.50	.90	1.17	.11	2.46	.79	.37	.03	.02	--	217	.30	151,700	32		348	7.4
Aug. 11-20	460,800	27	1.60	.99	1.26	.10	2.72	.81	.40	.03	.03	.08	237	.32	147,500	32		376	7.7
Aug. 21-31	461,200	32	1.65	1.07	1.35	.10	2.92	.85	.42	.03	.02	--	254	.35	161,400	32		396	7.6
Sept. 1-10	430,200	27	1.70	1.07	1.44	.12	2.88	.94	.45	.03	.03	--	265	.36	154,900	33		418	7.5
Sept. 11-20	457,600	30	1.80	1.15	1.52	.11	3.18	.96	.42	.03	.03	.11	276	.38	173,900	33		432	7.5
Sept. 21-30	430,400	34	1.90	1.15	1.48	.10	3.33	.92	.42	.03	.03	--	283	.38	163,600	32		442	7.8
Weighted average	b42,090,000	22	1.10	0.62	0.70	0.07	1.64	0.46	0.23	0.03	0.03	--	157	0.21	8,839,000	28		231	--

b Represents 90 percent of runoff for water year October 1951 to September 1952.

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

LOCATION.--One mile downstream from gaging station, 1 mile upstream from Alpowa Creek, 8 miles downstream from Clarkston, Asotin County, and 133 miles upstream from mouth.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1951 to September 1953.
Water temperatures: November 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 529 micromhos Nov. 30, Dec. 3; minimum daily, 133 micromhos May 21.
Percent sodium: Maximum, 34 Aug. 1-10; minimum, 25 Apr. 24-30.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 529 micromhos Nov. 30, Dec. 3, 1952; minimum daily, 118 micromhos May 28, 1952.
Percent sodium: Maximum, 34 July 21-31, 1952, Aug. 1-10, 1953; minimum, 25 May 1-10, 11-20, 1952, Apr. 24-30, 1953
REMARKS.--Values reported for dissolved solids are residues on evaporation. 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 1952 to September 1953 given in Water-Supply Paper 1287. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains.

Chemical analyses, water year October 1952 to September 1953

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, 1952..	434,200	35	1.95	1.23	1.52	0.10	3.56	0.98	0.42	0.03	0.03	--	305	0.41	178,000	32	1.2	459	8.0
Oct. 11-20	441,500	34	1.95	1.32	1.61	.10	3.46	1.08	.51	.03	.04	0.13	295	.40	176,600	32	1.3	479	7.6
Oct. 21-31	483,800	32	1.95	1.32	1.61	.12	3.36	1.10	.51	.03	.03	--	312	.42	203,200	32	1.3	472	8.2
Nov. 1-30	1,230,000	30	2.00	1.32	1.57	.12	3.34	1.12	.54	.03	.03	.11	310	.42	516,600	31	1.2	472	7.9
Dec. 1-31	1,289,000	35	1.95	1.23	1.61	.12	3.15	1.17	.54	.03	.05	.10	300	.41	528,500	33	1.3	474	8.0
Jan. 1-10, 1953..	458,600	33	1.95	1.23	1.52	.12	3.11	1.10	.56	.03	.05	--	291	.40	183,400	32	1.2	463	7.8
Jan. 11-31	2,026,000	28	1.30	.81	.91	.08	2.02	.65	.34	.03	.05	.06	197	.27	547,000	29	.9	301	7.7
Feb. 1-10	1,151,000	27	1.10	.75	.74	.08	1.77	.54	.27	.03	.03	--	173	.24	276,200	28	.8	256	7.7
Feb. 11-28	1,257,000	28	1.45	.90	1.04	.08	2.33	.75	.39	.03	.03	.09	218	.30	377,100	30	1.0	340	7.8
Mar. 1-10	643,600	28	1.55	.99	1.04	.07	2.33	.79	.42	.03	.03	--	229	.31	199,500	29	.9	352	7.5
Mar. 11-20.....	780,500	25	1.45	.90	.96	.07	2.13	.77	.39	.03	.03	.10	210	.29	226,300	28	.9	330	7.4
Mar. 21-31.....	1,139,000	27	1.30	.82	.83	.06	1.90	.65	.31	.03	.02	--	188	.26	296,100	27	.8	283	7.3
Apr. 1-10	1,010,000	24	1.20	.76	.74	.06	1.77	.58	.28	.03	.02	--	173	.24	242,400	27	.7	266	7.6
Apr. 11-23	1,240,000	24	1.15	.75	.74	.06	1.77	.58	.28	.03	.01	.08	170	.23	285,200	27	.8	261	7.3
Apr. 24-30	1,554,000	21	.70	.46	.40	.04	1.05	.48	.16	.03	.01	--	113	.15	233,100	25	.5	153	7.4

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

Chemical analyses, water year October 1952 to September 1953--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, 1953...	1,862,000	19	0.75	0.47	0.48	0.05	1.11	0.35	0.17	0.03	0.01	--	117	0.16	297,900	27	0.6	169	7.4
May 11-20.....	1,859,000	20	.75	.38	.52	.04	1.15	.37	.16	.01	.01	0.10	112	.15	278,800	31	.7	166	7.4
May 21-31.....	2,527,000	21	.75	.40	.57	.04	1.18	.40	.15	.02	.01	--	116	.16	404,300	32	.7	171	7.6
June 1-10	3,334,000	19	.70	.37	.52	.04	1.11	.37	.15	.02	.01	--	109	.15	500,100	32	.7	158	7.5
June 11-20	3,876,000	18	.85	.38	.48	.04	1.18	.35	.14	.02	.01	.09	111	.15	581,400	27	.6	166	7.3
June 21-23 a	924,300	--	--	--	--	--	1.72	.73	.14	--	.03	--	--	--	--	--	--	226	7.5
June 24-30	1,358,000	14	.75	.34	.44	.04	1.08	.33	.14	.02	.01	--	96	.13	215,500	28	.6	150	7.5
July 1-10.....	1,851,000	13	.75	.35	.48	.04	1.16	.35	.15	.01	.01	--	99	.13	240,600	29	.6	159	7.4
July 11-20	1,167,000	16	.85	.44	.52	.05	1.28	.37	.18	.02	.01	--	113	.15	175,000	28	.7	176	7.4
July 21-31	717,800	21	1.10	.64	.87	.07	1.80	.60	.28	.02	.01	.08	163	.22	157,900	32	.9	262	7.4
Aug. 1-10	548,400	26	1.40	.82	1.17	.09	2.26	.77	.37	.02	.01	--	208	.28	153,600	34	1.1	328	7.7
Aug. 11-20	460,800	33	1.65	.99	1.30	.11	2.79	.77	.39	.02	.02	.10	242	.33	152,100	32	1.1	376	7.6
Aug. 21-31	486,000	30	1.70	.99	1.39	.11	2.95	.83	.39	.03	.02	--	253	.34	165,200	33	1.2	392	7.5
Sept. 1-10	441,500	33	1.85	1.15	1.52	.11	3.10	.90	.39	.03	.02	--	265	.36	158,900	33	1.2	420	7.6
Sept. 11-20.....	426,600	32	1.90	1.23	1.61	.11	3.13	1.02	.45	.03	.02	.10	277	.38	162,100	33	1.3	439	7.7
Sept. 21-30.....	432,400	35	2.05	1.32	1.65	.11	3.52	.96	.42	.03	.03	--	293	.40	173,000	32	1.3	464	7.6
Total or weighted average.....	37,710,000	23	1.25	0.66	0.78	0.06	1.75	0.58	0.26	0.02	0.02	--	166	0.23	8,673,000	28	0.8	253	--

a Not included for computation of weighted averages.

BOISE RIVER BASIN

BOISE RIVER AT NOTUS, IDAHC

LOCATION.--At steel county 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 1953.
Water temperatures: November 1950 to September 1953.
Sediment records: January 1939 to June 1940.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 880 micromhos Aug. 22; minimum daily, 101 micromhos June 23-24.
Percent sodium: Maximum, 54 Aug. 11-20; minimum, 29 Mar. 29-31.
EXTREMES, 1939-40, 1950-53.--Specific conductance: Maximum daily, 1,390 micromhos Aug. 21-31, 1939; minimum daily, 81.7 micromhos Apr. 27, 1952.
Percent sodium: Maximum, 64 Sept. 1-10, 1939; minimum, 25 Apr. 11-20, 1951.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1287.

Chemical analyses, water year October 1952 to September 1953

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, 1952 ..	7,580	37	2.05	1.07	3.26	0.11	4.02	1.69	0.62		0.04	--	391	0.53	4,020	50	2.6	594	--
Oct. 11-20	10,500	37	2.25	1.15	3.52	.12	4.34	1.89	.68		.04	0.18	425	.58	6,090	50	2.7	651	--
Oct. 21-31	17,880	38	2.54	1.32	3.52	.12	4.65	2.00	.62		.03	.19	448	.61	10,910	47	2.5	681	--
Nov. 1-10	15,710	35	2.45	1.32	3.52	.12	4.59	1.98	.62		.03	--	438	.60	9,430	48	2.6	673	--
Nov. 11-20	14,520	36	2.59	1.32	3.57	.13	4.64	2.08	.68		.04	.19	454	.62	9,000	47	2.6	693	--
Nov. 21-30	13,420	37	2.59	1.23	3.70	.12	4.69	2.02	.90		.02	--	459	.62	8,320	48	2.7	697	7.5
Dec. 1-10	13,820	35	2.54	1.23	3.52	.12	4.52	1.94	.87		.01	--	442	.60	8,290	48	2.6	669	7.4
Dec. 11-20	13,800	35	2.45	1.23	3.39	.12	4.36	1.87	.79		.00	--	424	.58	8,000	47	2.5	646	7.3
Dec. 21-31	13,960	34	2.50	1.23	3.39	.09	4.29	1.94	.85		.02	--	430	.58	8,100	47	2.5	649	7.4
Jan. 1-10, 1953 ...	12,490	34	2.40	1.15	3.30	.09	4.03	1.92	.79		.06	--	418	.57	7,120	48	2.5	632	7.5
Jan. 11-17	10,830	35	2.10	1.07	2.44	.08	3.47	1.64	.51		.08	.09	362	.49	5,310	43	1.9	551	7.8
Jan. 18-22	18,470	28	1.40	.70	1.52	.09	2.26	1.04	.31		.05	--	248	.34	6,280	41	1.5	357	7.5
Jan. 23-31	17,430	33	1.95	.99	2.26	.08	3.18	1.48	.45		.10	--	328	.45	7,840	43	1.9	484	7.9
Feb. 1-9	21,320	29	1.70	.70	1.91	.08	2.75	1.25	.39		.09	--	290	.39	8,310	44	1.7	434	7.6
Feb. 10-28	34,880	29	2.00	.90	2.26	.08	3.15	1.48	.48		.09	--	331	.45	15,700	43	1.9	503	7.6
Mar. 1-8	12,290	31	2.15	1.07	2.52	.08	3.46	1.73	.51		.08	--	350	.48	5,900	43	2.0	539	--

BOISE RIVER BASIN--Continued

BOISE RIVER AT NOTUS, IDAHO--Continued

Chemical analyses, water year October 1952 to September 1953--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. 9-11, 1953..	6,450	22	1.25	0.60	1.22	0.06	1.93	0.87	0.25		0.05	--	a197	0.27	1,740	39	1.3	292	--
Mar. 12-20	49,570	20	.95	.40	.78	.04	1.48	.50	.16		.04	--	141	.19	9,420	36	1.0	215	--
Mar. 21-28	45,000	19	.95	.41	.83	.04	1.48	.50	.17		.03	--	140	.19	8,550	37	1.0	215	--
Mar. 29-31	22,430	18	.90	.37	.52	.04	1.21	.42	.14		.03	--	a117	.16	3,590	29	.7	171	--
Apr. 1-10	35,500	21	1.00	.53	.78	.05	1.54	.56	.21		.04	--	145	.20	7,100	33	.9	218	--
Apr. 11-20	9,720	23	1.30	.35	1.52	.07	2.16	.77	.25		.04	0.08	215	.29	2,820	47	1.7	336	--
Apr. 21-30	17,400	22	1.15	.47	1.17	.07	1.87	.67	.25		.04	--	181	.25	4,350	41	1.3	290	--
May 1-10	17,280	22	1.20	.51	1.30	.07	2.02	.73	.26		.04	--	193	.26	4,490	42	1.4	303	--
May 11-20	20,020	20	1.10	.45	1.17	.07	1.84	.65	.23		.04	--	173	.24	4,800	42	1.3	271	--
May 21-31	102,300	17	.70	.30	.57	.04	1.16	.31	.12		.04	--	110	.15	15,340	35	.8	160	--
June 1-10.....	131,800	15	.60	.25	.48	.03	1.00	.25	.09		.03	--	94	.13	17,130	35	.7	134	--
June 11-20	134,100	14	.50	.20	.38	.02	.82	.18	.07		.02	--	77	.10	13,410	35	.6	107	--
June 21-26	76,170	13	.55	.16	.37	.04	.82	.25	.07		.02	--	80	.11	8,380	34	.6	109	--
June 27-30	13,360	17	.90	.38	.87	.06	1.48	.58	.18		.04	--	140	.19	2,630	39	1.1	216	--
July 1-10	32,810	16	.85	.37	.87	.06	1.49	.42	.16		.04	--	134	.18	5,910	41	1.1	208	--
July 11-20	11,490	25	1.40	.63	1.74	.10	2.49	.90	.31		.04	.09	232	.32	3,680	45	1.7	365	--
July 21-31	7,740	31	1.70	.80	2.22	.10	3.15	1.23	.42		.05	--	304	.41	3,170	46	2.0	466	--
Aug. 1-10	5,710	33	1.85	.90	2.61	.10	3.43	1.42	.48		.05	--	333	.45	2,570	48	2.2	514	--
Aug. 11-20	1,730	35	2.30	1.23	4.35	.12	4.51	2.50	.90		.05	--	495	.67	1,160	54	3.3	757	--
Aug. 21-31	3,560	29	2.40	1.23	3.83	.12	4.42	2.29	.82		.04	--	467	.64	2,280	51	2.8	708	--
Sept. 1-10	4,210	37	2.25	1.07	3.30	.12	4.03	1.85	.68		.04	--	406	.55	2,320	49	2.6	618	--
Sept. 11-20	8,290	34	2.15	1.07	2.65	.12	3.74	1.60	.56		.05	--	364	.50	4,140	44	2.1	558	--
Sept. 21-30	8,630	34	2.15	1.07	2.83	.12	3.80	1.64	.56		.04	--	372	.51	4,400	46	2.2	570	--
Total or weighted average	1,015,000	21	1.15	0.53	1.26	0.06	1.93	0.75	0.26		0.04	--	190	0.26	263,900	42	1.4	285	--

a Sum of determined constituents.

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

DESCHUTES RIVER BASIN

DESCHUTES RIVER AT MOODY, NEAR BIGGS, OREG.

LOCATION.--At right bank, 0.5 mile upstream from bridge on U. S. Highway 30, 0.6 mile downstream from gaging station at Moody, 0.9 mile upstream from mouth, and about 4 miles southwest of Biggs, Sherman County.
DRAINAGE AREA.--10,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1952 to September 1953.
Water temperatures: December 1952 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 141 micromhos Jan. 18, Mar. 26; minimum daily, 92.4 micromhos Jan. 19.
Percent sodium: Maximum, 36 July 1-10; minimum, 27 Apr. 21-30.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1288.

Chemical analyses, December 1952 to September 1953

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				
Dec. 29-31, 1952, Jan. 1-10, 1953.	157,100	34	0.40	0.49	0.44	0.05	1.15	0.05	0.08	0.02	0.02	--	103	0.14	21,990	32	0.7	125	7.3
Jan. 11-31	435,900	30	.39	.43	.37	.05	.98	.05	.07	.02	.02	0.08	92	.13	56,670	30	.6	108	7.3
Feb. 1-10	243,300	29	.38	.42	.33	.05	.95	.05	.06	.02	.01	--	93	.13	31,630	28	.5	102	7.3
Feb. 11-28	300,400	31	.40	.42	.39	.05	1.08	.05	.07	.03	.01	.08	94	.13	39,050	31	.6	113	7.3
Mar. 1-10.....	135,000	33	.40	.39	.43	.05	1.16	.06	.08	.02	.02	--	99	.13	17,550	34	.7	124	7.4
Mar. 11-20.....	139,200	33	.40	.40	.43	.05	1.16	.05	.08	.02	.02	.10	98	.13	18,100	33	.7	122	7.1
Mar. 21-31.....	166,600	32	.45	.46	.44	.05	1.20	.06	.07	.02	.01	--	105	.14	23,320	31	.6	127	7.4
Apr. 1-10	153,600	33	.43	.42	.39	.05	1.15	.05	.07	.02	.01	--	97	.13	19,970	30	.6	120	7.4
Apr. 11-20.....	126,400	33	.42	.42	.44	.05	1.21	.06	.07	.02	.01	.08	98	.13	16,430	33	.7	126	7.3
Apr. 21-30.....	171,200	30	.46	.43	.34	.04	1.08	.11	.08	.02	.01	--	97	.13	22,260	27	.5	118	7.4
May 1-10.....	155,900	30	.50	.43	.37	.04	1.11	.08	.07	.02	.01	--	98	.13	20,270	28	.5	122	7.4
May 11-20.....	135,800	29	.47	.37	.40	.04	1.15	.07	.09	.02	.01	.05	95	.13	17,350	31	.6	122	7.2
May 21-31	175,400	30	.46	.39	.39	.04	1.11	.07	.06	.02	.01	--	95	.13	22,800	30	.6	121	7.4
June 1-10.....	148,300	29	.48	.37	.40	.04	1.15	.07	.08	.02	.01	--	95	.13	19,280	31	.6	121	7.6
June 11-20	149,900	30	.49	.39	.40	.05	1.18	.07	.09	.02	.00	.05	99	.13	19,490	30	.6	129	7.5
June 21-30	115,700	32	.45	.44	.48	.04	1.18	.09	.08	.01	.00	--	98	.13	15,040	34	.7	127	6.9

DESCHUTES RIVER BASIN--Continued

DESCHUTES RIVER AT MOODY, NEAR BIGGS, OREG.--Continued

Chemical analyses, December 1952 to September 1953--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 1-10, 1953 ..	110,600	31	0.40	0.40	0.48	0.04	1.11	0.09	0.07	0.01	0.00	--	92	0.13	14,380	36	0.8	118	6.9
July 11-20.....	110,200	31	.35	.42	.44	.04	1.05	.09	.07	.01	.00	0.04	97	.13	14,330	35	.7	112	6.9
July 21-31.....	104,700	33	.39	.43	.44	.04	1.11	.06	.07	.01	.00	--	90	.12	12,560	34	.7	121	7.0
Aug. 1-10	98,980	35	.41	.45	.44	.06	1.15	.07	.07	.01	.00	--	97	.13	12,870	32	.7	121	6.9
Aug. 11-20	96,180	34	.39	.46	.44	.06	1.13	.06	.08	.01	.01	.06	95	.13	12,500	32	.7	120	7.0
Aug. 21-31	112,100	34	.38	.44	.44	.06	1.13	.09	.08	.01	.01	--	94	.13	14,570	33	.7	121	7.0
Sept. 1-10	101,300	34	.40	.47	.48	.05	1.16	.08	.08	.01	.01	--	97	.13	13,170	34	.7	124	7.1
Sept. 11-20.....	93,260	34	.40	.49	.48	.05	1.18	.05	.09	.01	.00	.12	97	.13	12,120	34	.7	124	7.3
Sept. 21-30.....	93,920	35	.42	.47	.48	.04	1.18	.07	.07	.01	.01	--	97	.13	12,210	34	.7	124	7.3
Total or weighted average.....	a3,831,000	31	0.42	0.43	0.41	0.05	1.11	0.07	0.07	0.02	0.01	--	96	0.13	498,000	31	0.6	119	--

a Represents 82 percent of runoff for water year October 1952 to September 1953.

COLUMBIA RIVER AT MARYHILL FERRY NEAR RUFUS, OREG.

LOCATION.--At Maryhill Ferry, about 2 ½ miles downstream from Rufus, Sherman County, and about 9 miles upstream from gaging station near The Dalles, which is just upstream from Celilo Falls, 3 miles downstream from Deschutes River, and 11 miles east of The Dalles, Wasco County.
DRAINAGE AREA.--237,000 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1953.
Water temperatures: December 1950 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 268 micromhos Dec. 29; minimum daily, 137 micromhos May 24.
Percent sodium: Maximum, 32 Aug. 11-20; minimum, 10 July 1-10.
EXTREMES, 1950-53.--Specific conductance: Maximum daily, 268 micromhos Dec. 29, 1952; minimum daily, 124 micromhos May 26, 1951.
Percent sodium: Maximum, 32 Aug. 11-20, 1953; minimum, 10 July 1-10, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation. 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 1952 to September 1953, given in Water-Supply Paper 1287. These records include the inflow of the Deschutes River, which on the average amounts to less than 5 percent of the annual runoff at the gaging station. No other appreciable inflow between Maryhill Ferry and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1952 to September 1953

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, 1952.	1,706,000	11	1.25	0.66	0.52	0.04	1.70	0.54	0.18		0.01	--	146	0.20	341,200	21	0.5	239	7.8
Oct. 11-31	3,582,000	11	1.25	.66	.52	.04	1.74	.54	.18		.01	0.02	147	.20	716,400	21	.5	244	7.7
Nov. 1-30	5,049,000	11	1.30	.66	.57	.04	1.80	.56	.19		.02	--	149	.20	1,010,000	22	.6	252	7.5
Dec. 1-10	1,634,000	14	1.30	.64	.43	.06	1.77	.52	.17		.02	--	145	.20	326,800	18	.4	239	--
Dec. 11-20	1,589,000	13	1.30	.66	.43	.06	1.77	.52	.17		.03	--	145	.20	317,800	18	.4	239	--
Dec. 21-31	1,744,000	13	1.40	.69	.52	.06	1.84	.56	.19		.02	--	157	.21	366,200	20	.5	258	--
Jan. 1-10, 1953.	1,616,000	16	1.10	.63	.43	.06	1.51	.46	.16		.03	--	140	.19	307,000	20	.5	216	--
Jan. 11-31	5,285,000	18	1.00	.58	.37	.04	1.34	.35	.14		.03	.04	130	.18	951,300	19	.4	189	7.4
Feb. 1-10	3,140,000	16	1.10	.62	.34	.05	1.52	.40	.13		.02	--	127	.17	533,800	16	.4	199	--
Feb. 11-19.....	2,442,000	14	1.25	.68	.43	.05	1.69	.48	.15		.02	--	135	.18	439,600	18	.4	220	--
Feb. 20-28.....	2,182,000	14	1.25	.65	.43	.05	1.69	.48	.16		.02	--	137	.19	414,600	18	.4	224	--
Mar. 1-10	2,454,000	16	1.20	.64	.38	.06	1.59	.44	.16		.02	--	137	.19	466,300	17	.4	211	--
Mar. 11-20	2,644,000	18	1.15	.58	.37	.05	1.57	.42	.14		.02	--	136	.18	475,900	17	.4	203	--
Mar. 21-31	3,362,000	17	1.15	.59	.35	.04	1.52	.44	.14		.02	--	133	.18	605,200	16	.4	199	--

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT MARYHILL FERRY NEAR RUFUS, OREG.--Continued

Chemical analyses, water year October 1952 to September 1953--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. 1-10, 1953	2,993,000	15	1.20	0.53	0.35	0.05	1.52	0.44	0.14		0.01	--	127	0.17	508,800	16	0.4	200	--
Apr. 11-20	2,713,000	15	1.00	.49	.33	.04	1.38	.42	.11		.01	0.03	116	.16	434,100	18	.4	182	--
Apr. 21-30.....	3,562,000	16	.85	.42	.28	.05	1.18	.23	.08		.01	--	107	.15	534,300	18	.4	157	--
May 1-10	4,147,000	16	.85	.41	.28	.05	1.18	.29	.08		.01	--	108	.15	622,000	18	.4	155	--
May 11-20	3,921,000	8.7	.90	.37	.33	.06	1.29	.29	.09		.00	--	97	.13	509,700	20	.4	164	--
May 21-31	7,422,000	7.9	.90	.37	.30	.04	1.23	.31	.07		.01	--	96	.13	964,900	18	.4	157	--
June 1-10	9,340,000	6.5	.90	.37	.40	.05	1.33	.29	.07		.01	--	105	.14	1,308,000	23	.5	165	--
June 11-20	11,630,000	6.4	.90	.40	.61	.05	1.51	.27	.09		.01	--	116	.16	1,861,000	31	.8	185	--
June 21-30	9,376,000	6.5	.90	.37	.57	.05	1.51	.29	.08		.01	--	111	.15	1,406,000	30	.7	181	--
July 1-10	7,396,000	7.1	.95	.40	.15	.03	1.29	.25	.05		.01	--	85	.12	887,500	10	.2	145	--
July 11-20.....	6,603,000	8.0	1.00	.43	.20	.03	1.28	.27	.05		.00	.05	90	.12	792,400	12	.2	154	--
July 21-31.....	5,681,000	7.4	1.05	.43	.30	.04	1.39	.31	.08		.01	--	100	.14	795,300	16	.3	174	--
Aug. 1-10.....	3,721,000	7.3	1.05	.46	.48	.04	1.57	.31	.10		.00	--	114	.16	595,400	24	.6	192	--
Aug. 11-20	2,860,000	8.0	1.05	.46	.74	.07	1.72	.40	.15		.01	--	135	.18	514,800	32	.9	218	--
Aug. 21-31.....	2,977,000	8.7	1.10	.49	.30	.03	1.46	.37	.10		.01	--	109	.15	446,600	16	.3	186	--
Sept. 1-10	2,575,000	9.0	1.05	.49	.34	.04	1.44	.37	.10		.02	--	112	.15	386,200	18	.4	191	--
Sept. 11-20.....	2,305,000	8.6	1.10	.54	.39	.04	1.49	.42	.12		.02	--	118	.16	368,800	19	.4	199	--
Sept. 21-30	2,188,000	8.1	1.10	.54	.42	.04	1.56	.46	.13		.02	--	124	.17	372,000	20	.5	209	--
Total or weighted average	129,800,000	10	1.05	0.49	0.40	0.04	1.46	0.35	0.11		0.01	--	116	0.16	20,770,000	20	0.5	188	--

WILLAMETTE RIVER BASIN

WILLAMETTE RIVER AT SALEM, OREG.

LOCATION.--At bridge on State Highway 22, 300 feet downstream from gaging station at Salem, Marion County.
DRAINAGE AREA.--7,280 square miles.
RECORDS AVAILABLE.--Chemical analyses: August to December 1910, August 1911 to August 1912, February 1951 to September 1953.
Water temperatures: February 1951 to September 1953.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 84.1 micromhos Sept. 20; minimum daily, 34.6 micromhos Jan. 20.
Percent sodium: Maximum, 29 Sept. 21-30; minimum, 20 Mar. 21-31.
EXTREMES, 1951-53.--Specific conductance: Maximum daily, 92.7 micromhos Sept. 7, 1952; minimum daily, 34.6 micromhos Jan. 20, 1953.
Percent sodium: Maximum, 36 July 11-20, 1952; minimum 20 Apr. 11-20, 1951, May 11-20, 1952, Mar. 21-31, 1953.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oregon. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1288.

Chemical analyses, water year October 1952 to September 1953

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, 1952...	94,330	17	0.28	0.25	0.21	0.02	0.56	0.06	0.11		0.01	--	65	0.09	8,490	28	0.4	74.7	7.1
Oct. 11-31	177,600	16	.31	.25	.19	.02	.56	.07	.09		.01	0.03	67	.09	15,980	25	.4	75.3	7.1
Nov. 1-30	237,600	18	.30	.22	.21	.02	.59	.08	.10		.01	--	69	.09	21,380	28	.4	76.5	7.0
Dec. 1-10	246,600	16	.29	.25	.16	.04	.51	.07	.10		.01	--	60	.08	19,730	22	.3	66.0	--
Dec. 11-20	505,400	15	.26	.23	.14	.02	.46	.06	.08		.02	--	54	.07	35,380	22	.3	55.6	--
Dec. 21-31	283,600	17	.28	.21	.15	.02	.49	.06	.09		.01	--	60	.08	22,690	22	.3	61.4	--
Jan. 1-10,1953 ...	780,300	14	.23	.19	.14	.02	.43	.08	.08		.01	--	59	.08	62,420	24	.3	53.9	--
Jan. 11-20	2,349,000	12	.25	.16	.14	.04	.43	.07	.09		.01	.04	52	.07	164,400	24	.3	41.7	--
Jan. 21-31	2,519,000	13	.21	.16	.13	.03	.43	.06	.06		.01	--	45	.06	151,100	24	.3	43.4	--
Feb. 1-12	2,505,000	14	.21	.13	.11	.03	.34	.07	.06		.01	--	50	.07	175,400	23	.3	45.7	6.8
Feb. 13-28	1,524,000	15	.25	.13	.14	.03	.36	.08	.07		.01	--	54	.07	106,700	25	.3	54.3	6.6
Mar. 1-10.....	393,100	18	.32	.16	.15	.02	.49	.06	.08		.01	--	56	.08	31,450	22	.3	61.4	--
Mar. 11-20	566,500	16	.32	.16	.14	.03	.48	.06	.09		.02	--	56	.08	45,320	21	.3	55.9	--
Mar. 21-31	1,114,000	15	.31	.16	.13	.03	.46	.06	.08		.01	--	52	.07	77,980	20	.3	51.8	--
Apr. 1-10	477,800	17	.29	.16	.14	.03	.48	.06	.08		.01	--	54	.07	33,450	22	.3	58.6	--
Apr. 11-20	368,100	16	.30	.14	.14	.02	.46	.06	.06		.01	.04	52	.07	25,770	24	.3	56.5	--
Apr. 21-30	526,400	15	.22	.17	.13	.02	.39	.05	.06		.01	--	46	.06	31,580	24	.3	50.4	--
May 1-10	574,200	15	.22	.16	.13	.02	.44	.04	.06		.01	--	46	.06	34,450	25	.3	50.4	--

WILLAMETTE RIVER BASIN--Continued

WILLAMETTE RIVER AT SALEM, OREG.--Continued

Chemical analyses, water year October 1952 to September 1953--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 11-20, 1953 ..	479,800	15	0.24	0.17	0.14	0.02	0.44	0.04	0.06		0.01	--	47	0.06	28,790	24	0.3	52.5	--
May 21-31	923,900	15	.22	.21	.13	.02	.43	.06	.06		.01	--	48	.07	64,670	23	.3	48.7	--
June 1-10	621,000	15	.23	.17	.13	.01	.43	.05	.06		.01	--	47	.06	37,260	24	.3	50.4	--
June 11-20	525,400	15	.23	.17	.13	.02	.43	.05	.06		.01	--	48	.07	36,780	24	.3	50.6	--
June 21-30	304,500	16	.25	.18	.15	.02	.46	.06	.06		.01	--	51	.07	21,320	25	.3	55.2	--
July 1-10	235,800	17	.28	.20	.16	.03	.56	.09	.07		.01	--	50	.07	16,510	24	.3	60.4	--
July 11-20	178,600	19	.32	.20	.17	.03	.54	.06	.08		.01	0.08	54	.07	12,500	24	.3	64.8	--
July 21-31	145,800	20	.31	.20	.18	.04	.59	.07	.10		.01	--	59	.08	11,660	25	.4	69.9	--
Aug. 1-10	121,000	19	.33	.22	.19	.04	.62	.10	.09		.01	--	59	.08	9,680	25	.4	70.6	--
Aug. 11-20	108,800	18	.30	.20	.21	.03	.56	.07	.09		.01	--	61	.08	8,700	28	.4	73.5	--
Aug. 21-31	140,100	18	.29	.19	.20	.03	.57	.06	.08		.01	--	59	.08	11,210	28	.4	69.6	--
Sept. 1-10	121,300	17	.30	.19	.20	.03	.59	.07	.08		.01	--	57	.08	9,700	28	.4	69.3	--
Sept. 11-20.....	114,500	16	.32	.20	.21	.03	.57	.09	.09		.01	--	60	.08	9,160	28	.4	74.4	--
Sept. 21-30	118,800	16	.29	.18	.21	.03	.59	.08	.09		.01	--	60	.08	9,500	29	.4	72.1	--
Total or weighted average	19,380,000	15	0.25	0.16	0.14	0.03	0.43	0.07	0.07		0.01	--	52	0.07	1,357,000	24	0.3	51.5	--

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 to September 1953.
Water temperatures: January to September 1953.
EXTREMES, January to September 1953.--Specific conductance: Maximum daily, 105 micromhos Mar.22; minimum daily, 58.5 Micromhos Jan. 19.
Percent sodium: Maximum, 24 Mar. 1-10, 11-20, Apr. 11-20, Sept. 21-30; minimum, 18 May 21-31.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1952 to September 1953 given in Water-Supply Paper 1288.

Chemical analyses, January to September 1953

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. 5-31, 1953..	679,600	24	0.40	0.35	0.20	0.03	0.72	0.06	0.06	0.03	0.02	0.05	80	0.11	74,760	20	0.3	88.3	7.2
Feb. 1-10.....	308,600	22	.39	.31	.17	.03	.69	.05	.04	.03	.02	.--	74	.10	30,860	19	.3	77.3	7.6
Feb. 11-28.....	210,500	26	.42	.36	.20	.03	.80	.06	.06	.03	.01	.06	77	.10	21,050	20	.3	91.0	7.4
Mar. 1-10.....	71,560	29	.45	.30	.24	.04	.85	.07	.07	.02	.01	--	80	.11	7,870	24	.4	96.3	7.6
Mar. 11-20	75,550	29	.44	.30	.24	.04	.85	.06	.07	.02	.01	.06	79	.11	8,310	24	.4	94.4	7.4
Mar. 21-31.....	126,500	24	.48	.35	.23	.04	.85	.07	.07	.02	.02	--	85	.12	15,180	21	.4	93.9	7.0
Apr. 1-10	78,550	26	.43	.29	.23	.04	.82	.06	.07	.02	.02	--	78	.11	8,640	23	.4	91.8	7.2
Apr. 11-20.....	61,310	26	.43	.28	.23	.04	.85	.07	.07	.02	.00	.06	77	.10	6,130	24	.4	94.4	7.4
Apr. 21-30.....	92,530	22	.37	.24	.16	.03	.69	.07	.06	.02	.01	--	69	.09	8,330	20	.3	79.9	6.7
May 1-10	80,070	22	.37	.21	.18	.03	.66	.06	.05	.01	.01	--	64	.09	7,210	23	.3	73.8	6.8
May 11-20	82,610	23	.38	.24	.18	.03	.72	.07	.05	.01	.01	.04	69	.09	7,430	22	.3	78.2	6.9
May 21-31.....	190,200	23	.44	.37	.19	.04	.82	.11	.05	.02	.01	--	81	.11	20,920	17	.3	87.2	7.2
June 1-10	142,200	22	.39	.29	.19	.03	.75	.07	.06	.02	.01	--	71	.10	14,220	21	.3	82.1	7.0
June 11-20	115,400	22	.35	.27	.17	.03	.66	.06	.05	.02	.01	.05	65	.09	10,390	21	.3	72.6	6.9
June 21-30	78,490	22	.36	.25	.17	.04	.64	.05	.06	.02	.01	--	64	.09	7,060	21	.3	71.1	7.0
July 1-10	59,070	26	.31	.25	.16	.04	.59	.05	.05	.02	.01	--	63	.09	5,320	21	.3	69.9	6.9
July 11-20.....	45,180	28	.35	.25	.17	.04	.62	.06	.06	.01	.01	.02	69	.09	4,070	21	.3	71.9	7.1
July 21-31.....	39,290	31	.34	.26	.18	.04	.70	.05	.05	.01	.01	--	74	.10	3,930	22	.3	77.8	7.0

ROGUE RIVER BASIN--Continued

ROGUE RIVER AT GRANTS PASS, OREG.--Continued

Chemical analyses, January to September 1953--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. 1-10, 1953..	32,470	31	0.40	0.25	0.19	0.04	0.75	0.08	0.07	0.01	0.00	--	79	0.11	3,570	21	0.3	82.1	6.8
Aug. 11-20	30,110	31	.39	.26	.20	.04	.75	.07	.08	.01	.01	0.06	74	.10	3,010	22	.4	83.3	7.0
Aug. 21-31	37,590	31	.43	.27	.21	.04	.79	.07	.08	.01	.01	--	79	.11	4,130	22	.4	88.4	6.9
Sept. 1-10	32,730	31	.45	.28	.22	.04	.85	.06	.09	.01	.01	--	83	.11	3,600	22	.4	96.1	7.1
Sept. 11-20.....	29,450	34	.45	.32	.24	.04	.85	.05	.07	.01	.01	.04	80	.11	3,240	23	.4	93.4	7.1
Sept. 21-30.....	30,720	32	.44	.28	.24	.04	.84	.05	.08	.01	.01	--	81	.11	3,380	24	.4	93.4	7.0
Total or weighted average.....	a2,730,000	25	0.40	0.31	0.20	0.03	0.74	0.06	0.06	0.02	0.01	--	76	0.10	273,000	21	0.3	84.8	--

a Represents 87 percent of runoff for water year October 1952 to September 1953.

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