Quality of Surface Waters For Irrigation Western United States 1951

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

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1264

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1954

UNITED STATES DEPARTMENT OF THE INTERIOR

Douglas McKay, *Secretary*

GEOLOGICAL SURVEY

W. E. Wrather, *Director*

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price $1 (paper cover)

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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CONTENTS

ILLUSTRATIONS

QUALITY OF SURFACE WATERS FOR IRRIGATION, WESTERN UNITED STATES, 1951

INTRODUCTION

The records of chemical analyses, other physical measurements, and discharge given in this report comprise the first annual compilation of data for 78 irrigation network stations in operation west of the Mississippi River.

Increased development of irrigation agriculture in the Western States during the past decade has brought sharply into focus the 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. The U. S. Census of Agriculture for 1945 reports that approximately 20. 5 million acres of land were irrigated in 1944; of this acreage nearly 95 percent was in the 17 Western States. Straus (1952) estimates that the acreage of irrigated land in the Western States had increased to 21. 5 million acres in 1948. In 1934, an estimate by the National Resources Board placed the ultimate acreage that could be irrigated in the Western States at 51. 5 million acres.

The 17 Western States contain approximately 22 percent of the nation's population and 60 percent of the land area, of which about 1 acre in 10 of the arable lands in these States is irrigated.

All natural waters contain mineral salts in solution. Ordinary irrigation practice concentrates much of the salt burden of the input water in the ground and drainage waters owing to evaporation and transpiration. Where drainage is not adequate, this results in excessive concentrations of soluble salts in the soil solution. Since crops cannot tolerate excessively concentrated soil solutions, it is necessary to provide drainage so that the excess of salts can be leached out of the soil. The removal of mineral salts through proper drainage facilities is essential to the maintenance of a favorable salt balance in the soil.

The water in many of the surface streams of the West has been, or soon will be, completely allocated for specific purposes, often primarily for irrigation. Some of these allocations have been made without consideration of their effect on the quality of the downstream water or without adequate allowance for drainage purposes so that a proper salt balance can be maintained. As a result the productivity of many thousands of acres of agricultural land has been impaired due to the accumulation of excessive amounts of mineral salts. It is becoming increasingly apparent

that more judicious use must be made of available water for maintaining suitable quality and removing accumulations of salt. In order to provide for maximum beneficial water use it is essential to have available continuous records of the chemical quality of surface waters at key stations on the main streams that are used for irrigation. These continuous long-term records will assist in the determination of quality of water prior to irrigation development, the extent of impairment of water quality due to drainage return, requirements for maintaining proper salt balance, and the equitable division of water between projects, States, and adjoining nations.

In recognition of the 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 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 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 com-

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	nr. Westhope, N. Dak.	--
2.	6	Missouri River	nr. Williston, N. Dak.	12/5/50
3.		Missonri River	at Pierre, S. Dak.	--
4.		Missouri River	at Nebraska City, Nebr.	1/4/51
5.		Yellowstone River	at Billings, Mont.	12/15/50
6.		Yellowstone River	nr. Sidney, Mont.	1/3/51
7.		Bighorn River	at Thermopolis, Wyo.	1/1/51
8.		Bighorn River	at Bighorn, Mont.	--
9.		Tongue River	at Miles City, Mont.	1/4/51
10.		Powder River	nr. Locate, Mont.	1/4/51
11.		Grand River	nr. Wakpala, S. Dak.	1/17/51
12.		Moreau River	at Promise, S. Dak.	--
13.		Cheyenne River	nr. Eagle Butte, S. Dak.	1/17/51
14.		White River	nr. Oacoma, S. Dak.	--
15.		James River	nr. Huron, S. Dak.	--
16.		N. Platte River	below Alcova Dam, Wyo.	--
17.		N. Platte River	below Guernsey Reservoir, Wyo.	12/7/51
18.		Platte River	at Brady, Nebr.	2/26/51
18 a.		Supply Canal (Tri-County Diversion)	nr. Maxwell, Nebr.	3/1/51
19.		South Platte River	at Julesburg, Colo.	10/1/45
20.		Republican River	at Cambridge, Nebr.	12/22/50
21.		Republican River	nr. Hardy, Nebr.	--
22.		Smoky Hill River	nr. Langley, Kans.	--
23.		a Saline River	nr. Wilson (or Russell), Kans.	
			at Tescott, Kans.	4/3/50
24.	7	Arkansas River	below John Martin Reservoir, Colo.	1/10/51
25.		Arkansas River	at Arkansas City, Kans.	10/8/51
26.		Arkansas River	at Ralston, Okla.	1/1/50
27.		Arkansas River	at Van Buren, Ark.	10/1/45
28.		Cimarron River	at Mannford, Okla.	10/1/49
			at Perkins, Okla.	10/1/52
29.		Canadian River	nr. Tascosa, Tex.	6/2/48
30.		Canadian River	nr. Whitefield, Okla.	9/1/46
31.		Red River	at Denison Dam, nr. Denison, Tex.	5/1/44
32.		b Washita River	nr. Tabler, Okla.	9/10/46
33.		Sabine River	nr. Ruliff, Tex.	10/1/47
34.		Neches River	at Evadale, Tex.	10/1/47
35.	8	Trinity River	at Romayor, Tex.	9/1/45
36.		San Jacinto River	nr. Huffman, Tex.	9/1/45
37.		Brazos River	at Richmond, Tex.	9/1/45
38.		Colorado River	at Robert Lee, Tex.	--
39.		Colorado River	at Austin, Tex.	10/1/47
40.		Colorado River	at Wharton, Tex.	4/11/44
41.		Guadalupe River	at Victoria, Tex.	9/1/45
42.		Nueces River	nr. Mathis, Tex.	10/1/47
43.		Rio Grande	above Culebra Cr. nr. Lobatos, Colo.	10/11/46
44.		Rio Grande	at Otowi Bridge nr. San Ildefonso, N. Mex.	10/23/47
45.		Rio Grande	at San Marcial, N. Mex.	7/1/48
46.		Rio Grande	below Elephant Butte Outlet, N. Mex.	--
47.		c Rio Grande	nr. El Paso, Tex.	--/--/30
48.		c Rio Grande	below Old Fort Quitman, Tex.	--/--/30
49.		c Rio Grande	at Upper Presidio, Tex.	--/--/35
50.		c Rio Grande	at Langtry, Tex.	--/--/45
51.		c Rio Grande	at Eagle Pass, Tex.	--/--/38
52.		c Rio Grande	at Roma, Tex.	--/--/44
53.		Pecos River	below Alamorgordo Dam, N. Mex.	6/26/37
54.		Pecos River	nr. Artesia, N. Mex.	7/1/37
55.		Pecos River	nr. Orla, Tex.	7/1/37
56.		c Pecos River	nr. Comstock, Tex.	--/--/35
57.	9	Colorado River	nr. Glenwood Springs, Colo.	10/--/41
58.		Colorado River	nr. Cisco, Utah	10/--/28
59.		Colorado River	at Lees Ferry, Ariz.	10/1/47
60.		Colorado River	nr. Grand Canyon, Ariz.	10/--/39

Irrigation-Quality Network Stations in Western United States--Continued
/Selected by Subcommittee on Hydrology, Federal Interagency River Basin Committee, 1950/

No.	Geological Survey Part no.	Stream	Location	Date established
61.	9	Colorado River	below Hoover Dam, Ariz.-Nev.	10/--/39
62.		Colorado River	below Parker Dam, Calif.	--
63.		Colorado River (Yuma Main Canal)	below Colorado River Siphon at Yuma, Ariz.	10/--/42
64.		Gunnison River	nr. Grand Junction, Colo.	10/--/31
65.		Green River	nr. Linwood, Utah	--
66.		Green River	at Green River, Utah	10/--/28
67.		San Juan River	nr. Blanco, N. Mex.	10/1/45
68.		San Juan River	nr. Bluff, Utah	10/--/29
69.		Little Colorado River	at Cameron, Ariz.	1/17/51
70.		Gila River	at Kelvin, Ariz.	12/1/50
71.		Gila River	below Gillespie Dam, Ariz.	12/1/50
72.		Salt River	at Stewart Mountain Dam, Ariz.	12/9/50
73.		Verde River	below Bartlett Dam, Ariz.	12/9/50
74.		Agua Fria River	outflow from lake Pleasant Dam, Ariz.	12/1/50
75.	10	Bear River	nr. Collinston, Utah	--
76.		Sevier River	nr. Marysville, Utah	--
77.		Sevier River	nr. Lynndyl, Utah	3/22/51
78.		Humboldt River	at Palisade, Nev.	--
79.		Humboldt River	nr. Rye Patch, Nev.	12/10/51
80.	11	San Joaquin River	below Friant Dam, Calif.	--
81.		San Joaquin River	nr. Mendota, Calif.	--
82.		San Joaquin River	nr. Vernalis, Calif.	3/1/51
83.		San Joaquin River	at Antioch, Calif.	--
84.		d Calaveras River (Stockton Diverting Canal)	at Stockton, Calif.	3/1/51
64 a.		San Joaquin River	nr. Mendota, Calif.	10/--/52
85.		Mokelumne River	at Woodbridge, Calif.	3/1/51
86.		Sacramento River	nr. Red Bluff, Calif.	--
87.		Sacramento River	at Knights Landing, Calif.	2/26/51
88.		Feather River	at Nicolaus, Calif.	2/26/51
89.		American River	at Fair Oaks, Calif.	5/1/51
90.	12	Columbia River	at International Boundary	11/15/51
91.		Columbia River	at Grand Coulee Dam, Wash.	11/25/50
92.		Kootenai River	at Porthill, Idaho	--
93.		Pend Oreille River	nr. Metaline Falls, Wash.	--
94.		Yakima River	at Kiona, Wash.	--
95.	13	Snake River	nr. Heise, Idaho	--
96.		Snake River	nr. Minidoka, Idaho	--
97.		Snake River	at King Hill, Idaho	3/27/51
98.		Snake River	at Weiser, Idaho	--
99.		Snake River	nr. Clarkston, Wash.	11/14/51
100.		Boise River	nr. Arrowrock, Idaho	--
101.		Boise River	at Notus, Idaho	11/21/50
102.	14	Columbia River	at Maryhill, Ferry nr. Rufus, Oreg.	12/1/50
103.		Deschutes River	at Moody nr. Biggs, Oreg.	--
104.		Willamette River	at Salem, Oreg.	2/1/51
105.		Rogue River	at Grants Pass, Oreg.	--
106.	5	Sheyenne River	nr. Warwick, N. Dak.	1/8/51
		Stations added by Subcommittee, October 2, 1952		
107.	6	North Platte River	at Lewellen, Nebr.	--
106.		Platte River	nr. Ashland, Nebr.	--
109.	9	Virgin River	at Littlefield, Ariz.	7/--/49

a Dropped from list 10/3/52. Replaced by Station at Tescott.
b Dropped from list 10/3/52. Replaced by Station at Pauls Valley.
c Operated by International Boundary and Water Commission.
d Dropped from list 10/3/52. Replaced by Station on San Joaquin River near Mendota.

prises 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 which 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 106 network stations on streams in Western United States. The 78 stations in operation in 1951 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.

ACKNOWLEDGMENTS

Agencies which 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 1951, 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 20 and 21 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 1950 and 1951. Analyses for eight stations 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

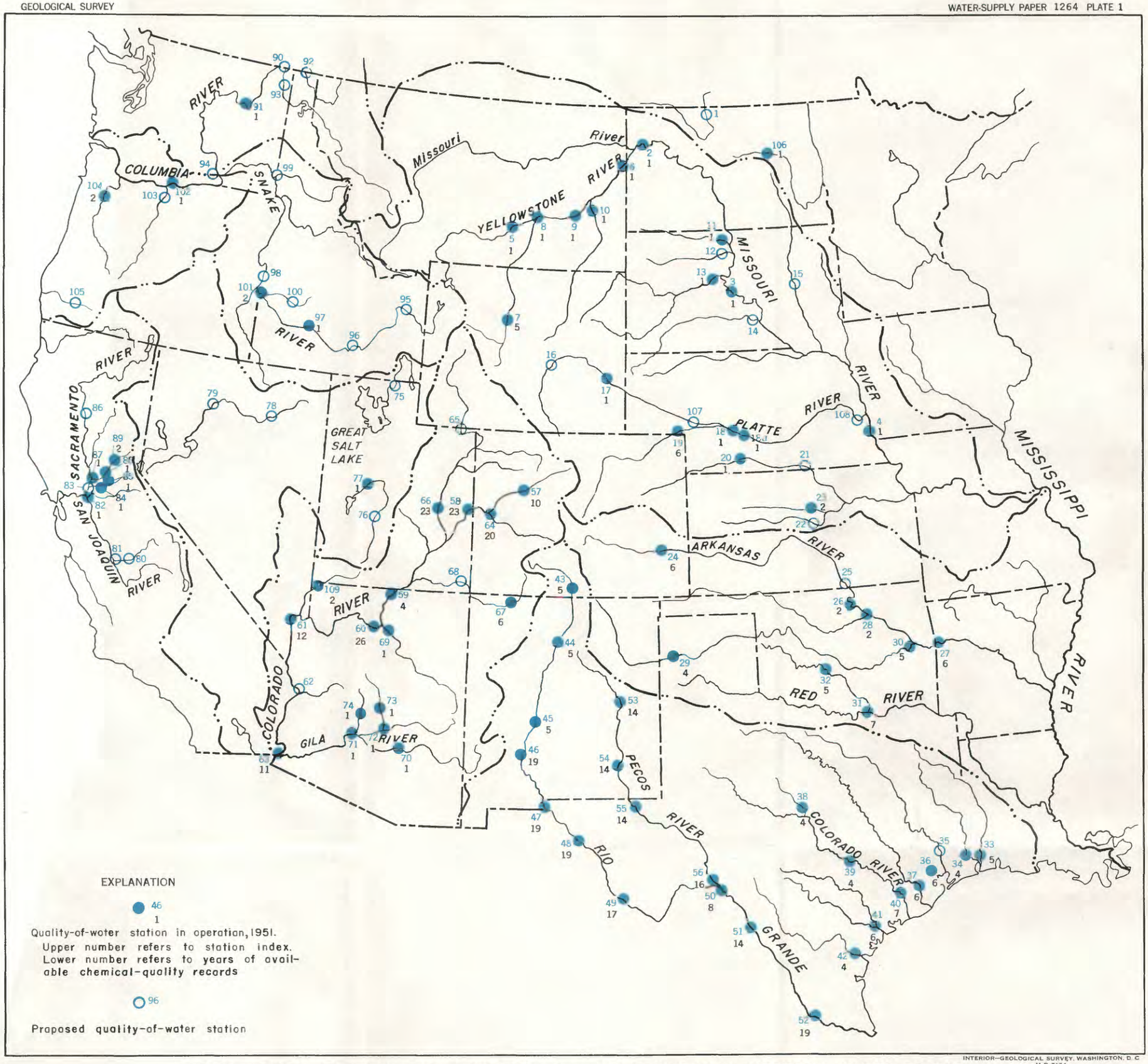
In accordance with the recommendation of the Subcommittee, where practicable, one sample was collected each day throughout the water year. In general, each sample was taken in an 8- or 12-ounce glass bottle provided with a pressure-type or positive-seal closure to prevent escape of dissolved gases. Each 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 show 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 values 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



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M R-5174

RECOMMENDED STATIONS FOR IRRIGATION-QUALITY NETWORK IN WESTERN UNITED STATES

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 1951 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 (me/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 15 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 Water Bulletins 20 and 21.

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's record are reported for specific conductance and percent sodium because of their widespread application in the evaluation of water analysis 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 analyses.

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.

DISCUSSION OF RESULTS

Discharge data and dissolved-solids loads for stations operated in 1951 are summarized in the following table. During the year the highest weighted average annual concentration observed was for the Pecos River near Orla, Tex. (6.23 tons per acre-foot) and the lowest was for the Columbia River at Grand Coulee Dam, Wash. (0.12 ton per acre-foot). However, part-year records at other stations indicate that the lower value may not have been the minimum had the observations been made for the entire year at all stations.

The median value for 57 weighted-average annual observed concentrations of dissolved solids was 0.67 ton per acre-foot or about 492 ppm; the middle 50 percent of concentrations ranged between 0.4 and 1.25 tons per acre-foot.

Diagrams showing dissolved-solids concentrations in equivalents per million and percentages of sodium in water at typical network stations are given in plate 2.

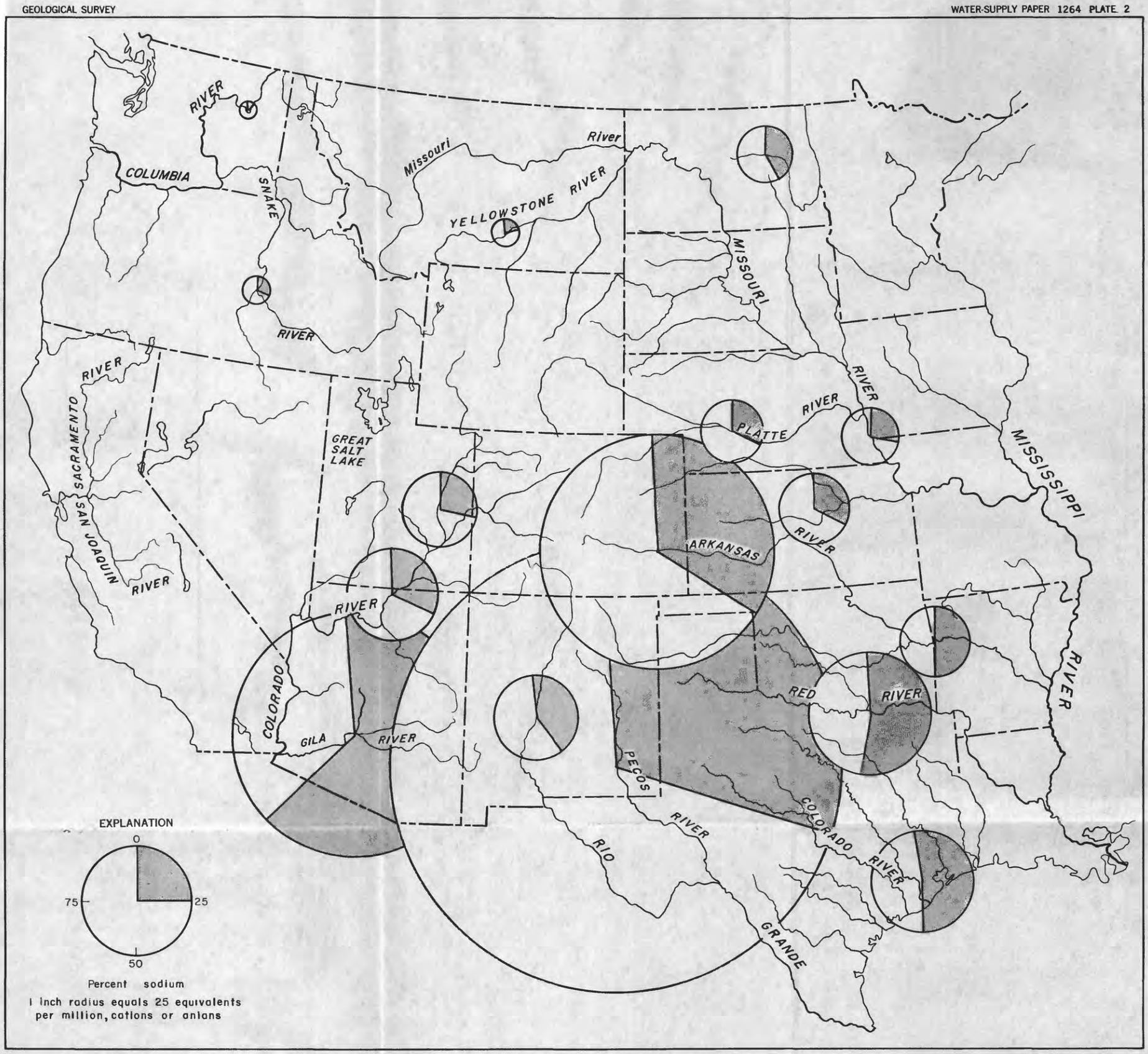
CRITERIA OF WATER QUALITY

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. In 1933, Scofield established limits for water for irrigation with reference to salinity, boron, chloride, and sulfate.

Eaton (1935) proposed five classes of water based on electrical conductivity, percent sodium, and boron. Scofield (1936) proposed a similar grouping for specific conductance, and percent sodium, but a further grouping of boron into 15 classes, involving

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 nr. Warwick, N. Dak.	a/40,140	0.55
Missouri River main stem		
Missouri River nr. Williston, N. Dak.	a/15,760,000	.51
Missouri River at Pierre, S. Dak.	a/14,230,000	.53
Missouri River at Nebraska City, Nebr.	a/32,340,000	.52
Yellowstone River basin		
Yellowstone River at Billings, Mont.	a/5,201,000	.23
Yellowstone River nr. Sidney, Mont.	a/8,245,000	.48
Bighorn River at Thermopolis, Wyo.	a/1,370,000	.47
Bighorn River at Bighorn, Mont.	a/2,721,000	.67
Tongue River at Miles City, Mont.	a/190,500	.59
Powder River near Locate, Mont.	a/177,400	1.51
Grand River basin		
Grand River nr. Wakpala, S. Dak.	a/114,300	.59
Cheyenne River basin		
Cheyenne River nr. Eagle Butte, S. Dak.	a/173,100	1.80
Platte River basin		
North Platte River below Guernsey Reservoir, Wyo.	--	--
Platte River at Brady, Nebr.	a/203,100	.57
Supply Canal (Tri-County Diversion) nr. Maxwell, Nebr.	a/791,200	.72
South Platte River at Julesburg, Colo.	a/146,000	1.80
Kansas River basin		
Republican River at Cambridge, Nebr.	a/365,300	.40
Saline River at Tescott, Kans.	a/872,300	.67
Arkansas River basin		
Arkansas River below John Martin Reservoir, Colo.	a/160,900	2.38
Arkansas River at Ralston, Okla.	9,246,648	.81
Arkansas River at Van Buren, Ark.	33,274,920	.64
Cimarron River at Mannford, Okla.	--	--
Canadian River nr. Tascosa, Tex.	141,800	.85
Canadian River nr. Whitefield, Okla.	3,326,623	1.59
Red River basin		
Red River at Denison Dam nr. Denison, Tex.	5,062,000	1.24
Washita River nr. Tabler, Okla.	585,688	.90
Sabine River basin		
Sabine River nr. Ruliff, Tex.	3,167,000	.18
Neches River basin		
Neches River at Evadale, Tex.	1,478,000	.19
San Jacinto River basin		
San Jacinto River nr. Huffman, Tex.	171,200	.36
Brazos River basin		
Brazos River at Richmond, Tex.	1,027,000	.95
Colorado River basin		
Colorado River at Robert Lee, Tex.	54,840	1.21
Colorado River at Austin, Tex.	764,600	.38
Colorado River at Wharton, Tex.	646,000	.40
Guadalupe River basin		
Guadalupe River at Victoria, Tex.	392,200	.50
Nueces River basin		
Nueces River nr. Mathis, Tex.	422,200	.31
Rio Grande basin		
Rio Grande above Culebra Creek nr. Lobatos, Colo.	79,980	.34
Rio Grande at Otowi Bridge nr. San Ildefonso, N. Mex.	395,400	.33
Rio Grande (Tiffany Channel) at Tiffany, N. Mex.	14,930	1.37
Rio Grande at San Marcial, N. Mex.	118,100	.77
Rio Grande below Elephant Butte Outlet, N. Mex.	451,100	--
Rio Grande nr. El Paso, Tex.	273,030	--
Rio Grande below Old Fort Quitman, Tex.	50,079.8	--
Rio Grande at Upper Presidio, Tex.	48.829.2	--
Rio Grande at Langtry, Tex.	864,600	--
Rio Grande at Eagle Pass, Tex.	1,310,870	--
Rio Grande at Roma, Tex.	1,990,100	--



CONCENTRATIONS IN EQUIVALENTS PER MILLION AND PERCENT-SODIUM VALUES AT TYPICAL IRRIGATION NETWORK STATIONS, 1951

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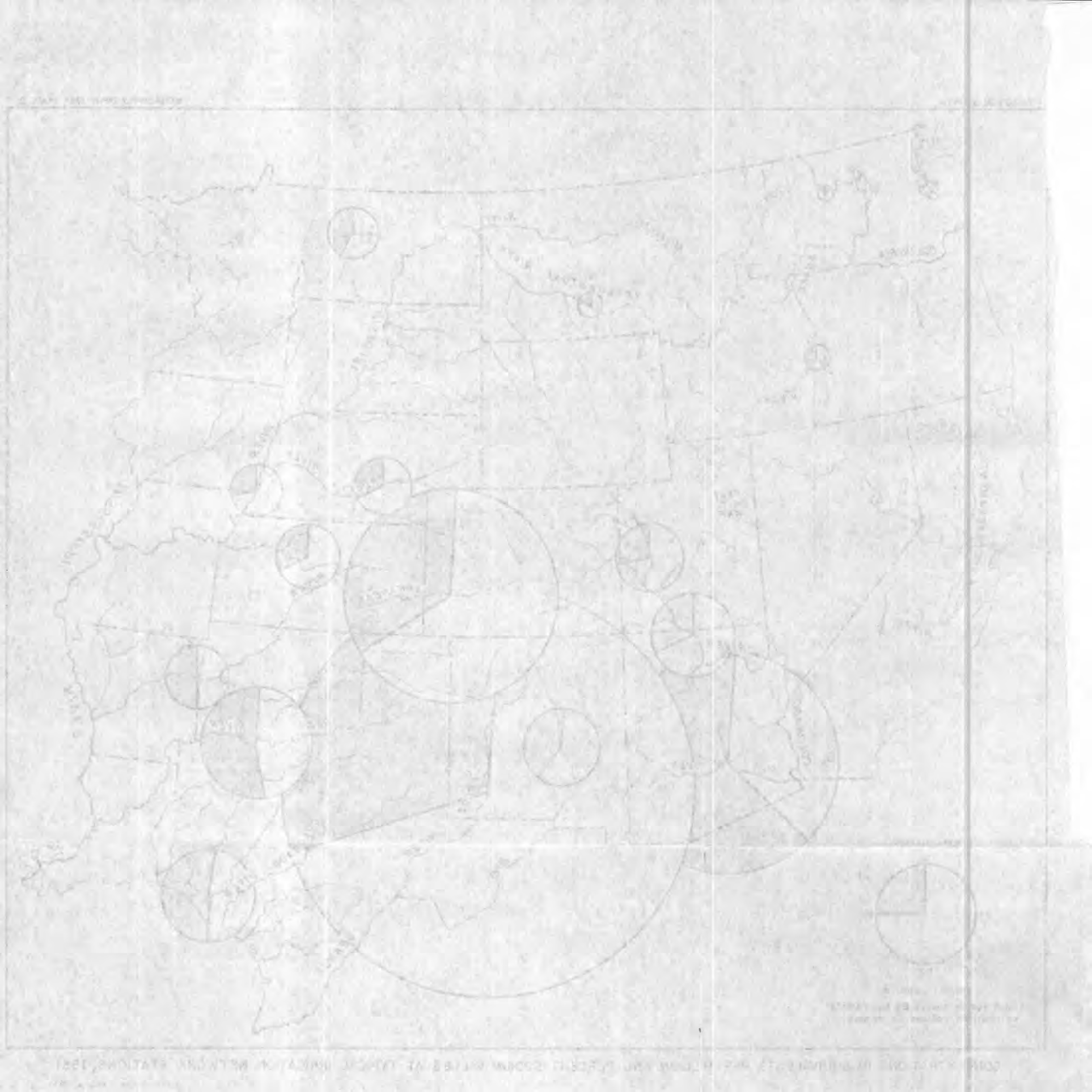

Summary of water discharge, and tonnages of dissolved solids--Continued

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Rio Grande basin--Continued		
Pecos River below Alamogordo Dam, N. Mex.	149,400	2.28
Pecos River nr. Artesia, N. Mex.	139,200	4.45
Pecos River nr. Orla, Tex.	110,300	6.23
Pecos River nr. Comstock, Tex.	147,480	--
Colorado River main stem		
Colorado River nr. Glenwood Springs, Colo.	a/1,836,000	.33
Colorado River nr. Cisco, Utah	a/2,892,000	.99
Colorado River at Lees Ferry, Ariz.	9,817,000	.79
Colorado River nr. Grand Canyon, Ariz.	a/9,110,000	.92
Colorado River below Hoover Dam, Ariz.-Nev.	a/7,657,000	.90
Diversions and Return Flows at and below Imperial Dam		
Yuma Main Canal below Colorado River Siphon at Yuma, Ariz.	a/281,300	.96
Gunnison River basin		
Gunnison River nr. Grand Junction, Colo.	a/929,100	1.13
Green River basin		
Green River at Green River, Utah	a/3,799,000	.61
San Juan River basin		
San Juan River nr. Blanco, N. Mex.	331,400	.26
Little Colorado River basin		
Little Colorado River at Cameron, Ariz.	--	--
Virgin River basin		
Virgin River at Littlefield, Ariz.	99,930	--
Gila River basin		
Gila River at Kelvin, Ariz.	a/64,820	1.22
Gila River below Gillespie Dam, Ariz.	a/139,600	2.31
Salt River at Stewart Mountain Dam, Ariz.	a/345,800	1.43
Verde River below Bartlett Dam, Ariz.	a/162,700	.43
Outflow from Lake Pleasant, Ariz.	453	--
Sevier Lake basin		
Sevier River nr. Lynndyl, Utah	a/98,110	2.38
San Joaquin River basin		
San Joaquin River main stem		
San Joaquin River nr. Vernalis, Calif.	a/1,418,000	--
Calaveras River basin		
Stockton Diverting Canal at Stockton, Calif.	--	--
Mokelumne River basin		
Mokelumne River at Woodbridge, Calif.	a/268,600	--
Sacramento River main stem		
Sacramento River at Knights Landing, Calif.	a/3,500,000	--
Feather River basin		
Feather River at Nicolaus, Calif.	a/2,535,000	--
American River basin		
American River at Fair Oaks, Calif.	a/1,445,000	--
Columbia River main stem		
Columbia River at Grand Coulee Dam, Wash.	a/79,440,000	.12
Snake River main stem		
Snake River at King Hill, Idaho	a/4,446,000	--
Boise River basin		
Boise River at Notus, Idaho	a/1,198,000	.21
Columbia River main stem		
Columbia River at Maryhill Ferry nr. Rufus, Oreg.	a/137,700,000	.14
Willamette River basin		
Willamette River at Salem, Oreg.	a/9,719,000	--

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

3 ranges for each of 5 classes. In addition he retained limits for chloride and sulfate.

Eaton (1942) suggested a classification consisting of three classes of sodium percentage, chloride, and sulfate. Plants were classified as sensitive or tolerant to boron. Total concentration was not included. Magistad and Christiansen (1944) followed the pattern established earlier by Scofield, reducing the number of groupings for specific conductance, percent-sodium values, and boron to three classes each. Limits for chloride and sulfate were excluded.

Four years later, Wilcox (1948) established criteria following the early Scofield criteria of five classes based on specific conductance, percent-sodium values, and 15 classes for boron. Like Magistad and Christiansen, however, he deleted chloride and sulfate. Wilcox concurrently prepared an empirical diagram for plotting and evaluating individual water analyses and this technique has had wide application for appraising water quality under average conditions.

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 concentration of the constituents is 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 because it relates more directly to the adsorption of 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:

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

In appraising quality of irrigation water with the above classification, 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. Other factors such as drainage and management practices likewise must be considered in the use of water having a given rating.

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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.
RECORDS AVAILABLE.--Chemical analyses: January to September 1951.
Water temperatures: January to September 1951.
EXTREMES, January to September, 1951.--Specific conductance: Maximum, 1,140 micromhos June 16, 18; minimum, 244 micromhos Mar. 29.
Percent sodium: Maximum, 53 July 15 to Aug. 13; minimum, 28 Mar. 1-26.
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 1950 to September 1951 given in Water-Supply Paper 1208.

Chemical analyses, January to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	512	28	3.89	2.87	2.96	0.15	7.37	1.83	0.45	0.01	0.05	0.13	590	0.80	410	30	868	7.8
Feb. 1-28	371	28	3.94	2.66	2.91	.13	7.08	2.08	.39	.01	.04	.10	578	.79	293	30	852	7.9
Mar. 1-26	432	28	3.89	2.59	2.61	.13	6.88	1.60	.37	.01	.05	.09	556	.76	328	28	816	7.9
Mar. 27	a60	34	4.34	2.88	3.35	.16	8.01	2.33	.26	--	.05	.13	--	--	--	31	919	8.1
Mar. 28	a127	--	4.14	3.10	3.57	--	3.87	2.56	--	--	--	--	--	--	--	33	962	7.6
Mar. 29	190	12	1.05	.67	.83	.06	1.80	.65	.14	.00	.06	.05	180	.24	46	32	244	8.1
Mar. 30-Apr. 6	3,540	16	1.60	1.16	1.30	.21	2.75	1.21	.25	.01	.07	.07	266	.36	1,270	30	412	7.6
Apr. 7-10	7,090	14	1.25	.79	1.22	.18	1.98	1.17	.14	.01	.06	.08	224	.30	2,130	35	340	7.8
Apr. 11-12	4,740	13	1.20	.84	1.83	.18	2.46	1.39	.14	.01	.07	.10	264	.36	1,710	45	399	8.2
Apr. 13-17	5,750	14	1.40	.96	1.91	.19	2.72	1.48	.17	.01	.06	.13	282	.38	2,190	43	427	8.3
Apr. 18-May 16	9,600	20	2.20	2.00	3.57	.21	4.83	2.62	.37	.02	.04	.26	504	.69	6,620	45	736	8.0
May 17-June 16	3,850	25	3.04	2.78	4.61	.20	7.11	3.00	.45	.02	.04	.28	630	.86	3,310	43	935	7.9
June 17-July 14	2,880	21	2.64	2.90	6.00	.21	7.37	3.58	.51	.02	.03	.33	690	.94	2,710	51	1,020	8.0
July 15-Aug. 13	383	17	2.45	2.67	5.91	.20	7.46	3.21	.48	.02	.03	.36	664	.90	345	53	988	8.0
Aug. 14-31	111	21	2.40	2.00	3.48	.14	5.80	1.94	.31	.01	.03	.22	471	.64	71	43	736	8.0
Sept. 1-30	688	15	2.15	2.23	4.78	.20	6.72	2.29	.45	.01	.03	.32	546	.74	509	51	851	8.1
Total or weighted average b	40,140	18	1.90	1.56	2.78	0.19	4.10	2.00	0.28	0.01	0.05	0.18	402	0.55	21,940	43	600	--

a Not included in total. b For period sampled only.

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, 7 miles west of Williston, Williams County, and 25 miles downstream from the Yellowstone River.
DRAINAGE AREA.--164,500 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951.
Water temperatures: October 1950, May to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 864 micromhos Mar. 20; minimum, 320 micromhos June 24.
Percent sodium: Maximum, 39 Apr. 8, May 1-31; minimum, 33 Feb. 1-28.
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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 5, 1950, Sta. 120	24,990	17	3.34	2.10	3.04	0.09	3.54	4.73	0.31	0.03	0.03	0.10	544	0.74	a17,740	35	798	8.2
Dec. 5, Sta. 220	b24,990	14	3.19	2.07	2.87	.10	3.44	4.54	.34	.04	.03	.10	510	.69	--	35	770	8.1
Dec. 5, Sta. 500	b24,990	17	3.14	1.98	2.91	.10	c3.43	4.35	.31	.04	.02	.10	508	.69	--	36	747	8.2
Dec. 6-31	701,000	17	3.24	1.94	2.65	.08	3.41	4.33	.31	.03	.03	.18	522	.71	497,700	34	721	7.7
Jan. 1-31, 1951	788,800	14	3.29	1.97	2.70	.09	3.43	4.33	.31	.03	.03	.17	526	.72	567,900	34	718	7.8
Jan. 3, Sta. 140 d	29,550	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	716	--
Jan. 3, Sta. 200 d	29,550	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	710	--
Jan. 3, Sta. 300 d	29,550	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	701	--
Jan. 3, Sta. 950 d	29,550	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	702	--
Feb. 1-28	739,200	14	3.09	1.89	2.52	.09	3.33	4.10	.28	.03	.03	.15	502	.68	502,700	33	691	7.8
Mar. 1-21	443,300	15	3.19	2.17	2.87	.08	3.28	4.73	.34	.03	.04	.16	522	.71	314,700	35	777	8.1
Mar. 2, Sta. 120 d	24,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	699	--
Mar. 2, Sta. 200 d	24,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	699	--
Mar. 2, Sta. 550 d	24,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	703	--
Mar. 22-27	236,400	13	2.94	1.46	2.30	.10	2.65	3.91	.28	.02	.07	.11	436	.59	139,500	34	642	8.2
Mar. 28-31	289,600	10	2.00	1.12	1.65	.10	2.20	2.33	.11	.01	.05	.09	304	.41	118,700	34	471	7.9

a Mean for cross section.
b Not included in total.
c Includes 0.20 equivalents per million carbonate (CO_3).
d Not included in total or weighted average.

Apr. 1-7	448,300	10	2.10	1.46	1.91	.09	2.20	3.10	.25	.02	.04	.09	360	.49	219,700	34	528	8.2
Apr. 8, Sta. 1,000	109,100	11	2.15	1.13	2.13	.12	2.43	2.91	.17	.03	.06	.08	368	.50	54,550	39	530	8.0
Apr. 9-30	1,246,000	12	2.40	1.56	2.35	.10	2.79	3.23	.23	.02	.03	.13	426	.58	722,700	37	606	8.0
Apr. 26, Sta. 710 d	44,430	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	662	--
Apr. 28, Sta. 880 d	44,430	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	658	--
Apr. 26, Sta. 890 d	44,430	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	660	--
Apr. 26, Sta. 978 d	44,430	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	661	--
May 1-31	1,948,000	15	2.30	1.22	2.30	.08	2.59	2.96	.21	.02	.04	.09	370	.50	974,000	39	559	7.8
June 1-30	2,443,000	15	1.65	.89	1.43	.05	1.97	2.02	.14	.02	.03	.05	272	.37	903,900	36	399	8.0
June 7, Sta. 560 d	80,530	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	445	--
June 7, Sta. 860 d	80,530	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	443	--
June 7, Sta. 890 d	80,530	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	438	--
June 7, Sta. 1,000 d	80,530	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	441	--
July 1-31	2,052,000	15	1.90	.82	1.61	.06	2.13	2.06	.16	.02	.02	.12	275	.37	759,200	37	425	7.7
Aug. 1-31	2,218,000	13	2.35	1.33	2.04	.08	2.61	2.96	.23	.03	.02	.12	358	.49	1,087,000	35	554	7.6
Sept. 1-30	2,070,000	13	2.84	1.42	2.39	.08	2.88	3.56	.25	.03	.02	.13	418	.57	1,180,000	36	640	7.8
Sept. 3, Sta. 580 d	74,380	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	630	--
Sept. 3, Sta. 870 d	74,380	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	626	--
Sept. 3, Sta. 890 d	74,380	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	622	--
Sept. 3, Sta. 1,015 d	74,380	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	628	--
Total or weighted average e	15,760,000	14	2.40	1.32	2.09	0.08	2.61	3.04	0.22	0.03	0.03	0.11	376	0.51	6,060,000	35	557	--

d Not included in total or weighted average.

e For period sampled only.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.

LOCATION.--At bridge on U. S. Highway 14 at Pierre, Hughes County, 1½ miles upstream from Bad River.
DRAINAGE AREA.--243,500 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951.
Water temperatures: May to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 975 micromhos Mar. 28; minimum, 394 micromhos July 3.
Percent sodium: Maximum, 41 Apr. 23, May 8, Sept. 13; minimum, 31 Apr. 8.
REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples and periodic nitrogen cycle determinations available in regional office at Lincoln, Nebr. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 3, 1950, Sta. 600 a	53,750	11	3.04	1.55	2.91	0.12	2.95	4.21	0.28	0.03	0.04	0.30	474	0.64	b 34,940	38	702	7.9
Oct. 3, Sta. 950 a	53,750	11	3.04	1.55	2.96	.12	2.95	4.25	.34	.03	.03	.24	474	.64	--	39	705	7.9
Oct. 3, Sta. 1,200 a	53,750	11	3.04	1.62	2.91	.11	2.95	4.37	.31	.03	.03	.30	476	.65	--	38	709	7.9
Oct. 3, Sta. 1,350 a	53,750	12	3.04	1.66	3.00	.13	2.95	4.46	.31	.03	.03	.20	490	.67	--	38	719	7.8
Nov. 3, Sta. 600 a	70,210	8.9	2.79	1.78	2.52	.10	3.02	3.68	.25	.03	.01	.30	448	.61	b 42,830	35	666	8.0
Nov. 3, Sta. 900 a	70,210	11	2.79	1.78	2.48	.10	3.00	3.66	.25	.03	.01	.30	446	.61	--	35	670	7.8
Nov. 3, Sta. 1,200 a	70,210	9.2	2.79	1.78	2.52	.09	2.98	3.81	.25	.03	.02	.30	452	.61	--	35	671	8.0
Nov. 3, Sta. 1,350 a	70,210	9.0	2.79	1.80	2.48	.11	3.02	3.77	.25	.03	.02	.30	450	.61	--	35	678	7.9
Jan. 8, 1951, Sta. 1/8	34,310	11	3.24	2.00	2.78	.11	3.47	4.37	.31	.03	.03	--	514	.70	b 24,020	34	787	8.0
Jan. 8, Sta. 3/8	c 34,310	11	3.29	1.87	2.83	.09	3.47	4.27	.31	.03	.03	.17	510	.69	--	35	772	8.0
Jan. 8, Sta. 5/8	c 34,310	10	3.24	2.12	2.91	.09	3.47	4.37	.31	.03	.02	--	514	.70	--	35	781	7.8
Jan. 8, Sta. 7/8	c 34,310	7.8	3.29	2.07	2.87	.10	3.51	4.54	.34	.03	.03	--	510	.69	--	34	792	7.9
Jan. 9-31	638,500	13	2.89	2.47	2.87	.10	3.57	4.43	.31	.01	.02	.17	526	.72	459,700	34	782	8.0

a Not included in total or weighted average.
b Mean for cross section.
c Not included in total.

Feb. 1-9	242,600	15	3.44	1.84	2.83	.09	3.54	4.50	.34	.01	.03	.17	532	.72	174,700	35	773	7.6
Feb. 10-28	465,500	13	3.34	1.94	2.74	.09	3.51	4.27	.34	.01	.02	.13	526	.72	335,200	34	758	8.1
Feb. 15, Sta. L 140 a	23,210	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	779	--
Feb. 15, Sta. L 260 a	23,210	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	782	--
Feb. 15, Sta. R 130 a	23,210	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	781	--
Feb. 15, Sta. R 330 a	23,210	12	3.49	1.89	2.83	.09	3.57	4.54	.31	.03	.03	--	524	.71	16,480	34	782	7.9
Mar. 1-3	96,990	17	3.39	1.89	3.17	.10	3.61	4.62	.34	.03	.04	.13	540	.73	70,800	37	793	7.8
Mar. 6-9	137,900	18	3.24	1.89	2.78	.10	3.38	4.25	.31	.03	.04	.16	500	.68	93,770	35	734	8.0
Mar. 14 a	28,980	10	2.89	1.85	2.65	.09	3.15	4.00	.28	.03	.03	--	472	.64	18,530	35	703	8.0
Mar. 14-16	82,310	13	2.94	1.86	2.74	.09	3.21	3.91	.31	.03	.04	.15	478	.65	53,500	36	708	7.8
Mar. 21-23	63,870	12	3.09	1.95	2.78	.09	3.28	4.18	.31	.03	.03	.14	494	.87	42,790	35	732	7.8
Mar. 27-Apr. 3	522,800	14	3.39	1.59	2.96	.12	3.05	4.50	.28	.02	.04	.13	512	.70	366,000	37	748	7.9
Apr. 4-5	284,600	11	2.69	1.23	2.09	.09	2.87	2.91	.20	.02	.05	.11	376	.51	145,100	34	574	7.9
Apr. 6	216,200	12	2.45	1.05	1.83	.07	2.90	2.17	.13	.02	.06	.10	332	.45	97,290	34	506	7.7
Apr. 8	210,200	13	2.30	1.07	1.57	.09	2.85	1.89	.11	.02	.08	.08	302	.41	86,180	31	455	7.8
Apr. 9	168,800	13	2.15	.82	1.57	.09	2.75	1.83	.14	--	.08	.09	304	.41	89,210	34	448	7.7
Apr. 10-11	409,800	10	2.20	.92	1.52	.07	2.69	1.79	.11	.01	.05	.08	302	.41	168,000	32	445	7.7
Apr. 18-30	804,100	12	2.40	1.34	2.39	.09	2.84	3.08	.21	.02	.04	.12	408	.55	442,300	38	593	7.9
Apr. 23, Sta. 500 a	63,470	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	583	--
Apr. 23, Sta. 820 a	63,470	7.3	2.20	1.20	2.39	.08	2.56	3.02	.23	.02	.03	--	366	.50	31,740	41	562	7.8
Apr. 23, Sta. 1,200 a	63,470	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	568	--
Apr. 23, Sta. 1,350 a	63,470	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	570	--
May 1-31	1,794,000	13	2.45	1.53	2.78	.11	2.95	3.56	.24	.03	.02	.13	468	.63	1,130,000	40	650	7.9
May 8, Sta. 450 a	58,710	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	678	--
May 8, Sta. 895 a	58,710	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	679	--
May 8, Sta. 1,075 a	58,710	9.8	2.54	1.62	3.00	.13	3.15	4.04	.25	.02	.02	--	488	.63	36,990	41	684	8.0
May 8, Sta. 1,330 a	58,710	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	687	--
June 1-30	2,682,000	17	2.15	1.05	2.04	.11	2.62	2.60	.17	.02	.04	.13	338	.46	1,225,000	38	517	7.5
July 1-23	1,661,000	15	1.85	.95	1.65	.08	2.23	2.14	.14	.03	.03	.12	288	.39	647,800	36	444	7.4
July 9, Sta. 440 a	66,640	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	421	--
July 9, Sta. 750 a	66,640	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	429	--
July 9, Sta. 1,000 a	68,640	13	1.80	.88	1.87	.11	2.02	2.42	.16	.02	.03	--	296	.40	28,660	40	452	8.2
July 9, Sta. 1,315 a	66,640	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	459	--
July 29-Aug. 31	2,435,000	14	2.10	1.10	2.00	.09	2.34	2.81	.18	.02	.03	.12	336	.46	1,120,000	38	518	7.5
Aug. 8, Sta. 410 a	68,430	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	436	--
Aug. 8, Sta. 710 a	68,430	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	439	--
Aug. 8, Sta. 965 a	68,430	12	1.80	.98	1.61	.09	1.93	2.46	.16	.02	.03	--	298	.41	28,080	36	448	8.0
Aug. 8, Sta. 1,300 a	68,430	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	454	--

a Not included in total or weighted average.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons			
Sept. 1-30, 1951	2,298,000	11	2.50	1.46	2.70	0.10	2.79	3.62	0.23	0.03	0.03	0.14	418	0.57	1,310,000	40	637	7.4
Sept. 13, Sta. 410 a	76,560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	634	--
Sept. 13, Sta. 585 a	76,560	12	2.50	1.46	2.78	.12	2.75	3.79	.21	.01	.04	--	428	.58	44,400	41	641	7.7
Sept. 13, Sta. 1,385 a	76,560	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	652	--
Total or weighted average [d]	15,230,000	14	2.40	1.32	2.30	0.10	2.74	3.10	0.21	0.02	0.03	0.13	389	0.53	8,060,000	38	581	--

a Not included in total or weighted average.

d For period sampled only.

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.
RECORDS AVAILABLE.--Chemical analyses: January to September 1951.
Water temperatures: May to September 1951.
EXTREMES, 1951.--Specific conductance: Maximum, 870 micromhos Jan. 7, Feb. 8; minimum, 361 micromhos Mar. 29.
Percent sodium: Maximum, 34 Jan. 4-31, June 9-19; minimum, 18 Mar. 27-29.
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 1950 to September 1951 given in Water-Supply Paper 1210.

Chemical analyses, January to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 4, 1951, Sta. 175 a	42,450	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	795	--
Jan. 4, Sta. 225 a	42,450	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	799	--
Jan. 4, Sta. 300 a	42,450	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	800	--
Jan. 4, Sta. 375 a	42,450	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	802	--
Jan. 4, Sta. 600 a	42,450	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	804	--
Jan. 4-31	1,152,000	22	3.34	2.10	2.91	0.15	3.74	3.96	0.68	0.03	0.06	0.13	532	0.72	829,400	34	798	8.1
Feb. 1-28	1,191,000	21	3.29	1.83	2.61	.13	3.61	3.44	.68	.03	.06	.10	514	.70	833,700	33	747	7.9
Mar. 1-24	1,356,000	21	3.04	1.60	2.22	.14	3.31	3.14	.56	.02	.07	.10	456	.62	840,700	32	659	7.9
Mar. 25-26	242,800	18	2.69	1.15	1.30	.16	2.98	1.83	.31	.01	.09	.06	332	.45	109,300	25	505	7.8
Mar. 27-29	837,000	13	2.74	.94	.87	.16	2.98	1.42	.20	.01	.10	.10	280	.38	318,100	18	442	7.8
Mar. 30-Apr. 17	4,453,000	13	2.45	1.23	1.48	.13	2.69	2.08	.25	.02	.09	.09	348	.47	2,093,000	28	498	7.9
Apr. 18-20	542,100	13	2.79	1.25	1.70	.12	3.08	2.48	.27	.02	.09	.06	382	.52	281,900	29	555	7.5
Apr. 21-29	1,148,000	15	2.89	1.23	1.74	.14	3.15	2.46	.37	.02	.09	.07	410	.56	642,900	29	569	7.7
Apr. 30-May 3	720,000	16	3.24	1.24	1.22	.16	3.67	1.85	.27	.02	.06	.08	378	.51	367,200	21	545	7.3
May 4-31	3,357,000	19	3.19	1.49	2.09	.16	3.41	3.08	.37	.02	.09	.08	428	.58	1,947,000	30	652	7.6
June 1-2	529,600	14	2.89	.99	1.22	.16	3.16	1.58	.31	.02	.05	.08	316	.43	227,700	23	478	7.5
June 3-5	630,000	16	2.79	1.07	1.57	.16	2.98	2.21	.28	.02	.11	.08	348	.47	296,100	28	533	7.4
June 6-8	554,600	17	3.04	1.34	1.83	.16	3.08	2.91	.34	.02	.10	.13	396	.54	299,500	29	599	7.3
June 9-19	1,787,000	17	2.64	1.20	2.09	.16	2.95	2.66	.31	.02	.09	.09	374	.51	911,400	34	575	7.7
June 20-22	564,500	15	2.59	1.05	1.30	.15	2.92	1.83	.25	.02	.11	.06	314	.43	242,700	26	483	7.6
June 23-28	901,300	15	2.84	1.14	1.61	.16	2.85	2.56	.31	.02	.10	.08	356	.48	432,600	28	547	7.4
June 29-July 31	4,728,000	19	2.84	1.16	1.74	.15	3.10	2.39	.34	.02	.09	.09	369	.50	2,364,000	30	560	7.6
Aug. 1-31	3,890,000	17	2.54	1.06	1.57	.14	2.75	2.21	.34	.02	.08	.04	338	.46	1,789,000	30	519	7.7
Sept. 1-30	3,760,000	16	2.79	1.35	2.04	.14	3.05	2.77	.34	.03	.06	.08	395	.54	2,030,000	32	602	7.7
Total or weighted average b	32,340,000	17	2.84	1.32	1.83	0.15	3.06	2.54	0.37	0.02	0.08	0.08	384	0.52	16,860,000	30	575	--

a Not included in total or weighted average.
b For period sampled only.

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.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951.
Water temperatures: December 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,210 micromhos Feb. 2; minimum, 140 micromhos June 19.
Percent sodium: Maximum, 37 Dec. 1; minimum, 16 May 20.
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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 11, 1950 a	10,550	12	1.75	1.07	1.13		2.29	1.37	0.25	0.03	0.01	--	240	0.33	3,480	29	381	7.8
Nov. 3 a	10,430	12	1.70	1.04	1.12		2.21	1.44	.18	.02	.01	--	238	.32	3,340	29	368	7.7
Dec. 1 a	8,910	5.6	.70	.34	.61		.82	.65	.09	.06	.03	--	102	.14	1,250	37	168	7.0
Dec. 15-31	131,400	15	1.95	1.07	1.13	0.06	2.44	1.67	.20	.02	.03	0.18	272	.37	48,620	27	401	7.5
Jan. 1-30, 1951	167,300	16	2.34	.96	1.30	.08	2.65	1.81	.25	.02	.03	.24	294	.40	66,920	28	449	7.7
Jan. 5 a	5,450	13	2.10	1.10	1.45		2.64	1.77	.20	.02	.02	--	274	.37	2,020	31	455	7.9
Jan. 31-Feb. 28	201,900	15	2.54	1.12	1.43	.09	2.72	2.23	.21	.02	.05	.24	332	.45	90,860	28	497	7.5
Feb. 2 a	5,950	20	5.34	4.18	3.79		5.28	7.97	.03	.03	.00	--	868	1.18	7,020	28	1,210	7.5
Mar. 1-21	106,400	17	2.25	1.17	1.35	.07	2.59	2.02	.25	.02	.05	.27	306	.42	44,690	28	475	7.6
Mar. 7 a	2,780	16	2.79	1.21	1.84		3.02	2.48	.28	.03	.03	--	370	.50	1,390	32	551	7.5
Mar. 22-23	28,900	15	1.95	.93	1.17	.06	2.44	1.58	.21	.02	.02	.17	254	.35	10,120	28	407	7.7
Mar. 24-31	95,390	15	2.15	.87	1.04	.09	2.64	1.31	.18	.00	.07	.16	266	.36	34,340	25	405	7.5
Apr. 1-30	272,200	14	1.85	.91	1.00	.06	2.38	1.31	.20	.01	.02	.15	232	.32	87,100	26	380	7.7
Apr. 6 a	9,360	12	1.95	.85	1.28		2.39	1.42	.21	.02	.04	--	246	.33	3,090	31	383	7.7

a Not included in total or weighted average.

May 1-8	104,200	16	1.75	.79	.87	.06	2.20	1.17	.16	.02	.04	.13	224	.30	31,260	25	344	7.7
May 9-19	253,100	16	1.35	.43	.48	.05	1.67	.56	.11	.02	.03	.11	158	.21	53,150	21	234	7.5
May 15 a	22,810	14	1.20	.42	.67		1.44	.65	.13	.02	.05	--	146	.20	4,560	29	214	7.3
May 20	38,080	18	1.50	.39	.37	.06	1.93	.33	.03	.01	.05	.05	154	.21	8,000	16	212	7.4
May 21-22	71,010	16	1.05	.27	.35	.04	1.29	.40	.03	.01	.03	.07	124	.17	12,070	20	172	7.7
May 23	34,510	15	1.05	.35	.33	.05	1.41	.33	.03	.01	.03	.05	130	.18	6,210	19	177	7.3
May 24-June 2	505,000	14	1.05	.25	.32	.03	1.18	.42	.07	.01	.03	.04	120	.16	80,800	19	167	7.4
June 3-12	302,100	13	1.50	.06	.52	.04	1.41	.63	.10	.01	.03	.07	142	.19	57,400	25	216	7.5
June 13-16	168,000	12	.90	.36	.38	.05	1.21	.42	.08	.01	.03	.06	122	.17	28,560	22	170	7.5
June 17-19	216,400	11	.90	.24	.29	.04	1.08	.33	.07	.01	.03	.03	104	.14	30,300	20	147	7.3
June 19 a	68,630	11	.80	.26	.45		1.05	.37	.06	.01	.02	--	96	.13	8,920	30	140	7.3
June 20-24	256,500	12	.80	.30	.35	.03	1.05	.37	.08	.01	.02	.06	106	.14	35,910	24	153	7.4
June 25-30	213,800	13	.95	.27	.43	.04	1.15	.46	.08	.01	.02	.08	122	.17	36,350	25	174	7.7
July 1-4	145,400	12	.80	.42	.43	.04	1.18	.40	.08	.02	.01	.10	110	.15	21,810	25	174	7.3
July 5	45,220	11	1.05	.15	.39	.04	1.18	.37	.06	.01	.03	.09	122	.17	7,690	24	161	7.2
July 6-21	631,100	13	.85	.37	.48	.04	1.20	.40	.08	.02	.02	.09	116	.16	101,000	28	178	7.4
July 17 a	37,880	9.8	.85	.39	.49		1.18	.44	.08	.01	.02	--	111	.15	5,680	28	172	7.2
July 22	40,070	16	.80	.44	.48	.04	1.28	.42	.08	.01	.02	.09	136	.18	7,210	27	173	8.1
July 23-Aug. 11	527,200	13	.95	.53	.61	.05	1.43	.60	.11	.03	.02	.13	138	.19	100,200	29	218	7.5
Aug. 12-25	245,300	14	1.35	.69	.87	.06	1.87	.92	.16	.02	.02	.10	181	.25	61,330	29	295	7.4
Aug. 15 a	20,830	12	1.45	.65	.86		1.92	.90	.11	.01	.02	--	184	.25	5,210	29	297	7.2
Aug. 26	14,540	15	2.10	.06	.91	.07	2.00	1.02	.14	.02	.02	.15	214	.29	4,220	29	309	7.7
Aug. 27-31	67,700	14	1.55	.69	1.00	.06	2.03	1.08	.17	.02	.02	.14	201	.27	18,280	30	326	7.9
Sept. 1-30	318,100	13	1.75	.87	1.13	.07	2.23	1.33	.18	.02	.02	.15	231	.31	98,610	30	373	7.9
Sept. 17 a	9,820	11	1.75	.99	1.37		2.72	1.19	.17	.02	.01	--	246	.33	3,240	33	381	6.9
Total or weighted average b	5,201,000	14	1.30	0.53	0.65	0.05	1.64	0.79	0.12	0.02	0.03	0.11	167	0.23	1,183,000	26	255	--

a Not included in total or weighted average.
b For period sampled only.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At gaging station at highway bridge 2 miles south of Sidney, Richland County, and 30 miles upstream from mouth.
DRAINAGE AREA.--69,450 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951.
Water temperatures: January to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,780 micromhos Jan. 14; minimum, 288 micromhos June 21.
Percent sodium: Maximum, 39 Aug. 1-31; minimum, 28 June 17-25.
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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 4, 1950 a	22,020	14	3.09	1.53	2.87	0.08	2.92	4.41	0.25	0.03	0.03	0.20	490	0.67	14,750	38	700	8.1
Dec. 13 a	14,880	14	3.94	2.44	3.61	.12	3.82	5.83	.39	.02	.05	.10	636	.86	12,800	36	891	8.2
Jan. 3-31, 1951	292,200	17	4.64	2.04	3.52	.12	4.13	6.00	.48	.01	.06	.22	678	.92	268,800	34	955	7.6
Feb. 1-10	49,980	18	4.79	2.41	3.78	.12	4.46	6.35	.45	.01	.07	.22	714	.97	48,480	34	1,010	7.4
Feb. 11-28	286,000	13	3.54	1.86	2.87	.15	3.31	4.79	.39	.01	.08	.28	550	.75	214,500	34	797	7.3
Mar. 1-24	287,600	15	4.04	2.28	3.44	.11	3.67	5.43	.42	.03	.08	.19	626	.85	244,500	35	918	7.6
Mar. 25-28	130,900	9.0	1.65	1.43	1.48	.26	2.65	1.96	.17	.02	.10	.12	308	.42	54,980	31	459	7.3
Mar. 29-Apr. 6	427,400	11	2.79	1.71	2.17	.13	3.08	3.33	.25	.02	.07	.11	426	.58	247,900	32	634	7.6
Apr. 7-30	451,800	14	3.04	1.92	2.78	.08	3.10	4.27	.34	.02	.04	.13	496	.67	302,700	36	727	7.8
May 1-21	550,600	14	2.35	1.41	2.09	.07	2.51	3.04	.24	.02	.03	.12	380	.52	286,300	35	568	7.8
May 22-31	538,300	14	1.70	.76	1.13	.05	1.97	1.52	.16	.02	.04	.09	238	.32	172,300	31	357	7.7
June 1-9	677,600	17	1.90	.66	1.30	.06	2.08	1.79	.13	.02	.05	.08	262	.36	243,900	33	392	7.4
June 10-16	314,000	16	2.10	.68	1.48	.05	2.06	2.10	.16	.02	.04	.08	286	.39	122,500	34	423	7.7
June 17-25	721,800	14	1.65	.55	.87	.05	1.80	1.27	.11	.02	.04	.05	210	.29	209,300	28	313	7.7
June 26-July 2	418,100	15	1.65	.63	1.04	.05	1.75	1.58	.11	.01	.04	.13	230	.31	129,600	31	340	7.7
July 3-31	1,554,000	14	1.65	.65	1.30	.06	1.77	1.79	.13	.01	.04	.08	244	.33	512,800	36	367	7.6
Aug. 1-31	955,400	14	2.20	1.08	2.13	.08	2.43	2.85	.21	.02	.03	.15	350	.48	458,600	39	540	7.6
Sept. 1-30	589,000	14	3.24	1.78	3.13	.10	2.95	5.02	.31	.02	.05	.19	533	.72	424,100	36	787	7.5
Total or weighted average b	8,245,000	14	2.35	1.15	1.87	0.08	2.41	2.79	0.21	0.02	0.05	0.12	352	0.48	3,941,000	34	522	--

a Not included in total or weighted average.

b For period sampled only.

BIGHORN RIVER AT THERMOPOLIS, WYO.

LOCATION.--At Broadway Street bridge at Thermopolis, Hot Springs County, upstream from principal hot springs inflow and half a mile downstream from small tributary. Water discharge measurements made at this site.
DRAINAGE AREA.--8,080 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1947 to September 1951.
Water temperatures: April 1947 to September 1951.
Sediment records: March 1946 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,220 micromhos Sept. 8; minimum, 259 micromhos June 22.
Percent sodium: Maximum, 43 Aug. 15-31, Sept. 4; minimum, 21 May 30.
EXTREMES, 1947-49, 50-51.--Specific conductance: Maximum, 1,270 micromhos Apr. 26, 1947; minimum, 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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 4, 1950 a	3,970	--	3.54	1.14	2.91	--	2.62	4.33	0.34	--	0.04	0.20	494	0.67	2,660	39	646	--
Oct. 9 a	3,590	13	2.79	1.64	2.54		2.65	3.89	.39	0.01	.03	--	458	.62	2,230	36	668	7.7
Nov. 2 a	2,720	10	3.04	1.78	2.65		2.88	4.21	.34	.02	.02	--	478	.65	1,770	35	697	7.9
Dec. 13 a	2,120	12	3.39	1.85	3.25		3.02	5.02	.39	.02	.04	--	534	.73	1,550	38	806	7.7
Jan. 1-27, 1951	42,180	--	3.79	2.09	3.44	0.07	3.44	5.23	.45	.02	.03	.06	636	.66	36,270	37	904	--
Jan. 8 a	1,520	13	3.74	1.94	3.51		3.23	5.48	.42	.02	.04	--	584	.79	1,200	38	870	7.7
Jan. 28	1,430	--	3.54	1.74	2.83	--	3.44	4.64	.42	--	.05	.53	554	.75	1,070	33	786	8.0
Jan. 29-Feb. 28	56,150	--	3.54	1.70	2.83	.07	3.11	4.39	.39	.02	.04	.03	550	.75	42,110	35	783	--
Feb. 6 a	2,520	12	3.19	1.63	2.91		2.98	4.33	.37	.02	.03	--	488	.66	1,660	38	731	7.8
Mar. 1-31	62,510	--	3.44	1.88	3.09	--	2.95	5.20	.39	--	.05	.08	555	.75	46,680	36	804	8.0
Mar. 1 a	1,850	11	3.54	1.66	3.10		3.06	4.79	.39	.02	.04	--	528	.72	1,330	37	784	7.4
Apr. 1-30	69,560	--	3.29	1.91	3.04	--	2.98	5.02	.34	--	.05	.10	541	.74	51,470	36	786	7.8
Apr. 3 a	1,940	10	4.14	1.76	3.42		3.23	5.56	.45	.02	.06	--	634	.86	1,670	37	893	7.6

a Not included in total or weighted average.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT THERMOPOLIS, WYO.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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 1-19, 1951	77,140	--	2.89	1.43	2.48	--	2.62	4.10	0.28	--	0.05	0.12	455	0.62	47,830	35	664	7.2
May 7 a	4,400	11	3.49	1.77	3.00		2.88	4.98	.34	0.02	.04	--	528	.72	3,170	36	787	7.8
May 20-24	47,030	--	2.30	1.04	1.70	--	2.15	2.79	.16	--	.06	.06	342	.47	22,100	33	502	7.3
May 25-29	74,680	--	1.55	.65	.74	--	1.69	1.17	.08	--	.03	.16	201	.27	20,160	25	300	7.3
May 30	20,030	--	2.10	.62	.74	--	2.36	1.00	.11	--	.03	.02	222	.30	6,010	21	332	7.8
May 31	21,620	--	1.90	.66	.83	--	2.20	1.10	.11	--	.03	.06	222	.30	6,490	24	331	7.9
June 1-2	38,260	--	1.55	.55	.78	--	1.74	1.12	.08	--	.03	.15	206	.28	10,710	26	288	7.8
June 3-17	162,700	--	1.90	.72	1.09	--	2.00	1.73	.13	--	.04	.07	252	.34	55,320	28	374	8.1
June 7 a	9,500	13	2.10	.84	1.44		2.16	2.04	.14	.01	.03	--	272	.37	3,520	33	416	7.8
June 18-21	82,190	--	1.60	.52	.65	--	1.82	1.02	.07	--	.03	.07	192	.26	21,370	22	282	8.0
June 22-24	42,150	--	1.60	.48	.83	--	1.67	1.21	.08	--	.03	.09	201	.27	11,380	28	293	7.9
June 25-July 21	262,700	--	1.65	.67	1.17	--	1.59	1.87	.13	--	.02	.06	242	.33	86,690	32	358	7.7
July 10 a	10,120	11	1.95	.59	1.22		1.90	1.69	.13	.02	.02	--	229	.31	3,140	32	359	7.7
July 22-23	26,320	--	2.05	.71	1.57	--	1.92	2.37	.14	--	.04	.06	296	.40	10,530	35	438	7.9
July 24-31	67,700	--	2.00	.76	1.48	--	1.74	2.44	.16	--	.03	.09	287	.39	26,400	34	433	7.8
July 30 a	8,270	12	2.50	.86	1.72		2.16	2.66	.20	.03	.03	--	329	.45	3,720	34	498	7.6
Aug. 1-14	95,500	--	2.20	.86	1.78	--	1.97	2.81	.21	--	.03	.05	326	.44	42,020	37	492	7.5
Aug. 15-31	46,670	--	3.09	1.49	3.52	--	2.59	5.14	.39	--	.03	.11	544	.74	34,540	43	791	8.0
Sept. 1-30	73,160	--	3.69	1.79	3.91	--	2.95	6.16	.42	--	.04	.08	644	.88	64,380	42	918	7.8
Sept. 4 a	2,920	11	3.39	1.57	3.81		2.82	5.50	.39	.02	.04	--	570	.78	2,280	43	828	7.4
Total or weighted average b	1,370,000	--	2.30	0.99	1.78	--	2.16	2.83	0.21	--	0.03	0.08	346	0.47	643,700	34	506	--

a Not included in total or weighted average.
b For period sampled only.

BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At bridge on U. S. Highway 10 and 12, three-quarters of a mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 3½ miles downstream from gaging station near Custer.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951.
Water temperatures: April 1949 to September 1951.
Sediment records: July 1947 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,270 micromhos Feb. 2; minimum, 235 micromhos Feb. 11.
Percent sodium: Maximum, 43 Sept. 1-30; minimum 29 Feb. 11.
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. Chemical analyses 1946-48 published under Bighorn River near Custer, Mont. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 2, 1950 a	9,180	13	4.04	2.32	4.31	0.09	3.21	6.97	0.39	0.01	0.05	0.10	696	0.95	8,720	40	985	7.7
Oct. 3 a	9,080	16	4.74	1.94	4.35	.10	3.64	7.04	.39	.01	.06	.20	708	.96	8,720	39	994	7.7
Dec. 4 a	6,410	17	4.49	2.71	4.35	.17	4.00	7.66	.42	.01	.04	.14	784	1.07	6,860	37	1,090	7.8
Jan. 5-8, 1951	17,450	15	5.24	2.72	4.61	.07	4.20	7.70	.48	.02	.07	.18	830	1.13	19,720	36	1,130	8.0
Jan. 23	4,560	17	4.04	3.24	4.04	.09	3.93	5.83	1.55	.02	.06	.13	786	1.07	4,880	35	1,010	8.0
Jan. 24-25	8,530	14	4.59	2.01	3.43	.05	3.61	5.93	.42	.02	.06	.14	682	.93	7,930	34	938	8.0
Feb. 1-10	47,010	16	5.79	2.85	4.48	.12	4.62	7.56	.54	.02	.07	.19	860	1.17	55,000	34	1,170	8.0
Feb. 11	5,950	8.4	1.00	.52	.70	.19	1.57	.73	.03	.01	.04	.06	168	.23	1,370	29	235	7.6
Feb. 14-15	10,710	11	4.34	1.74	3.74	.07	3.44	5.83	.42	.02	.08	.13	672	.91	9,750	38	922	7.7
Feb. 16-28	70,020	12	4.34	1.94	3.52	.07	3.28	6.00	.40	.02	.07	.13	690	.94	65,820	36	920	8.0
Mar. 7-15	38,080	13	4.89	2.43	3.87	.13	3.87	6.66	.48	.02	.06	.17	768	1.04	39,600	34	920	7.9
Mar. 16-17	13,090	10	3.64	1.72	2.78	.10	2.85	5.00	.31	.02	.06	.20	540	.73	9,560	34	782	7.7
Mar. 18	5,950	19	7.68		4.48	.09	b4.14	7.70	.45	--	.07	.20	768	1.04	6,190	37	1,060	8.2
Mar. 26-28	30,350	9.7	3.19	2.05	2.65	.19	2.72	5.10	.27	.02	.06	.13	546	.74	22,460	33	747	7.6
Mar. 29-30	22,810	12	3.99	1.61	3.17	.09	2.95	5.37	.34	.02	.06	.14	622	.85	19,390	36	840	8.1
Mar. 31-Apr. 6	53,280	13	4.29	2.35	4.00	.08	3.51	6.52	.42	.02	.05	.08	738	1.00	53,280	37	984	7.8

a Not included in total or weighted average.
b Includes 0.27 equivalents per million of carbonate (CO_3).

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 7-22, 1951	94,250	16	4.24	2.70	3.96	0.09	3.61	7.18	0.45	0.03	0.05	0.13	722	0.98	92,370	36	1,020	7.8
Apr. 23-May 24	331,400	16	3.04	1.66	3.00	.06	2.77	4.46	.31	.02	.05	.08	506	.69	228,700	39	743	7.9
May 25-29	103,800	16	2.40	1.10	1.91	.05	2.34	3.00	.20	.02	.06	.07	366	.50	51,900	35	540	7.7
May 30-June 22	611,800	18	2.30	1.08	1.78	.06	2.36	2.71	.16	.02	.05	.06	354	.48	293,700	34	510	7.9
June 23	29,750	24	2.10	.92	1.74	.05	2.25	2.21	.14	.01	.03	.29	304	.41	12,200	36	449	7.7
June 24-30	153,300	19	2.25	1.03	1.70	.05	2.23	2.69	.16	.02	.03	.08	342	.47	72,050	34	501	7.5
July 1-31	581,500	17	2.35	1.09	2.22	.06	2.16	3.39	.18	.02	.05	.07	390	.53	308,200	39	567	7.8
Aug. 1-31	299,200	16	3.29	1.67	3.52	.08	2.62	5.60	.28	.02	.06	.14	578	.79	236,400	41	821	8.0
Sept. 1-30	188,100	16	4.44	2.46	5.22	.09	3.38	8.39	.45	.02	.05	.15	816	1.11	208,800	43	1,140	7.9
Total or weighted average c	2,721,000	17	2.99	1.48	2.74	0.07	2.64	4.37	0.26	0.02	0.05	0.10	491	0.67	1,819,000	38	703	--

c For period sampled only.

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 to September 1951.
Water temperatures: June 1950 to September 1951.
Sediment records: June 1946 to September 1951.
EXTREMES, 1951.--Specific conductance: Maximum, 1,340 micromhos May 9; minimum, 338 micromhos June 9.
Percent sodium: Maximum, 42 Aug. 24 to Sept. 5; minimum, 19 June 8-11.
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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, January to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 4-31, 1951	11,710	11	4.34	4.30	2.70	0.11	5.60	5.93	0.14	0.01	0.03	0.10	688	0.94	11,010	24	988	7.9
Feb. 1-28	12,420	17	3.74	3.50	2.61	.12	4.72	4.89	.13	.01	.04	.35	604	.82	10,180	26	868	7.5
Mar. 1-15	6,290	11	3.19	2.69	2.35	.12	4.36	4.73	.13	.01	.04	.10	558	.76	4,780	25	838	8.1
Mar. 16-Apr. 1	8,690	9.0	2.64	2.90	2.35	.11	a3.64	4.12	.08	.02	.02	.13	550	.75	6,520	29	702	8.4
Apr. 2-14	10,510	8.4	2.94	3.04	2.30	.11	b3.87	4.33	.10	.03	.03	.10	584	.79	8,300	27	731	8.5
Apr. 15-30	3,400	8.4	3.39	4.01	3.70	.13	4.92	6.14	.17	.03	.01	.19	670	.91	3,090	33	891	6.1
May 1-8	764	8.4	3.29	4.73	5.65	.17	5.42	8.33	.21	.02	.02	.13	846	1.15	879	41	1,220	6.0
May 9-10	2,200	12	3.64	4.02	4.30	.18	4.83	7.14	.18	.02	.03	.13	750	1.02	2,240	35	1,080	7.7
May 11-June 5	34,440	13	2.79	1.97	1.65	.09	3.33	3.12	.07	.01	.04	.09	396	.54	18,600	25	605	7.7
June 8-11	6,340	11	1.80	1.16	.70	.06	2.34	1.33	.03	.02	.04	.05	234	.32	2,030	19	354	7.5
June 12-24	8,760	11	2.25	1.85	1.39	.07	3.00	2.33	.06	.01	.02	.07	322	.44	3,850	26	505	7.6
June 25-July 15	21,630	15	2.05	1.55	1.10	.05	c2.86	1.87	.03	.01	.02	.08	282	.38	8,220	23	448	8.3
July 16-Aug. 6	20,740	15	2.15	1.73	1.04	.06	2.92	1.98	.04	.01	.02	.07	292	.40	8,300	21	466	8.1
Aug. 7-23	4,410	14	2.50	2.24	2.22	.09	3.70	3.16	.07	.02	.01	.09	413	.56	2,470	31	638	6.0
Aug. 24-Sept. 5	20,140	16	2.20	1.40	2.70	.10	3.54	2.81	.01	.02	.05	.12	395	.54	10,880	42	603	7.6
Sept. 6-30	18,050	12	2.74	2.66	1.91	.10	c3.81	3.44	.07	.01	.01	.07	428	.58	10,470	26	661	8.3
Total or weighted average d	190,500	13	2.69	2.30	1.91	0.09	3.62	3.33	0.07	0.02	0.03	0.11	431	0.59	111,800	27	638	--

a Includes 0.30 equivalents per million carbonate (CO_3).
b Includes 0.40 equivalents per million carbonate (CO_3).
c Includes 0.17 equivalents per million carbonate (CO_3).
d For period sampled only.

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 1951.
Water temperatures: March to September 1951.
Sediment records: March 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,590 micromhos Aug. 16; minimum, 763 micromhos Sept. 1.
Percent sodium: Maximum, 53 Aug. 25; minimum, 24 Aug. 16.
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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 3, 1950 a	220	9.2	5.54	4.06	6.70	0.15	3.82	12.60	0.34	0.01	0.04	0.30	1,120	1.52	334	41	1,450	7.7
Nov. 6 a	335	12	7.49	4.47	6.83	.14	4.15	14.16	1.07	.02	.05	.13	1,290	1.75	586	36	1,640	7.8
Jan. 4-31, 1951	4,540	13	9.98	5.18	7.83	.17	5.67	16.34	1.47	.02	.06	.18	1,580	2.15	9,760	34	1,960	7.8
Feb. 1-28	6,600	12	8.18	4.78	7.09	.15	4.88	14.26	1.18	.02	.05	.26	1,360	1.85	12,210	35	1,740	7.5
Mar. 1-21	6,590	13	6.79	5.13	6.83	.12	3.29	14.37	1.38	.02	.07	.15	1,320	1.80	11,860	36	1,680	7.9
Mar. 22-28	6,600	9.6	5.19	3.53	5.09	.09	3.08	9.64	1.07	.02	.05	.11	938	1.28	8,450	37	1,260	7.7
Mar. 29	7,300	12	5.19	3.37	5.22	.12	3.11	9.78	.96	.03	.09	.10	924	1.26	9,200	38	1,250	7.6
Mar. 30-Apr. 4	17,560	11	5.74	3.46	5.26	.10	2.98	10.31	1.16	.02	.07	.12	994	1.35	23,710	36	1,320	7.7
Apr. 9-May 2	14,000	11	7.24	5.24	7.48	.12	3.87	14.68	1.35	.02	.05	.18	1,370	1.86	26,040	37	1,740	8.0
May 3-June 1	29,390	13	5.19	3.43	5.31	.13	3.16	10.16	.96	.04	.08	.13	928	1.26	37,030	38	1,280	7.8
June 4-14	6,160	13	4.64	2.94	5.44	.12	3.11	9.26	.79	.03	.06	.13	868	1.18	7,270	41	1,200	8.0
June 15-21	1,690	12	6.49	4.37	8.61	.18	3.61	14.95	1.21	.03	.03	.13	1,370	1.86	3,140	44	1,760	7.6
June 24-July 5	8,250	17	5.89	3.47	4.61	.15	3.33	10.37	.54	.03	.04	.13	950	1.29	10,640	33	1,260	7.4
July 6-16	b1,800	--	6.64	4.08	7.65	.18	4.43	13.32	.79	--	.01	--	--	--	--	41	--	--
July 17	585	21	7.68	3.72	6.61	.20	c3.51	14.16	.51	.03	.09	.18	1,260	1.71	1,000	36	1,580	8.4
July 18-Aug. 15	11,140	18	5.04	3.18	4.30	.14	3.00	9.22	.42	.03	.08	.14	868	1.18	13,150	34	1,150	7.7

a Not included in total or weighted average.
b Not included in total.
c Includes 0.40 equivalents per million carbonate (CO_3).

Aug. 16	908	17	14.57	8.79	8.04	.36	8.23	23.11	2.14	--	.13	.22	2,270	3.09	2,810	24	2,590	7.0
Aug. 17-24	8,360	18	10.33	5.15	5.44	.20	3.47	16.97	.48	.03	.12	.15	1,470	2.00	16,720	26	1,760	7.0
Aug. 25	5,240	13	3.04	1.16	5.00	.15	4.59	4.03	.06	--	.02	.20	596	.81	4,240	53	835	7.5
Aug. 26-Sept. 12	31,800	14	7.73	3.43	4.74	.18	3.06	12.60	.37	.03	.03	.13	1,090	1.48	47,060	29	1,400	7.5
Sept. 13-30	10,710	13	9.93	4.63	8.70	.17	3.24	18.95	1.21	.03	.07	.16	1,620	2.20	23,560	37	1,990	7.9
Total or weighted average d	177,400	13	6.69	3.87	5.74	0.15	3.41	12.16	0.85	0.03	0.06	0.14	1,110	1.51	267,900	35	1,440	--

d For period sampled only.

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.
RECORDS AVAILABLE.--Chemical analyses: March to September 1951.
EXTREMES, March to September, 1951.--Specific conductance: Maximum, 1,920 micromhos May 26, 28; minimum, 181 micromhos Mar. 24. Percent sodium: Maximum, 77 June 8; minimum, 41 Mar. 24-25.
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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, March to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 24-25, 1951	119	10	0.60	0.26	0.74	0.22	0.97	0.75	0.06	0.01	0.04	0.19	184	0.25	30	41	187	6.8
Mar. 26-30	51,130	13	1.30	.42	1.78	.09	2.16	1.33	.07	.01	.04	.08	282	.38	19,430	50	349	7.3
Mar. 31-Apr. 11	9,100	9.7	1.60	.80	4.00	.13	2.97	3.29	.14	.01	.04	.17	452	.61	5,550	61	632	7.7
Apr. 12-15	809	12	2.50	1.30	6.17	.15	4.29	5.27	.21	.02	.03	.14	680	.92	744	61	959	7.8
Apr. 16-May 24	4,770	12	3.54	2.10	10.31	.20	6.05	9.37	.34	.01	.02	.20	1,060	1.44	6,870	64	1,450	8.1
May 25-June 2	744	13	3.24	2.48	10.91	.23	a5.10	11.76	.34	.04	.03	.30	1,120	1.52	1,130	65	1,570	8.2

a Includes 0.20 equivalents per million carbonate (CO_3).

GRAND RIVER BASIN--Continued

GRAND RIVER NEAR WAKPALA, S. DAK.--Continued

Chemical analyses, March to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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 4, 1951	1,430	18	3.04	1.72	12.00	0.25	6.16	10.26	0.39	0.02	0.07	0.31	1,090	1.48	2,120	71	1,600	7.5
June 5-7	1,720	21	1.85	.75	7.17	.18	b 6.40	3.37	.17	.04	.14	.29	632	.86	1,480	72	924	8.2
June 8	1,360	22	1.25	.67	7.00	.17	4.49	4.29	.17	.02	.09	.21	576	.78	1,060	77	879	7.5
June 9-14	4,030	15	1.15	.49	4.39	.12	3.16	2.98	.06	.03	.05	.35	396	.54	2,180	71	593	7.9
June 15-20	5,840	13	1.35	.57	4.44	.13	3.33	3.12	.08	.02	.04	.20	418	.57	3,330	68	624	7.9
June 21-22	3,150	29	1.30	.46	4.87	.14	4.46	1.98	.14	.02	.12	.23	446	.61	1,920	72	643	7.7
June 23-July 10	6,160	15	1.65	.77	6.35	.14	4.06	4.75	.14	.02	.07	.18	566	.77	4,740	71	836	8.0
July 11-28	2,300	16	3.04	1.76	10.09	.23	c 5.65	9.74	.25	.02	.06	.35	1,010	1.37	3,150	67	1,430	8.3
July 30-Aug. 29	3,020	20	2.10	.94	7.78	.18	d 4.62	6.31	.20	.02	.03	.22	732	1.00	3,020	71	1,080	8.5
Aug. 30-Sept. 1	9,000	20	1.50	.64	4.83	.13	3.41	3.44	.08	.02	.03	.14	450	.61	5,490	68	683	7.6
Sept. 2-10	7,450	15	1.00	.36	3.17	.11	2.64	2.02	.08	.02	.03	.10	307	.42	3,130	68	473	7.6
Sept. 11-28	2,140	15	2.25	.99	6.39	.18	4.46	5.50	.20	.02	.02	.14	652	.89	1,900	65	976	7.8
Total or weighted average e	114,300	15	1.55	0.66	3.96	0.12	3.13	3.04	0.11	0.02	0.04	0.14	434	0.59	67,270	63	604	--

b Includes 0.47 equivalents per million carbonate (CO_3).
c Includes 0.60 equivalents per million carbonate (CO_3).
d Includes 0.33 equivalents per million carbonate (CO_3).
e For period sampled only.

CHEYENNE RIVER BASIN

CHEYENNE RIVER NEAR EAGLE BUTTE, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 63, half a mile upstream from Hermaphrodite Creek, and 21 miles south of Eagle Butte, Dewey County.
DRAINAGE AREA.--24,500 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 3,080 micromhos Feb. 1; minimum, 968 micromhos Sept.10.
Percent sodium: Maximum, 55 June 25; minimum, 25 Mar. 1-19.
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 1950 to September 1951 given in Water-Supply Paper 1209.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 22, 1950	169	15	10.98	10.02	9.13	0.31	1.56	26.23	1.44	--	0.05	0.33	2,260	3.07	519	30	--	8.0
Jan. 17-31, 1951	893	11	14.97	8.83	9.26	.25	5.01	26.65	1.58	0.03	.06	.30	2,240	3.05	2,720	28	2,610	7.8
Feb. 1-28	2,310	11	13.87	7.09	9.00	.25	4.56	23.94	1.47	.04	.03	.26	2,130	2.90	6,700	30	2,480	8.0
Mar. 1-19	2,620	9.5	12.48	6.80	6.57	.25	4.26	20.09	1.33	.04	.05	.25	1,900	2.58	6,760	25	2,160	7.8
Mar. 21, at gage	218	11	9.13	10.07	7.87	.24	4.29	21.03	1.44	.03	.11	.23	1,880	2.56	a 558	29	2,190	7.9
Mar. 21, R. channel	b218	7.8	9.13	10.15	8.04	.22	4.26	21.24	1.47	.03	.09	.25	1,870	2.54	--	29	2,190	7.8
Mar. 21, L. channel	b218	7.8	12.38	6.82	7.26	.23	4.28	20.72	1.52	.04	.08	.25	1,900	2.58	--	27	2,190	8.1
Mar. 22-24	1,030	8.7	10.98	5.50	6.57	.21	3.84	17.70	1.33	.04	.07	.21	1,650	2.24	2,310	28	2,050	7.9
Mar. 26-27	8,930	8.8	5.49	2.55	4.87	.15	2.25	10.20	.28	.01	.04	.09	894	1.22	10,890	37	1,180	7.6
Mar. 28	12,890	16	5.74	2.22	5.09	.20	3.21	8.81	.54	--	.45	.17	914	1.24	15,980	38	1,100	7.5
Mar. 29-31	11,520	11	5.34	2.02	4.78	.17	2.20	9.37	.54	.01	.07	.17	820	1.12	12,900	39	1,130	7.7
Apr. 1-9	9,270	13	7.44	4.16	6.83	.22	2.80	14.84	.87	.03	.15	.21	1,270	1.73	16,040	37	1,630	7.5
Apr. 10-May 10	9,940	12	10.78	6.74	9.48	.28	3.10	22.48	1.35	.03	.07	.27	1,890	2.57	25,550	35	2,230	7.6
May 11-June 1	7,980	15	11.88	7.72	10.18	.41	2.65	26.23	1.38	.04	.14	.33	2,190	2.98	23,780	34	2,540	7.5
June 4-8	8,750	24	6.19	2.55	8.44	.28	3.34	13.64	.79	.03	.04	.26	1,220	1.66	14,530	48	1,600	7.6
June 11-18	7,600	20	8.78	4.02	8.83	.36	2.93	18.32	.90	.04	.07	.31	1,530	2.08	15,810	40	1,930	7.7
June 20	2,980	16	8.33	4.07	7.70	.31	2.79	17.18	.65	.04	.11	.31	1,410	1.92	5,720	38	1,760	7.4
June 22-23	5,060	18	7.83	3.37	8.39	.38	3.38	15.51	.51	.03	.01	.29	1,340	1.82	9,210	42	1,730	7.5
June 25	4,680	26	4.74	1.48	7.87	.26	3.74	9.78	.48	.03	.01	.25	938	1.28	5,990	55	1,270	7.5

a Mean for cross section.
b Not included in total.

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER NEAR EAGLE BUTTE, S. DAK.--Continued

Chemical analyses, December 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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 27-July 2, 1951--	6,500	26	5.49	1.97	8.09	0.28	2.80	12.08	0.54	0.03	0.10	0.24	1,090	1.48	9,620	51	1,470	7.5
July 5-6 ----------	4,050	21	7.78	3.10	7.57	.26	3.51	14.89	.48	.03	.02	.34	1,300	1.77	7,170	40	1,670	7.5
July 9-Aug. 16 -------	25,700	19	8.83	5.09	7.35	.33	2.33	18.42	.76	.03	.06	.32	1,540	2.09	53,710	34	1,860	7.4
Aug. 17----------	1,950	17	10.23	4.25	7.22	.36	3.83	17.90	.68	.04	.01	.33	1,540	2.09	4,080	33	1,850	7.6
Aug. 20-31----------	6,680	19	9.93	5.27	7.00	.33	2.41	19.67	.71	.03	.05	.39	1,600	2.18	14,560	31	1,920	7.6
Sept. 4-10 ----------	20,010	24	4.39	1.29	6.09	.23	2.87	8.70	.39	.03	.02	.27	804	1.09	21,810	51	1,140	7.6
Sept. 12-30 ----------	11,320	17	9.43	5.01	6.48	.31	2.52	18.11	.71	.03	.05	.30	1,500	2.04	23,090	31	1,810	7.6
Total or weighted average c -	173,100	18	7.68	3.87	7.13	0.28	2.85	15.22	0.73	0.09	0.03	0.26	1,320	1.80	310,000	38	1,640	--

c For period sampled only.

PLATTE RIVER BASIN

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.

LOCATION.--At gaging station three-quarters of a mile downstream from Guernsey Dam and 1 mile northwest of Guernsey, Platte County.
DRAINAGE AREA.--16,200 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 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 1950 to September 1951 given in Water-Supply Paper 1210.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 7, 11, 1950	657	13	4.64	2.68	4.35	0.14	3.80	6.87	0.68	--	0.05	0.13	744	1.01	664	37	1,040	7.5
Jan. 1-16, 1951	6,500	12	5.09	3.03	4.48	.14	4.11	7.70	.93	0.01	.05	.20	816	1.11	7,220	35	1,140	7.9
Jan. 22-24	839	15	3.29	4.83	4.96	.15	4.46	8.29	.79	.03	.05	.14	840	1.14	956	37	1,190	8.1
Feb. 1-28	9,580	15	5.44	3.12	4.70	.14	4.29	8.12	.87	.01	.05	.19	868	1.18	11,300	35	1,190	8.0
Mar. 6-9	502	15	3.54	4.70	4.48	.15	4.13	7.81	.76	.02	.05	.13	778	1.06	532	35	1,140	8.0
Mar. 25-31	222	13	4.94	2.72	4.26	.13	3.98	7.04	.85	.02	.05	.15	783	1.06	235	35	1,090	7.9
Apr. 2-5	5,760	13	4.99	2.83	4.44	.14	3.97	7.35	.85	.02	.05	.14	796	1.08	6,220	36	1,120	7.8
Apr. 23	2,080	13	3.34	3.70	4.39	.14	3.38	7.08	.79	.02	.03	.12	740	1.01	2,100	38	1,030	7.9
Apr. 26-27	3,710	13	4.04	2.36	3.96	.12	3.18	6.25	.73	.02	.02	.15	680	.92	3,410	38	966	7.8
Apr. 30	1,900	12	3.19	2.73	3.48	.13	3.05	5.62	.65	--	.08	.11	616	.84	1,600	37	872	7.8
May 3-14	39,000	13	2.69	1.35	1.74	.09	2.44	3.02	.28	.02	.04	.04	374	.51	19,890	30	570	7.8
June 4-22	104,300	13	2.69	1.39	1.70	.08	2.64	2.85	.28	.01	.02	.12	368	.50	52,150	29	559	7.5
July 6-10	41,160	10	2.79	1.49	1.83	.09	2.74	3.16	.31	.01	.02	.11	388	.53	21,810	30	593	7.8
Aug. 10-31	203,000	12	2.54	1.44	1.57	.08	2.56	2.73	.28	.01	.03	.11	352	.48	97,440	28	538	7.8
Sept. 1-11	70,100	9.8	2.64	1.34	1.61	.08	2.59	2.79	.31	.01	.02	.09	344	.47	32,950	28	545	7.7
Sept. 12-27	75,350	14	2.84	1.48	1.83	.09	2.77	3.14	.34	.02	.03	.10	394	.54	40,690	29	597	7.7
Sept. 28-30	6,020	11	3.19	1.69	2.13	.10	3.03	3.56	.39	.01	.03	.08	430	.58	3,490	30	665	7.9

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging station at highway bridges on county road south of Brady, Lincoln County, 18 miles downstream from confluence of North Platte and South Platte Rivers.

DRAINAGE AREA.--56,900 square miles.

RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1951.
Water temperatures: March to September 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 1950 to September 1951 given in Water-Supply Paper 1210.

Chemical analyses, November 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 24, 1950, Chan.1 a	149	39	3.19	1.13	2.44		b3.77	2.52	0.42	0.03	0.02	0.10	426	0.58	86	36	619	8.4
Jan. 9,1951,Chan.1 a--	133	35	2.79	.81	1.85		3.16	1.92	.31	.02	.04	.20	348	.47	63	34	511	8.0
Feb. 28-Mar. 31 ----	14,420	36	2.94	1.06	1.87	0.23	3.41	2.14	.39	.02	.06	.08	404	.55	7,930	31	560	8.0
Apr. 1-26----------	9,230	29	2.69	1.23	2.00	.25	3.34	2.12	.45	.03	.04	.14	408	.55	5,080	32	584	7.9
Apr. 27-May 1-------	2,900	43	2.69	1.07	1.96	.26	c3.38	2.23	.39	.03	.04	.06	404	.55	1,600	33	564	8.4
May 2-13----------	3,980	40	2.99	1.17	2.00	.20	3.51	2.33	.42	.03	.03	.08	424	.58	2,310	31	598	8.2
May 14, Chan. 1-----	1,070	33	2.54	.76	1.74	.20	2.98	1.85	.31	.02	.04	.07	338	.46	492	33	484	7.5
May 14, Chan. 4-----	242	40	3.09	1.23	1.78	.31	3.61	2.27	.45	.02	.05	.09	418	.57	138	28	595	7.5
May 15, Chan. 1-----	7,280	30	2.74	.67	1.70	.24	3.44	1.52	.23	.02	.07	.08	340	.46	3,350	32	457	7.4
May 15, Chan. 4-----	440	45	3.29	1.40	2.13	.33	3.98	2.62	.48	.02	.04	.10	482	.66	290	30	655	7.6
May 16-17----------	14,920	43	2.69	1.15	1.96	.20	3.15	2.42	.42	.03	.05	.08	402	.55	8,210	33	566	8.2
May 20-24 ----------	6,980	36	3.09	1.31	2.00	.21	3.74	2.33	.42	.03	.03	.06	424	.58	4,050	30	617	8.1
May 25-30----------	3,080	31	2.79	.89	1.87	.20	3.21	2.25	.34	.03	.03	.05	392	.53	1,630	33	549	7.9
May 31-June 2-------	3,850	35	3.19	1.17	2.09	.21	3.57	2.29	.59	.03	.03	.32	436	.59	2,270	31	608	8.1
June 3-7 ----------	3,790	37	3.09	1.19	2.17	.26	3.83	2.21	.42	.04	.02	.08	436	.59	2,240	32	600	8.1
June 8 ----------	4,500	32	2.20	.82	1.30	.25	2.80	1.48	.24	.03	.06	.12	312	.42	1,890	28	439	8.0
June 9-10 ----------	10,100	30	2.40	.86	1.70	.24	3.23	1.75	.31	.03	.03	.09	346	.47	4,750	33	500	8.1
June 11-21 ----------	10,490	43	3.04	1.16	1.91	.25	3.83	2.23	.34	.03	.03	.10	420	.57	5,980	30	592	8.2
June 22-24 ----------	5,830	41	2.45	.93	1.65	.22	d3.36	1.67	.28	.03	.04	.13	352	.48	2,800	31	493	8.3
June 25-July 17------	17,470	46	2.94	1.16	2.00	.25	e3.71	2.25	.37	.03	.03	.12	426	.58	10,130	31	591	8.2

a Not included in total or weighted average.
b Includes 0.20 equivalents per million carbonate (CO_3).
c Includes 0.23 equivalents per million carbonate (CO_3).
d Includes 0.30 equivalents per million carbonate (CO_3).
e Includes 0.17 equivalents per million carbonate (CO_3).

July 18-Aug. 10 -----	25,560	39	2.69	1.15	2.30	.25	f3.58	2.37	.42	.03	.03	.15	434	.59	15,080	36	601	8.3
Aug. 11-Sept. 5------	43,360	33	2.64	1.22	2.70	.25	3.61	2.73	.48	.03	.03	.12	448	.61	26,450	40	648	8.0
Sept. 6-30, Chan. 1--	13,670	40	2.99	1.05	2.44	.26	b3.54	2.73	.45	.03	.03	.15	456	.62	8,480	36	646	8.4
Sept. 6-30, Chan. 4--	g3,180	--	3.49	1.65	2.44	.36	--	2.62	--	--	.03	--	--	--	--	31	--	--
Total or weighted average h	203,100	37	2.79	1.15	2.17	0.24	3.51	2.31	0.39	0.03	0.04	0.12	417	0.57	115,200	34	588	--

b Includes 0.20 equivalents per million carbonate (CO_3).
f Includes 0.27 equivalents per million carbonate (CO_3).
g Not included in total.
h For period sampled only.

PLATTE RIVER BASIN--Continued

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

LOCATION.--At gaging station at Parshall Flume in section 28, township 13 N, Range 29 W, near Maxwell, Lincoln County.
RECORDS AVAILABLE.--Chemical analyses: March to September 1951.
Water temperatures: March to September 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 1950 to September 1951 given in reports of State Engineer.

Chemical analyses, March to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-31, 1951 ---	102,300	30	3.24	1.44	3.00	0.25	3.64	3.44	0.65	0.02	0.03	0.12	516	0.70	71,610	38	732	8.1
Apr. 1-26 ---------	94,060	26	3.14	1.14	2.57	.33	3.44	3.39	.54	.04	.04	.10	508	.69	64,900	36	681	7.9
Apr. 27-May 1 -----	18,190	31	2.79	1.35	3.09	.28	3.51	3.39	.56	.03	.04	.14	492	.67	12,190	41	710	8.2
May 2-13 ----------	37,390	29	2.99	1.37	3.13	.24	3.51	3.39	.62	.03	.02	.08	496	.67	25,050	40	720	8.0
May 14 ----------	4,010	24	2.94	1.23	2.70	.26	3.38	3.23	.51	.02	.05	.11	458	.62	2,490	38	647	7.5
May 15 ----------	3,810	23	2.59	.82	1.70	.31	2.77	2.17	.31	.02	.06	.07	368	.50	1,910	31	499	7.4
May 16-17 ---------	7,780	32	2.74	1.34	3.22	.24	3.21	3.44	.62	.03	.02	.10	508	.69	5,370	43	711	8.1
May 18-19 ---------	7,930	31	2.94	1.22	3.52	.25	2.59	4.39	.71	.03	.03	.12	528	.72	5,710	44	768	8.1
May 20-24 --------	18,720	30	3.24	1.28	2.70	.28	3.54	3.12	.56	.02	.04	.20	488	.66	12,360	36	721	8.2
May 25-30 ---------	21,040	29	3.04	1.44	3.04	.26	3.64	3.41	.59	.02	.03	.21	500	.68	14,310	39	742	8.0
May 31-June 2------	10,850	25	3.09	1.37	2.91	.26	3.46	3.46	.59	.02	.03	.14	492	.67	7,270	38	731	8.1
June 3-6 ----------	13,350	34	3.19	1.39	2.91	.25	a3.58	3.62	.59	.03	.04	.16	512	.70	9,350	38	738	8.3
June 7-8 ----------	7,890	23	2.79	1.05	2.00	.28	2.93	2.58	.42	.02	.02	.10	388	.53	4,180	33	573	7.5
June 9-10 ---------	7,950	33	3.29	1.41	2.83	.31	3.52	3.56	.59	.02	.05	.21	508	.69	5,490	36	740	8.1
June 11-21 ---------	39,770	30	3.24	1.54	2.91	.31	3.44	3.93	.62	.03	.05	.13	530	.72	28,630	36	759	7.9
June 22-24 ---------	11,760	24	3.14	1.44	2.83	.28	3.20	3.85	.62	.03	.05	.11	500	.68	8,000	37	737	7.9
June 25-July 17-----	87,890	24	3.49	1.71	3.57	.28	3.33	4.81	.73	.03	.04	.12	588	.80	70,310	39	847	8.1
July 18-Aug. 10 ----	94,810	25	3.39	1.41	3.61	.28	3.51	4.37	.68	.03	.04	.14	564	.77	73,000	42	814	8.1
Aug. 11-Sept. 5 ----	103,700	24	3.19	1.57	3.35	.28	3.56	4.14	.62	.03	.04	.14	550	.75	77,780	40	802	8.1
Sept. 6-30 ---------	97,960	27	3.14	1.56	3.48	.28	3.51	4.35	.65	.03	.03	.18	551	.75	73,470	41	811	8.0
Total or weighted average b	791,200	27	3.19	1.48	3.17	0.28	3.47	3.91	0.62	0.03	0.04	0.14	533	0.72	573,400	39	765	--

a Includes 0.27 equivalents per million carbonate (CO_3).

b For period sampled only.

SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on State Highway 51, half a mile east of Julesburg, Sedgwick County, and 4 miles upstream from Colorado-Nebraska State line.
DRAINAGE AREA.--22,800 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1951.
Water temperatures: October 1945 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,060 micromhos Feb. 2; minimum, 887 micromhos May 21.
EXTREMES, 1945-51.--Specific conductance: Maximum, 2,140 micromhos Dec. 30, 1946; minimum, 635 micromhos Aug. 5, 1950.
Percent sodium (1945-50): Maximum, 82 Mar. 1-12, 1947; minimum, 30 Mar. 15, 20, 1948.
REMARKS.--Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1210.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,660	--
Oct. 1, Chan. 2 a ---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,720	--
Oct. 1, Chan. 4 a ---	9.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,650	--
Oct. 1-31----------	9,240	40	9.13	4.27	7.00	0.66	5.75	13.95	1.80	0.03	0.09	0.10	1,390	1.89	17,460	33	1,780	7.5
Nov. 1, Chan. 1 a ---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,950	--
Nov. 1, Chan. 2 a ---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,940	--
Nov. 1, Chan. 4 a ---	7.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,950	--
Nov. 1-15 ----------	8,060	--	--	--	--	--	--	--	--	--	--	--	1,500	2.04	16,440	--	1,860	--
Dec. 14-31 ---------	12,170	--	--	--	--	--	--	--	--	--	--	--	1,520	2.07	25,190	--	1,890	--
Dec. 15, Chan. 1 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,850	--
Dec. 15, Chan. 2 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,950	--
Dec. 15, Chan. 4 a --	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,940	--
Jan. 1, 1951, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,970	--
Jan. 1, Chan. 4 a ---	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,960	--
Jan. 1-7 ----------	4,380	--	--	--	--	--	--	--	--	--	--	--	1,530	2.08	9,110	--	2,030	--
Jan. 14-31----------	10,670	--	--	--	--	--	--	--	--	--	--	--	1,460	1.99	21,230	--	1,850	--
Jan. 15, Chan. 2 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,880	--
Jan. 15, Chan. 4 a --	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,730	--

a Not included in total or weighted average.

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951, Chan. 2 -	480	--	--	--	8.26	--	--	--	--	--	--	--	1,610	2.19	1,050	--	2,010	--
Feb. 1, Chan. 4 a ---	24	--	--	--	5.83	--	--	--	--	--	--	--	1,330	1.81	43	--	1,690	--
Feb. 2-14 ----------	8,580	30	10.13	3.79	7.31	0.33	4.92	14.16	1.69	0.03	0.09	0.33	1,480	2.01	17,250	34	1,830	7.8
Feb. 15, Chan. 2----	595	--	--	--	7.87	--	--	--	--	--	--	--	1,530	2.08	1,240	--	1,940	--
Feb. 15, Chan. 4 a --	19	--	--	--	5.87	--	--	--	--	--	--	--	1,310	1.78	34	--	1,670	--
Feb. 16-Mar. 14 ----	14,780	--	--	--	7.48	--	--	--	--	--	--	--	1,480	2.01	29,710	--	1,850	--
Feb. 22, Chan. 1 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,860	--
Feb. 22, Chan. 2 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,860	--
Feb. 22, Chan. 4 a --	30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,760	--
Mar. 1, Chan. 1 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,850	--
Mar. 1, Chan. 2 a---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,860	--
Mar. 1, Chan. 4 a---	17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,650	--
Mar. 15, Chan. 1 a--	--	--	--	--	7.39	--	--	--	--	--	--	--	1,450	1.97	--	--	1,830	--
Mar. 15, Chan. 2 ---	480	--	--	--	7.44	--	--	--	--	--	--	--	1,460	1.99	955	--	1,830	--
Mar. 15, Chan. 4 a--	8.7	--	--	--	5.00	--	--	--	--	--	--	--	1,180	1.60	15	--	1,520	--
Mar. 16-31 ---------	6,180	--	--	--	7.48	--	--	--	--	--	--	--	1,450	1.97	12,170	--	1,840	--
Apr. 1, Chan. 1 a---	--	--	--	--	7.17	--	--	--	--	--	--	--	1,330	1.81	--	--	1,720	--
Apr. 1, Chan. 2-----	169	--	--	--	6.76	--	--	--	--	--	--	--	1,360	1.85	313	--	1,730	--
Apr. 1, Chan. 4 a ---	5.2	--	--	--	3.61	--	--	--	--	--	--	--	1,030	1.40	7	--	1,350	--
Apr. 2-30----------	8,280	30	8.03	4.37	7.26	.38	3.52	14.89	1.76	.03	.06	.23	1,370	1.86	15,400	36	1,750	7.8
Apr. 15, Chan. 1 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,720	--
Apr. 15, Chan. 2 a --	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,720	--
Apr. 15, Chan. 4 a --	3.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,660	--
May 1, Chan. 1 a ---	--	28	8.73	4.44	8.13	.38	3.16	15.39	2.74	--	.04	.25	1,390	1.89	--	38	1,760	8.1
May 1, Chan. 2 -----	428	33	9.48	4.28	8.22	.41	5.01	15.55	1.64	--	.02	.23	1,440	1.96	839	37	1,780	8.0
May 1, Chan. 4 a----	6.3	46	8.53	3.04	4.09	.38	4.52	9.99	1.35	--	.08	.11	1,030	1.40	9	25	1,260	8.4
May 2-20 ----------	4,810	--	--	--	6.91	--	--	--	--	--	--	--	1,290	1.75	8,420	--	1,640	--

a Not included in total or weighted average.

May 15, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,530	--
May 15, Chan. 4 a	8.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,560	--
May 21	1,300	18	4.29	1.73	3.30	.33	2.72	6.04	.79	.03	.08	.13	694	.94	1,220	34	887	7.5
May 22, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,570	--
May 22, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,600	--
May 22, Chan. 4 a	61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,540	--
May 22-June 22	12,360	--	--	--	6.83	--	--	13.12	--	--	--	--	1,260	1.71	21,140	--	1,650	--
June 1, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,560	--
June 1, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,550	--
June 1, Chan. 4 a	38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,520	--
June 15, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,830	--
June 15, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,830	--
June 15, Chan. 4 a	56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,800	--
June 23-24	2,770	--	--	--	5.44	--	--	4.58	--	--	--	--	904	1.23	3,410	--	1,240	--
June 25-July 2	8,280	--	--	--	7.57	--	--	14.68	--	--	--	--	1,100	1.50	12,420	--	1,770	--
July 1, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,750	--
July 1, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,750	--
July 1, Chan. 4 a	125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,730	--
July 3, Aug. 5	8,850	--	--	--	6.26	--	--	--	--	--	--	--	1,200	1.63	14,430	--	1,570	--
July 15, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,720	--
July 15, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,520	--
July 15, Chan. 4 a	22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,530	--
Aug. 1, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,550	--
Aug. 1, Chan. 4 a	5.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,660	--
Aug. 6-10	12,490	17	6.39	2.65	3.87	.28	3.41	9.16	.82	.04	.03	.28	876	1.19	14,860	29	1,160	7.7
Aug. 10, 1951, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,290	--
Aug. 10, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,310	--
Aug. 10, Chan. 4 a	504	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,280	--
Aug. 11-Sept. 2	10,690	--	--	--	6.57	--	--	--	--	--	--	--	1,230	1.67	17,850	--	1,600	--
Aug. 15, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,660	--
Aug. 15, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,680	--
Aug. 15, Chan. 4 a	123	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,670	--
Sept. 1, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,690	--
Sept. 1, Chan. 4 a	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,700	--
Sept. 3-30	b 24,890	--	--	--	6.74	--	--	--	--	--	--	--	--	--	--	--	--	--
Sept. 8, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,570	--
Sept. 8, Chan. 2 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,570	--
Total or weighted average c	146,000	--	--	--	6.87	--	--	--	--	--	--	--	1,310	1.80	262,100	--	1,710	--

a Not included in total or weighted average.

b Not included in total.

c For period sampled only.

KANSAS RIVER BASIN

REPUBLICAN RIVER AT CAMBRIDGE, NEBR.

LOCATION.--At bridge on State Highway 47, half a mile south of Cambridge, Furnas County, a quarter of a mile upstream from Medicine Creek, and about 1 mile upstream from gaging station at Cambridge.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951.
Water temperatures: December 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 760 micromhos Feb. 2; minimum, 319 micromhos Sept. 2.
Percent sodium: Maximum, 29 Apr. 15-27; minimum, 15 June 18-19.
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 1950 to September 1951 given in Water-Supply Paper 1210.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 22-31, 1950	5,410	49	3.24	1.54	1.48	0.31	4.93	1.23	0.25	0.05	0.10	0.02	412	0.56	3,030	23	573	8.0
Jan. 1-31, 1951	13,330	45	3.19	1.65	1.48	.36	4.98	1.27	.28	.05	.09	.00	424	.58	7,730	22	591	8.0
Feb. 1-8	2,250	46	3.34	1.68	1.43	.33	5.18	1.25	.31	.05	.10	.00	420	.57	1,280	21	606	7.9
Feb. 9-10	950	34	2.45	1.03	1.13	.21	3.49	.83	.21	.03	.10	.01	294	.40	380	23	430	7.8
Feb. 11-12	4,710	36	2.74	1.10	1.22	.28	3.98	1.06	.23	.04	.09	.04	342	.47	2,210	23	488	7.8
Feb. 13-28	12,800	40	2.84	1.44	1.52	.31	4.33	1.21	.25	.05	.10	.12	366	.50	6,400	25	539	7.9
Mar. 1-31	20,460	42	2.99	1.55	1.48	.33	4.67	1.21	.28	.05	.07	.05	398	.54	11,050	23	562	8.1
Apr. 1-12	a8,040	--	4.09	1.31	1.74	.33	b5.84	1.35	.23	--	.05	--	--	--	--	23	--	--
Apr. 13-14	1,430	62	3.19	1.49	1.74	.33	c5.02	1.33	.28	.05	.09	.08	442	.60	858	26	614	8.3
Apr. 15-27	a6,220	--	2.74	1.40	1.83	.36	b4.53	1.42	.34	--	.04	--	--	--	--	29	--	--
Apr. 28	1,560	42	2.84	1.07	1.30	.36	4.52	.92	.20	.04	.01	.10	354	.48	749	23	499	7.5
Apr. 29-May 2	2,680	43	2.69	1.03	1.43	.36	3.83	1.33	.25	.06	.08	.09	360	.49	1,310	26	526	7.9
May 3-9	a2,630	--	3.39	1.41	1.83	.43	b5.08	1.62	.34	--	.02	--	--	--	--	26	--	--
May 10-14	2,110	56	2.69	1.51	1.78	.38	4.59	1.48	.34	.06	.07	.10	410	.56	1,180	28	591	8.1
May 15-16	16,640	44	2.40	.99	1.04	.31	4.06	.27	.17	.04	.05	.08	288	.39	6,490	22	424	7.5
May 17-21	21,800	36	2.40	.82	1.04	.36	3.61	.83	.16	.04	.06	.10	294	.40	8,720	23	438	7.5
May 22-25	14,140	34	2.35	.73	1.04	.36	3.38	.94	.18	.03	.09	.09	296	.40	5,660	23	432	7.5
May 26-June 7	11,700	41	2.94	1.18	1.48	.38	4.38	1.27	.25	.05	.09	.12	372	.51	5,970	25	555	7.9

a Not included in total.
b Calculated.
c Includes 0.37 equivalents per million carbonate (CO_3).

June 8-17	25,340	35	2.30	.86	.91	.33	3.57	.73	.14	.03	.06	.08	282	.38	9,630	21	423	7.6
June 11 d	3,770	30	3.09	.93	.83	.38	4.28	.81	.16	.03	.05	.10	316	.43	1,620	16	491	7.4
June 18-19	7,320	33	2.00	.63	.52	.31	3.05	.42	.06	.03	.02	.07	224	.30	2,200	15	335	7.4
June 20-22	3,620	34	2.64	.84	1.09	.38	3.70	.98	.20	.04	.11	.10	318	.43	1,560	22	476	7.7
June 23-July 5	18,090	37	2.59	.83	1.04	.36	3.77	.87	.17	.04	.08	.13	306	.42	7,600	22	458	7.8
July 6-10	3,160	47	2.89	1.27	1.61	.36	4.47	1.15	.27	.05	.06	.16	378	.51	1,610	26	556	8.0
July 11-19	31,270	35	2.35	.77	.87	.28	3.51	.54	.13	.03	.04	.09	266	.36	11,260	20	398	7.6
July 20-Aug. 10	17,850	34	2.45	.87	1.09	.36	3.64	.77	.18	.03	.05	.10	306	.42	7,500	23	443	7.8
Aug. 11-15	18,230	32	2.40	.82	.91	.31	3.52	.71	.16	.03	.02	.09	278	.38	6,930	20	415	7.7
Aug. 16-Sept. 1	9,120	41	2.79	1.09	1.43	.41	4.10	1.25	.25	.05	.05	.13	372	.51	4,650	25	528	8.0
Sept. 2-11	81,620	24	2.15	.63	.83	.36	3.10	.69	.10	.03	.04	.09	244	.33	26,930	21	375	7.7
Sept. 12-30	17,730	39	3.09	1.35	1.61	.41	4.56	1.44	.27	.05	.04	.12	410	.56	9,930	25	591	8.0
Total or weighted average e	365,300	35	2.54	0.99	1.13	0.33	3.83	0.87	0.18	0.04	0.06	0.09	294	0.40	152,800	23	454	--

d Not included in total or weighted average.

e For period sampled only.

KANSAS RIVER BASIN--Continued

SALINE RIVER AT TESCOTT, KANS.

LOCATION.--At gaging station at highway bridge, half a mile south of Tescott, Ottawa County, and half a mile upstream from Dry Creek.
DRAINAGE AREA.--2,820 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1951.
Water temperatures: April 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 3,770 micromhos Dec. 16; minimum, 253 micromhos June 8.
Percent sodium: Maximum, 66 Oct. 1; minimum, 11 June 8-10.
EXTREMES, 1949-51.--Specific conductance: Maximum, 4,940 micromhos May 6, 1950; minimum, 253 micromhos June 8, 1951.
Percent sodium: Maximum, 75 May 5, 1950; 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 1950 to September 1951 given in Water-Supply Paper 1210.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950 -------	391	22	6.54	2.88	19.09	0.25	4.82	6.77	17.43	0.02	0.06	0.20	1,790	2.43	950	66	2,950	7.7
Oct. 2 ----------	5,080	19	5.04	1.32	7.44	.18	4.65	2.66	6.66	--	.01	.16	850	1.16	5,890	53	1,350	7.4
Oct. 3 ----------	7,300	15	3.04	.41	1.48	.19	3.31	.65	1.27	.03	.04	.04	314	.43	3,140	29	443	7.3
Oct. 4-6 ----------	10,410	20	3.69	.87	4.74	.20	3.03	2.29	3.81	.02	.02	.10	574	.78	8,120	50	922	7.4
Oct. 7-31 ---------	10,950	26	6.34	2.14	12.35	.28	4.95	5.10	11.42	.02	.09	.10	1,300	1.77	19,380	59	2,070	7.8
Nov. 1-30 ---------	8,110	20	7.98	3.78	21.83	.28	6.29	7.81	19.46	.02	.07	.20	2,020	2.75	22,300	64	3,180	7.8
Dec. 1-31 ---------	7,230	20	8.28	3.72	20.35	.28	6.39	7.81	18.61	.02	.11	.20	2,000	2.72	19,670	62	3,140	7.7
Jan. 1-Feb. 5, 1951-	7,450	17	8.58	3.34	19.48	.18	6.29	6.87	18.33	.02	.12	.23	1,960	2.67	19,890	62	3,180	7.9
Feb. 12-Mar. 11 ---	6,610	17	8.43	2.69	18.09	.15	5.74	6.87	16.64	.02	.12	.25	1,790	2.43	16,060	62	2,930	7.9
Mar. 12-Apr. 2 ----	4,430	16	8.13	2.35	18.44	.20	5.05	6.25	17.77	.02	.09	.22	1,850	2.52	11,160	63	3,020	7.9
Apr. 3-20 ---------	4,570	18	6.04	3.24	14.70	.21	3.24	7.45	13.54	.04	.07	.23	1,530	2.08	9,510	61	2,380	8.0
Apr. 21 ----------	1,800	16	4.79	.69	3.35	.23	3.83	2.25	2.88	.01	.01	.10	596	.81	1,460	37	778	7.5
Apr. 22----------	2,680	18	4.54	.72	4.30	.24	3.80	2.37	3.67	.01	.03	.09	588	.80	2,140	44	915	7.4
Apr. 23 ----------	1,450	17	4.29	.64	3.65	.25	3.64	1.79	3.16	.01	.07	.06	518	.70	1,020	41	815	7.6
Apr. 24-May 16 ----	15,740	17	5.64	1.20	3.83	.21	3.57	3.39	3.55	.02	.10	.10	728	.99	15,580	35	1,070	8.1

May 17	1,890	14	4.24	1.15	5.87	.20	2.29	3.29	5.33	.02	.10	.10	722	.98	1,850	51	1,170	7.6
May 18	2,700	17	3.89	1.07	4.87	.23	2.95	2.46	4.20	.02	.10	.09	606	.82	2,210	48	978	7.7
May 22-25	30,740	16	3.19	.69	1.26	.16	2.41	1.79	1.13	.02	.05	.04	350	.48	14,760	24	525	8.0
May 26-28	28,980	20	3.19	.58	1.39	.25	2.39	1.60	1.18	.02	.09	.07	388	.53	15,360	26	511	7.7
June 2	4,200	17	4.39	.53	3.04	.23	2.65	2.42	2.74	.02	.16	.08	590	.80	3,360	37	803	7.9
June 3-5	16,150	34	2.79	1.09	2.09	.23	3.64	2.21	.37	.02	.03	.11	414	.56	9,040	34	566	8.1
June 3 a	7,120	16	2.89	.47	1.70	.19	2.20	1.37	1.44	.02	.13	.05	360	.49	3,490	32	516	8.1
June 6	4,320	23	3.54	1.02	1.39	.21	3.24	1.62	1.02	.02	.02	.09	364	.50	2,160	23	540	7.5
June 7	12,890	16	2.30	.42	.52	.16	2.43	.42	.31	.01	.10	.03	196	.27	3,480	15	310	7.6
June 8-10	56,730	15	2.25	.27	.34	.15	2.36	.31	.20	.02	.02	.03	170	.23	13,050	11	253	7.5
June 11-12	27,530	22	3.59	.73	1.04	.20	2.79	1.73	.85	.02	.06	.01	352	.48	13,210	19	524	7.5
June 13-21	65,590	21	3.74	.70	1.65	.20	3.02	1.85	1.41	.03	.08	.10	398	.54	35,420	26	623	7.8
June 22-28	186,500	16	2.69	.33	.65	.18	2.39	.85	.65	.02	.05	.08	246	.33	61,550	17	394	7.6
June 29-July 5	91,140	19	3.49	.59	1.39	.22	2.82	1.64	1.10	.02	.06	.08	350	.48	43,750	24	540	7.7
July 6-10	25,230	22	6.24	1.38	4.87	.25	4.21	4.02	4.26	.02	.14	.13	800	1.09	27,500	38	1,230	7.9
July 15	20,430	15	2.64	.40	.61	.18	2.15	1.15	.56	.02	.05	.10	246	.33	6,740	16	392	7.4
July 18-19	15,470	20	6.09	1.11	3.04	.23	4.24	3.46	2.57	.02	.19	.12	666	.91	14,080	29	1,010	7.8
July 20-Aug. 14	73,400	23	6.34	1.58	6.44	.26	4.16	4.52	5.75	.03	.21	.24	918	1.25	91,750	44	1,440	8.0
Aug. 19-Sept. 3	19,230	19	6.34	1.82	9.13	.24	4.41	4.81	8.46	.02	.19	.15	1,100	1.50	28,850	52	1,770	8.1
Sept. 4-12	94,930	17	2.89	.41	1.52	.19	2.28	1.39	1.27	.02	.11	.09	319	.43	40,820	30	512	8.0
Sept. 13-30	b28,890	--	8.78	2.04	9.48	.23	6.48	5.73	8.32	--	.00	--	--	--	--	46	--	--
Total or weighted average c	872,300	19	3.99	0.82	3.17	0.20	3.13	2.23	2.82	0.02	0.08	0.10	494	0.67	585,200	39	769	--

a Not included in total or weighted average.
b Not included in total.
c For period sampled only.

Part 7. LOWER MISSISSIPPI RIVER BASIN

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 to September 1951 (daily samples).
EXTREMES, January to September, 1951.--Specific conductance: Maximum 4,260 micromhos Feb. 2; minimum, 1,680 micromhos Sept. 1, 3, 4. Percent sodium: Maximum, 40 Feb. 11-20, 21-28, June 21-30, July 1-5; minimum, 29 Sept. 21-30.
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 1950 to September 1951 given in Water-Supply Paper 1211.

Chemical analyses, January to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons			
Jan. 11-20, 1951	90	21	17.32	13.98	20.18	0.14	6.08	41.64	3.27	0.04	0.08	0.71	3,310	4.50	405	39	3,890	7.7
Jan. 21-31	103	20	17.61	14.23	20.00	.16	6.26	41.85	3.33	.04	.08	.70	3,330	4.53	466	38	3,960	7.7
Feb. 1-10	84	22	17.56	14.31	20.35	.22	6.36	41.85	3.30	.04	.09	.72	3,350	4.56	383	39	3,950	7.7
Feb. 11-20	89	20	17.27	14.39	21.00	.17	6.21	42.47	3.38	.04	.07	.72	3,380	4.60	409	40	3,990	7.7
Feb. 21-28	67	20	16.57	14.39	20.74	.18	6.08	42.05	3.33	.04	.05	.72	3,340	4.54	304	40	3,940	7.7
Mar. 1-10	112	19	17.02	14.56	20.44	.17	6.11	42.68	3.33	.04	.06	.68	3,370	4.58	513	39	3,990	7.7
Mar. 11-20	227	16	16.27	13.16	18.18	.14	6.26	37.89	2.79	.04	.05	.51	3,040	4.13	939	38	3,630	7.7
Mar. 21-31	942	13	13.27	8.96	12.48	.11	4.00	28.52	1.92	.04	.07	.47	2,240	3.05	2,870	36	2,780	7.7
Apr. 1-10	9,190	11	12.57	8.14	11.13	.19	3.54	26.44	1.72	.04	.05	.34	2,070	2.82	25,870	35	2,580	7.8
Apr. 11-20	8,740	11	12.87	8.31	11.31	.18	3.62	27.06	1.75	.04	.05	.37	2,110	2.87	25,080	35	2,620	7.8
Apr. 21-30	8,840	9.6	13.27	8.14	11.22	.21	3.56	27.06	1.55	.03	.05	.36	2,110	2.87	25,370	34	2,630	7.9
May 1-10	14,370	12	13.17	8.31	11.00	.26	3.52	27.48	1.81	.04	.05	.36	2,130	2.90	41,630	34	2,660	7.9
May 11-20	7,430	17	15.67	10.28	15.26	.26	4.21	34.56	2.62	.04	.05	.57	2,700	3.67	27,280	37	3,300	7.9
May 21-31	400	18	16.87	12.58	18.39	.33	4.98	39.14	3.16	.03	.05	.68	3,090	4.20	1,680	38	3,730	7.9
June 1-10	4,040	12	14.17	9.37	12.57	.31	3.54	30.60	2.09	.04	.06	.41	2,370	3.22	13,020	35	2,910	7.9
June 11-20	311	18	16.67	12.17	18.52	.25	4.56	39.14	3.07	.04	.06	.72	3,070	4.18	1,300	39	3,670	7.9
June 21-30, July 1-5	233	20	16.87	12.66	19.92	.21	4.72	41.01	3.22	.04	.06	.63	3,210	4.37	1,020	40	3,830	7.6

July 6-10	3,140	14	10.88	7.15	10.26	.17	2.98	23.32	1.58	.04	.06	.30	1,830	2.49	7,810	36	2,340	7.7
July 11-20	10,290	13	10.38	6.99	9.44	.19	2.90	22.07	1.49	.04	.06	.25	1,740	2.37	24,350	35	2,230	7.8
July 21-31	16,170	14	10.18	6.83	9.09	.16	2.92	21.44	1.44	.04	.07	.24	1,690	2.30	37,170	35	2,170	7.6
Aug. 1-10	19,010	14	9.48	6.00	8.00	.16	2.74	19.20	1.21	.03	.07	.26	1,520	2.07	39,300	34	1,970	7.8
Aug. 11-20	12,360	15	9.23	5.43	6.83	.31	2.67	17.68	1.07	.04	.08	.26	1,410	1.92	23,700	31	1,820	7.8
Aug. 21-31	19,580	14	9.13	5.18	6.48	.26	2.81	17.01	.96	.03	.10	.22	1,350	1.84	35,950	31	1,770	7.7
Sept. 1-10	11,070	13	9.03	5.02	6.04	.28	2.59	16.70	.87	.03	.08	.27	1,320	1.80	19,870	30	1,730	7.7
Sept. 11-20	6,080	8.9	9.23	5.43	6.61	.33	2.72	17.65	.99	.03	.07	.28	1,400	1.90	11,580	31	1,810	7.6
Sept. 21-30	7,970	3.4	9.18	5.59	6.09	.28	2.47	17.95	1.02	.03	.07	.28	1,380	1.88	14,960	29	1,820	7.5
Total or weighted average	160,900	13	10.93	6.83	9.09	0.23	3.06	22.28	1.41	0.04	0.07	0.30	1,750	2.38	383,300	34	2,230	--

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 1951.
Water temperatures: January 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 4,070 micromhos Jan. 5; minimum, 319 micromhos July 16.
Percent sodium: Maximum, 71 Jan. 5; minimum, 38 May 3-5.
EXTREMES, January 1950 to September 1951.--Specific conductance: Maximum, 4,070 micromhos Jan. 5, 1951; minimum, 319 micromhos July 16, 1951.
Percent sodium: Maximum, 71 Jan. 5, 1951; minimum, 36 July 18-20, 1950.
REMARKS.--Records of specific conductance of daily samples available in district office at Stillwater, Okla. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1211.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 8, 1950 ---	32,570	--	5.19	2.30	10.00		3.51	5.04	8.88	--	0.06	--	1,110	1.51	49,210	57	1,780	--
Oct. 4-7----------	27,530	--	5.99	2.80	12.23		3.80	5.89	11.28	--	.05	--	1,260	1.71	47,220	58	2,110	--
Oct. 9-10----------	31,100	--	3.09	1.15	4.71		2.56	2.35	3.98	--	.06	--	559	.76	23,670	53	926	--
Oct. 11-13----------	33,160	--	3.39	1.40	5.75		2.64	2.71	5.13	--	.06	--	643	.87	29,030	55	1,070	--
Oct. 14-16----------	20,010	--	4.69	1.97	8.52		3.24	4.41	7.47	--	.06	--	944	1.26	25,720	56	1,510	--
Oct. 17-20----------	21,440	--	5.84	2.88	10.52		3.89	5.95	9.36	--	.04	--	1,190	1.62	34,730	55	1,890	--
Oct. 21-31----------	51,110	15	5.94	2.96	12.92	0.26	3.74	6.48	11.34	0.03	.04	--	1,340	1.82	93,240	59	2,150	7.6
Nov. 1-10 ----------	41,650	13	5.89	3.04	13.48	.26	3.75	6.10	12.69	.03	.03	--	1,380	1.88	78,250	59	2,240	7.6
Nov. 11-20 ---------	38,780	13	6.49	2.96	14.00	.31	4.56	5.77	12.69	.00	.03	--	1,410	1.92	74,430	59	2,320	7.6
Nov. 21-30 ---------	36,440	14	6.99	3.29	14.87	.21	4.64	6.50	13.96	.02	.04	--	1,540	2.09	76,360	59	2,490	8.0
Dec. 1-10 ----------	35,210	17	7.28	3.37	15.74	.28	4.77	7.20	14.95	.03	.09	--	1,620	2.20	77,640	59	2,640	8.0
Dec. 11-20 ---------	39,370	15	6.84	2.96	15.22	.19	4.62	5.91	14.36	.04	.11	--	1,520	2.07	81,460	60	2,550	7.8
Dec. 21-31 ---------	39,490	15	6.84	3.12	16.09	.18	4.49	6.83	14.95	.03	.12	--	1,590	2.16	85,470	61	2,630	7.9
Jan. 1-4, 6-10, 1951-	32,750	--	6.19	3.29	16.47		4.36	6.00	15.51	--	.08	--	1,560	2.12	69,540	63	2,590	--
Jan. 5 ----------	3,808	--	7.68	3.95	29.02		4.26	5.85	30.46	--	.08	--	2,530	3.44	13,120	71	4,070	--
Jan. 11-20----------	35,900	12	6.94	3.29	16.92	.16	4.47	7.04	15.51	.02	.11	--	1,650	2.24	80,640	62	2,720	7.8
Jan. 21-31----------	37,110	--	7.19	3.45	17.22		4.49	6.93	16.36	--	.08	--	1,680	2.28	84,870	62	2,830	--

Feb. 1-10	35,840	13	7.68	3.78	19.05	.20	4.84	7.20	18.47	.02	.09	--	1,820	2.48	88,800	62	3,000	7.8
Feb. 11-20	36,480	--	6.69	3.21	15.83		4.25	5.75	15.65	--	.08	--	1,550	2.11	76,960	62	2,580	--
Feb. 21, 26-28	25,690	--	7.28	3.54	17.95		3.66	6.54	18.47	--	.10	--	1,750	2.38	61,190	62	2,900	--
Feb. 22-25	44,370	--	5.44	2.38	10.68		3.06	4.23	11.14	--	.07	--	1,120	1.52	67,650	58	1,890	--
Mar. 1-2, 5-10	52,380	--	6.69	3.29	16.74		3.99	6.65	15.79	--	.09	--	1,600	2.18	114,100	63	2,630	--
Mar. 3-4	15,070	--	6.04	2.88	13.87		3.54	5.77	13.40	--	.08	--	1,360	1.88	28,320	61	2,290	--
Mar. 11-20	48,060	13	6.84	3.21	16.61	.23	4.34	6.83	15.65	.02	.09	--	1,620	2.20	106,000	62	2,640	7.8
Mar. 21-31	47,230	--	6.49	3.45	17.04		3.67	6.93	16.36	--	.02	--	1,640	2.23	105,400	63	2,700	--
Apr. 1-3, 9	37,090	--	4.79	2.06	9.77		3.23	3.56	9.73	--	.10	--	1,000	1.36	50,490	59	1,710	7.6
Apr. 4-5, 10	24,260	--	5.69	2.38	12.70		3.51	4.41	12.75	--	.10	--	1,280	1.74	42,270	61	2,140	7.6
Apr. 6-8	19,810	--	6.59	2.80	17.45		3.79	4.77	18.19	--	.09	--	1,660	2.26	44,780	65	2,770	7.8
Apr. 11-20	66,330	13	4.79	2.22	14.65	.23	3.31	4.14	14.67	.02	.03	0.16	1,360	1.85	122,800	67	2,270	8.1
Apr. 21-30	50,640	6.0	4.79	2.55	15.13	.18	3.02	4.75	15.65	.02	.02	.13	1,460	1.99	100,600	67	2,430	7.8
May 1, 7	67,720	--	3.09	1.15	5.55		2.54	1.56	5.64	--	.05	--	587	.80	54,110	57	1,020	7.9
May 2, 6	108,900	--	2.40	.82	3.38		2.20	1.02	3.33	--	.05	--	408	.55	60,480	51	698	7.8
May 3-5	246,100	--	2.00	.66	1.66		1.98	.60	1.69	--	.05	--	265	.36	88,790	38	449	7.8
May 8-10	42,720	--	3.99	1.48	7.68		3.24	2.23	7.62	--	.06	--	810	1.10	47,110	58	1,370	7.8
May 11, 18	54,470	--	4.59	1.73	8.90		3.29	2.33	9.53	--	.07	--	984	1.34	72,960	58	1,620	--
May 12-17	87,170	--	3.69	1.48	6.48		2.80	2.16	6.63	--	.06	--	744	1.01	88,290	56	1,250	8.0
May 19-20	306,400	--	1.80	.69	3.28		1.72	.77	3.24	--	.04	--	366	.50	152,700	57	636	8.2
May 21, 24	361,400	--	2.00	.81	3.82		1.74	1.17	3.67	--	.05	--	409	.56	201,200	58	706	8.2
May 22-23, 25	388,800	--	2.34	.82	5.13		1.90	1.54	4.80	--	.05	--	512	.70	271,000	62	880	7.9
May 26-31	386,200	--	3.59	1.32	6.80		2.57	3.23	5.87	--	.04	--	747	1.02	392,700	58	1,230	8.1
June 1, 8	86,880	--	4.69	1.81	7.55		a3.12	4.50	6.35	--	.08	--	854	1.16	101,000	54	1,400	8.5
June 2-7	143,800	--	5.64	2.14	9.92		3.67	5.52	8.46	--	.05	--	1,100	1.50	215,300	56	1,780	8.0
June 9-10	205,100	--	2.30	.72	2.76		1.88	1.23	2.62	--	.05	--	346	.47	96,600	48	604	8.1
June 11-12, 15-16, 19	236,600	--	2.79	1.07	4.48		2.26	2.19	3.84	--	.05	--	506	.69	163,000	54	855	--
June 13-14, 17-18, 20	191,800	--	3.54	1.32	5.49		2.67	2.89	4.74	--	.05	--	642	.87	167,600	53	1,090	7.6
June 21, 23, 25	243,200	--	2.99	1.07	4.98		2.29	2.35	4.34	--	.06	--	544	.74	160,100	55	934	8.2
June 22, 29-30	204,700	--	2.64	.90	3.93		2.11	1.98	3.33	--	.05	--	461	.63	128,500	53	777	--
June 24, 26-28	519,700	--	2.00	.68	3.23		1.79	1.29	2.79	--	.04	--	359	.49	254,000	55	623	7.8
July 1, 5-8	620,400	--	2.34	.90	2.88		1.98	1.62	2.48	--	.04	--	382	.52	322,600	47	630	7.3
July 2-4	667,800	--	1.75	.62	2.01		1.66	.96	1.72	--	.04	--	278	.38	252,700	46	462	7.6
July 9-10	102,500	--	3.89	1.56	4.86		2.70	3.10	4.46	--	.05	--	658	.89	91,850	47	1,060	7.4
July 11-13	156,100	--	3.89	1.64	5.75		2.67	3.14	5.42	--	.05	--	678	.92	144,100	51	1,120	8.1
July 14, 18	246,300	--	2.10	.81	2.35		1.75	1.23	2.23	--	.05	--	331	.45	111,000	45	565	7.5
July 15-17	611,700	--	1.20	.59	1.50		1.34	.71	1.18	--	.06	--	208	.28	173,200	46	345	7.1
July 19-20	143,800	--	2.70	1.07	3.34		2.31	1.81	2.93	--	.06	--	446	.61	87,300	47	725	8.0
July 21, 26-28	169,600	--	3.14	1.32	4.26		2.52	2.37	3.78	--	.05	--	547	.74	126,300	49	913	8.1
July 22-25, 29-31	212,000	--	3.69	1.81	6.54		3.56	3.21	5.22	--	.05	--	748	1.02	215,900	54	1,200	8.1

a Includes 0.20 equivalents per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT RALSTON, OKLA.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951-----	147,900	18	5.19	2.30	8.48	0.20	4.02	4.20	8.18	0.02	0.03	0.25	1,010	1.37	203,400	52	1,630	7.9
Aug. 11-12, 17, 20 --	54,620	--	4.94	2.14	8.68		3.56	4.04	8.12	--	.04	--	926	1.26	68,860	55	1,560	8.0
Aug. 13-16, 18-19---	96,360	--	3.79	1.81	6.72		2.95	2.89	6.43	--	.05	--	736	1.00	96,540	55	1,270	7.9
Aug. 21-31 ---------	106,500	18	4.94	2.22	9.04	.18	3.70	4.12	8.60	.02	.05	.25	1,010	1.37	146,400	55	1,650	8.1
Sept. 1-7----------	76,070	--	4.64	1.89	8.58		3.41	3.25	8.40	--	.05	--	919	1.25	95,160	57	1,550	7.9
Sept. 8-10----------	158,300	--	1.85	.68	2.44		1.85	.79	2.28	--	.05	--	321	.44	69,160	49	536	7.6
Sept. 11, 14-16 -----	223,900	--	2.15	.82	3.91		1.98	1.46	3.38	--	.06	--	397	.54	121,000	57	713	7.7
Sept. 12-13, 17-20 --	202,100	--	2.94	.41	6.45		2.18	2.35	5.22	--	.05	--	590	.80	162,300	66	1,030	7.5
Sept. 21-23---------	53,240	--	4.09	1.97	7.44		3.20	3.62	6.63	--	.05	--	828	1.13	60,000	55	1,390	8.2
Sept. 24, 29-30 -----	67,320	--	2.84	.99	4.34		2.21	1.96	3.95	--	.05	--	504	.69	46,190	53	865	7.7
Sept. 25-28---------	187,800	--	2.40	.81	2.67		2.02	1.33	2.68	--	.05	--	382	.52	97,670	47	641	7.6
Total or weighted average --	9,246,648	--	3.04	1.23	5.35		2.38	2.31	4.91	--	0.05	--	593	0.81	7,461,050	56	991	--

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 1951.
Water temperatures: October 1945 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 3,830 micromhos Jan. 12; minimum, 327 micromhos July 22.
Percent sodium: Maximum, 69 Jan. 1-3, 10, 11-13, 21-27; minimum, 32 July 18-27.
EXTREMES, 1945-1951.--Specific conductance: Maximum, 3,830 micromhos Jan. 12, 1951; 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 concentrations less than 1,000 ppm are residue on evaporation and for concentrations more than 1,000 ppm are sum of determined constituents. Records of specific conductance of daily samples available in district office at Fayetteville, Ark. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1211.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950 ------	156,100	--	2.69	0.82	4.44	--	2.05	1.25	4.37	--	0.04	--	462	0.63	98,340	56	816	8.1
Oct. 4-10 ----------	351,300	--	3.09	1.15	5.74	--	a2.29	1.33	5.87	--	.07	--	595	.81	284,600	58	1,010	8.3
Oct. 11, 16-20 ------	248,700	18	2.59	.99	5.39	0.26	2.08	1.15	5.50	0.03	.07	--	531	.72	179,100	58	955	8.1
Oct. 12-15 ----------	171,200	--	3.34	1.32	6.48	--	2.43	1.83	6.54	--	.05	--	672	.91	155,800	58	1,140	8.2
Oct. 21-26 ----------	165,000	--	3.44	1.07	6.00	--	b2.56	1.50	6.35	--	.05	--	635	.86	141,900	57	1,100	8.4
Oct. 27-31 ----------	89,970	--	4.79	2.06	10.57	--	b3.15	2.52	11.70	--	.05	--	998	1.36	122,400	61	1,810	8.4
Nov. 1-10 ----------	171,700	16	4.54	1.89	11.48	.38	2.79	2.29	12.55	.02	.05	0.08	1,050	1.43	245,500	63	1,880	8.4
Nov. 11-15, 18-20 ---	120,700	--	4.89	1.97	12.52	--	b2.85	2.21	13.82	--	.04	--	1,090	1.48	178,600	65	1,950	8.4
Nov. 16-17 ----------	31,260	--	5.64	2.30	14.61		a3.08	2.37	17.06	--	.04	--	1,290	1.75	54,700	65	2,460	8.4
Nov. 21-22, 25-27 ---	70,250	--	4.49	1.81	11.44	--	c2.82	1.89	12.83	--	.04	--	1,010	1.37	96,240	64	1,840	8.5
Nov. 23-24, 28-30 ---	69,220	--	5.39	2.22	13.35	--	c2.99	2.31	15.09	--	.04	--	1,180	1.60	110,800	64	2,260	8.5

a Includes 0.07 equivalents per million of carbonate (CO_3).
b Includes 0.13 equivalents per million of carbonate (CO_3).
c Includes 0.20 equivalents per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-2, 7-10, 1951	77,950	--	5.59	2.38	14.65	--	d3.28	2.66	17.34	--	0.04	0.00	1,320	1.80	140,300	65	2,410	8.5
Dec. 3-6	54,110	--	4.89	1.97	13.13	--	2.95	2.37	14.72	--	.04	.00	1,150	1.56	84,410	66	2,160	7.8
Dec. 11, 14	24,520	--	5.29	2.06	12.61	--	3.11	2.27	14.52	--	.04	.00	1,140	1.55	38,010	63	2,120	8.2
Dec. 12-13	23,090	--	4.79	1.89	10.48	--	2.92	1.69	12.75	--	.07	.00	985	1.34	30,940	61	1,840	7.7
Dec. 15-20	75,490	12	5.59	2.38	15.92	0.31	3.26	2.62	17.91	0.01	.05	--	1,420	1.93	145,700	66	2,500	8.3
Dec. 21-23, 30-31	66,330	--	6.14	2.47	16.83	--	3.46	2.44	20.31	--	.04	.00	1,480	2.01	133,300	66	2,740	7.9
Dec. 24-29	78,590	--	5.29	2.06	14.00	--	3.11	2.19	16.41	--	.04	.00	1,240	1.69	132,800	66	2,190	8.1
Jan. 1-3, 10, 1951	54,150	--	6.19	2.71	20.05	--	3.38	3.02	22.05	--	.05	.00	1,650	2.24	121,300	69	2,970	8.0
Jan. 4-9	77,590	10	5.34	2.38	15.78	.54	3.08	2.52	17.54	.02	.03	--	1,370	1.86	144,300	66	2,400	8.0
Jan. 11-13	43,160	--	6.64	2.88	21.05	--	c3.33	2.77	24.03	--	.05	--	1,740	2.37	102,300	69	3,190	8.4
Jan. 14-15, 20	57,560	--	5.04	2.22	15.00	--	2.64	2.37	17.06	--	.03	--	1,270	1.73	99,580	67	2,330	7.8
Jan. 16-19	87,070	--	4.09	2.06	11.78	--	2.49	1.94	13.11	--	.04	.00	1,010	1.37	119,300	66	1,900	8.1
Jan. 21-27	106,800	--	5.89	2.55	18.65	--	2.77	2.52	21.43	--	.05	.00	1,550	2.11	225,300	69	2,870	8.0
Jan. 28-31	45,040	--	4.89	2.30	14.09	--	2.93	2.42	15.37	--	.05	.00	1,200	1.63	73,420	66	2,230	8.2
Feb. 1-4, 10	46,990	--	4.99	2.30	14.44	--	3.15	2.56	15.57	--	.04	.00	1,230	1.67	78,470	66	2,250	8.1
Feb. 5, 7, 9	50,620	--	3.99	1.89	10.39	--	2.57	2.12	11.51	--	.05	.00	977	1.33	67,320	64	1,750	7.8
Feb. 6, 8	34,510	--	3.54	1.56	8.35	--	2.38	1.87	9.25	--	.04	--	617	1.11	38,310	62	1,390	7.8
Feb. 11-14	71,720	--	4.44	1.97	12.26	--	2.56	2.08	13.76	--	.02	.00	1,060	1.44	103,300	66	1,980	8.1
Feb. 15-16	115,000	--	2.74	1.32	7.04	--	1.57	1.29	8.18	--	.03	--	649	.88	101,200	63	1,220	7.7
Feb. 17, 19	204,300	--	1.40	.70	3.04	--	1.11	1.10	3.10	--	.03	--	328	.45	91,940	59	561	7.8
Feb. 18, 20-28	1,907,000	--	2.00	.90	4.44	--	1.31	1.52	4.85	--	.03	--	440	.60	1,144,000	60	773	7.7
Mar. 1-6	529,000	--	2.30	.79	3.57	--	1.61	.92	4.03	--	.04	.00	427	.58	306,800	54	694	7.5
Mar. 7-10	284,600	--	2.69	1.15	4.96	--	1.77	1.37	5.64	--	.05	.00	562	.76	216,300	56	901	7.7
Mar. 11, 15-20	580,000	--	2.10	.81	3.35	--	1.52	1.00	3.64	--	.03	.00	400	.54	313,200	54	656	8.0
Mar. 12-14	426,800	--	2.79	.99	5.44	--	1.69	1.00	6.15	--	.05	.00	586	.80	341,400	59	952	7.9
Mar. 21-29	348,300	9.9	3.04	1.15	5.67	.21	2.23	1.39	6.35	.01	.06	.00	617	.84	292,600	57	1,050	7.3
Mar. 30-31	47,210	--	3.99	1.73	9.00	--	2.36	1.92	10.29	--	.04	.00	893	1.21	57,120	61	1,520	8.0

c Includes 0.20 equivalents per million of carbonate (CO_3).
d Includes 0.33 equivalents per million of carbonate (CO_3).

Apr. 1-4, 8-10 ------	163,200	--	3.69	1.64	9.13	--	2.23	1.62	10.29	--	.03	.00	906	1.23	200,700	63	1,520	7.8
Apr. 5-7 ----------	65,380	--	5.19	2.55	15.18	--	2.66	2.52	17.15	--	.11	--	1,300	1.77	115,700	66	2,370	7.8
Apr. 11, 14 ---------	114,200	--	4.24	1.81	10.18	--	2.59	1.77	11.22	--	.11	--	908	1.24	141,600	63	1,690	7.5
Apr. 12-13, 15-20 ---	378,800	--	3.04	1.15	7.57	--	2.28	1.48	8.12	--	.06	--	764	1.04	394,000	64	1,300	8.0
Apr. 21-30 ---------	460,000	7.3	2.94	1.32	7.48	.12	1.84	1.29	8.24	.02	.05	.00	699	.95	437,000	63	1,220	7.7
May 1-6 ----------	623,000	--	2.74	1.15	5.96	--	2.00	1.10	6.35	--	.06	--	608	.83	517,100	61	1,040	7.9
May 7-12 ----------	671,800	--	2.00	.72	2.35	--	1.92	.65	2.28	--	.06	--	342	.47	315,700	46	521	7.7
May 13-15 ----------	223,300	--	2.74	.99	3.35	--	2.16	.96	3.61	--	.15	--	433	.59	131,700	47	726	7.9
May 16, 18-19 -------	191,600	--	2.89	1.15	5.09	--	2.33	1.25	5.39	--	.14	--	574	.78	149,400	56	960	8.0
May 17, 20 ----------	218,600	--	3.99	1.64	7.22	--	2.74	1.77	7.84	--	.16	--	825	1.12	244,800	56	1,300	8.0
May 21-23 ----------	880,700	--	3.39	1.32	8.74		2.41	1.89	9.00	--	.13	--	862	1.17	1,030,000	65	1,440	7.9
May 24-26, 29-31 ----	1,221,000	14	3.14	1.15	5.61	.14	2.25	1.69	6.15	.03	.05	--	638	.87	1,062,000	56	1,070	7.6
May 27-28 ----------	499,800	--	2.20	.90	4.00	--	2.02	1.35	3.86	--	.04	--	457	.62	309,900	56	758	7.6
June 1-6, 9, 11-12 ---	1,174,000	13	3.34	1.32	5.26	.15	2.41	2.14	5.30	.02	.06	--	622	.85	997,900	52	1,010	7.8
June 7-8 ----------	118,800	--	4.29	1.56	7.31	--	2.67	2.77	7.05	--	.06	--	749	1.02	121,200	56	1,320	7.6
June 10, 13-18, 20 ---	1,547,000	--	1.95	.99	3.61	--	1.97	1.19	3.53	--	.04	.10	411	.56	866,300	55	692	7.8
June 19, 21-30 ------	2,098,000	--	2.84	.99	3.61	--	2.20	1.42	3.58	--	.04	.06	426	.58	1,217,000	49	759	7.7
July 1, 4-5, 9 -------	1,579,000	--	2.45	.68	2.78	--	2.00	1.10	2.68	--	.04	.28	359	.49	773,700	47	594	7.7
July 2-3, 6-8, 10 ----	2,442,000	--	2.15	.62	1.91	--	1.95	.94	1.83	--	.05	.10	294	.40	976,800	40	486	7.4
July 11-17 ----------	2,339,000	11	2.35	.75	1.65	.11	2.06	.94	1.61	.02	.04	--	286	.39	912,200	34	470	7.2
July 18-27----------	3,743,000	--	1.90	.53	1.13	--	1.84	.65	1.10	--	.04	.10	216	.29	1,085,000	32	381	7.6
July 28-31 ----------	718,800	--	2.30	.67	2.39	--	2.06	.94	2.48	--	.04	.05	318	.43	309,100	45	571	7.7
Aug. 1-10 ----------	775,900	13	2.79	1.07	3.57	.12	2.41	1.12	3.78	.02	.04	--	468	.64	496,600	47	761	7.8
Aug. 11-15 ----------	260,100	--	2.99	1.07	3.87	--	2.25	1.42	4.51	--	.08	.27	502	.68	190,500	49	841	7.6
Aug. 16-20 ----------	212,800	--	3.64	1.48	6.13	--	2.77	1.81	6.66	--	.05	.12	682	.93	197,900	54	1,160	7.3
Aug. 21-29 ----------	279,300	--	3.19	1.23	5.00	--	2.54	1.48	5.56	--	.09	.27	572	.78	217,900	53	997	7.7
Aug. 30-31 ----------	42,840	--	3.79	1.40	6.09	--	2.93	1.75	6.99	--	.05	--	707	.96	41,130	54	1,210	7.6
Sept. 1-5, 8, 11 -----	324,500	15	3.49	1.40	6.17	.15	2.52	1.42	6.77	.03	.06	.24	658	.89	288,800	55	1,110	7.8
Sept. 6-7, 9-10, 12 --	355,000	--	2.59	.90	4.17	--	2.18	1.02	4.51	--	.07	.30	477	.65	230,800	54	821	7.6
Sept. 13-20 ---------	1,531,000	--	2.20	.59	2.35	--	1.95	.60	2.54	--	.06	.10	316	.43	658,300	46	546	8.0
Sept. 21-23, 29-30 ---	491,500	--	2.25	.65	2.44	--	2.06	.83	2.51	--	.06	.08	332	.45	221,200	46	566	7.6
Sept. 24-28 ---------	348,100	--	2.64	.82	3.26	--	2.36	1.08	3.38	--	.06	.13	438	.58	201,900	49	717	7.8
Total or weighted average -	33,274,920	--	2.64	0.99	4.17	--	2.06	1.23	4.43	--	0.05	--	474	0.64	21,464,730	53	811	--

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT MANNFORD, OKLA.

LOCATION.--At county highway bridge half a mile north of Mannford, Creek County, 1½ miles downstream from House Creek, and 18 miles upstream from mouth.
DRAINAGE AREA.--18,822 square miles (revised).
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1951.
Water temperatures: October 1949 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 20,200 micromhos Feb. 1, Apr. 8; minimum, 964 micromhos Sept. 10.
Percent sodium: Maximum, 88 Apr. 8; minimum, 63 Sept. 10.
EXTREMES, 1949-51.--Specific conductance: Maximum, 20,200 micromhos Feb. 1, Apr. 8, 1951; minimum, 964 micromhos Sept. 10, 1951.
Percent soduim: Maximum, 88 Apr. 8, 1951; minimum, 63 Sept. 10, 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Stillwater, Okla. No discharge records available for this station for period October 1950 to September 1951.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-7, 1950		--	10.48	4.60	48.73		3.61	6.54	53.59	--	0.07		4,100	5.58		76	6,450	--
Oct. 8-10		--	13.07	5.84	79.59		3.92	7.62	86.87	--	.09		6,200	8.43		81	9,510	--
Oct. 11-12, 18-20		--	12.83	6.00	74.69		4.07	7.52	81.79	--	.14		5,700	7.75		80	8,880	--
Oct. 13-17		--	10.73	4.93	56.13		3.77	5.89	62.05	--	.08		4,480	6.09		78	7,140	--
Oct. 21-31		14	14.97	7.32	89.14	0.54	3.31	7.56	100.97	0.02	.06		6,840	9.30		80	10,700	7.7
Nov. 1-10		16	16.27	7.90	99.15	.69	3.33	7.79	109.43	.00	.04		7,520	10.23		80	11,700	7.6
Nov. 11-20		--	17.37	8.63	110.09		4.00	8.22	123.81	--	.06		8,450	11.49		81	13,000	--
Nov. 21-30		16	17.32	8.47	109.58	.72	4.42	8.60	120.71	.00	.02		8,350	11.36		81	12,700	7.7
Dec. 1-10		--	18.86	8.63	113.48		4.65	8.54	127.76	--	.02		8,730	11.87		80	14,000	--
Dec. 11-20		13	17.07	8.39	98.28	.82	4.88	8.06	112.25	.00	.10		7,750	10.54		79	12,600	7.6
Dec. 21-31		12	15.82	7.73	103.49	.77	4.56	8.68	114.50	.01	.07		7,810	10.62		81	12,500	7.7
Jan. 1-10, 1951		--	14.72	7.32	97.41		4.42	7.83	107.17	--	.03		7,340	9.98		82	12,000	--
Jan. 11-20		6.6	15.17	7.81	111.32	.44	4.06	8.49	120.15	.02	.06		8,160	11.10		83	13,100	7.9
Jan. 21-27		--	14.82	7.48	111.16		3.95	8.74	120.71	--	.06		8,020	10.91		83	12,800	--
Jan. 28-31		--	18.36	8.88	152.23		4.54	10.72	164.14	--	.07		10,700	14.55		85	17,100	--
Feb. 1-5		--	24.55	11.35	154.41		3.57	8.95	177.68	--	.11		11,900	16.18		81	18,400	--
Feb. 6-10		--	16.72	7.90	104.59		4.23	6.97	117.89	--	.12		7,830	10.65		81	12,600	--
Feb. 11-19		--	15.77	7.98	104.73		3.92	7.12	117.33	--	.11		7,710	10.49		82	12,500	--
Feb. 20		--	7.19	4.11	50.77		2.90	3.79	55.28	--	.10		3,720	5.06		82	6,510	--

Feb. 21-23		--	4.94	2.71	26.54		2.90	2.73	28.48	--	.08		2,010	2.73		78	3,580	--
Feb. 24-28		--	6.99	3.54	43.86		2.82	4.64	46.82	--	.11		3,210	4.37		81	5,570	--
Mar. 1-5		--	10.48	5.43	72.16		3.75	6.72	77.56	--	.04		5,290	7.19		82	9,010	--
Mar. 6-10		--	14.17	7.16	124.22		3.88	10.20	131.43	--	.04		8,840	12.02		85	14,500	--
Mar. 11-12, 18-20		--	13.52	6.58	89.08		3.94	7.35	97.87	--	.02		6,710	9.13		82	11,000	--
Mar. 13-17		--	11.68	5.84	72.53		5.00	6.60	78.97	--	.02		5,550	7.55		81	9,300	--
Mar. 21-31	12		15.32	7.98	110.45	56	3.97	8.60	120.15	.00	.04		8,150	11.08		82	13,100	7.7
Apr. 1-7, 10		--	14.52	7.48	110.87		3.93	8.70	120.15	--	.09		8,050	10.95		83	13,000	8.1
Apr. 8		--	16.87	8.63	188.63		3.52	13.12	197.42	--	.07		13,000	17.68		88	20,200	8.2
Apr. 9		--	13.27	6.74	135.18		a3.90	10.22	141.02	--	.05		9,370	12.74		87	15,100	8.3
Apr. 11-15		--	12.48	6.33	92.76		3.69	10.72	97.02	--	.14		6,840	9.30		83	11,200	8.0
Apr. 16-20		--	14.47	6.83	114.09		3.64	11.78	119.86	--	.11		8,390	11.41		84	13,400	8.0
Apr. 21-22		--	10.08	4.11	52.81		2.49	4.62	59.79	--	.10		4,310	5.86		79	6,970	7.4
Apr. 23-30		--	11.33	6.58	85.53		3.41	7.16	92.79	--	.08		6,540	8.89		83	10,500	7.8
May 1, 9-10		--	9.93	4.93	62.79		3.10	5.37	69.10	--	.08		4,950	6.73		81	7,940	7.8
May 2, 7		--	4.49	2.06	18.08		2.56	1.81	20.17	--	.09		1,530	2.08		73	2,620	8.1
May 3, 5		--	3.14	1.32	10.89		2.41	1.37	11.51	--	.06		918	1.25		71	1,630	8.2
May 4, 6		--	3.69	1.56	13.43		2.39	1.79	14.38	--	.12		1,170	1.59		72	2,010	7.6
May 8		--	7.48	3.21	31.58		b2.74	3.02	36.38	--	.13		2,720	3.70		75	4,380	8.5
May 11-12		--	12.52	6.17	90.51		a3.95	7.27	97.87	--	.11		6,870	9.34		83	11,000	8.3
May 13, 18		--	8.98	5.10	57.79		c3.49	5.66	62.61	--	.11		4,390	5.97		80	7,280	8.4
May 14-15		--	3.99	2.47	17.74		2.38	1.83	19.88	--	.11		1,510	2.05		73	2,620	8.0
May 16, 19-20		--	4.99	2.22	25.17		2.21	3.29	26.79	--	.09		1,980	2.69		78	3,370	7.9
May 17		--	8.18	6.74	33.51		d2.78	3.14	42.30	--	.21		3,240	4.41		69	5,120	8.4
May 21, 26-29		--	5.84	2.30	23.39		2.69	4.08	24.68	--	.08		1,960	2.67		74	3,370	8.1
May 22-23, 30		--	4.54	1.81	18.80		2.69	3.50	18.90	--	.06		1,580	2.15		75	2,690	7.8
May 24-25, 31		--	3.79	1.48	13.83		2.44	2.77	13.82	--	.07		1,200	1.63		72	2,040	7.7
June 1-2, 10		--	4.54	2.22	17.71		2.77	3.44	18.19	--	.07		1,490	2.03		72	2,580	7.9
June 3-7		--	7.34	3.54	26.86		3.39	5.48	28.77	--	.10		2,340	3.18		71	3,940	7.8
June 8-9		--	3.99	1.97	12.83		2.46	2.87	13.40	--	.06		1,170	1.59		68	2,020	7.8
June 11, 20		--	5.19	2.30	18.87		2.46	4.81	19.04	--	.05		1,670	2.27		72	2,740	7.9
June 12-13		--	7.14	3.54	33.90		b3.26	6.27	34.97	--	.08		2,800	3.81		76	4,480	8.5
June 14-15, 19		--	3.64	1.64	12.98		2.23	3.00	12.97	--	.06		1,200	1.63		71	1,970	8.2
June 16-17		--	2.89	1.23	7.80		2.23	1.79	7.84	--	.06		765	1.04		65	1,280	--
June 21, 25-26, 29-30		--	5.49	1.97	15.25		2.10	4.75	15.79	--	.07		1,410	1.92		67	2,420	8.1
June 22, 27-28		--	6.74	2.30	21.79		e2.43	5.87	22.42	--	.11		1,900	2.58		71	3,260	8.3
June 23-24		--	3.19	1.23	9.83		a2.28	2.16	9.73	--	.08		847	1.15		69	1,510	8.4

a Includes 0.10 equivalents per million of carbonate (CO_3).
b Includes 0.23 equivalents per million of carbonate (CO_3).
c Includes 0.20 equivalents per million of carbonate (CO_3).
d Includes 0.17 equivalents per million of carbonate (CO_3).
e Includes 0.07 equivalents per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT MANNFORD, OKLA.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Specific conductance (micromhos at 25°C)	pH
July 1, 3-4, 8, 1951 --		--	4.54	1.73	15.88		a2.11	3.60	16.36	--	0.08		1,370	1.86		72	2,390	8.4
July 2 ----------		--	6.79	2.38	17.74		e2.08	6.81	17.91	--	.11		1,680	2.28		66	2,780	8.4
July 5-7, 9-10 -------		--	3.89	1.32	10.07		e2.08	2.85	10.29	--	.06		931	1.27		66	1,650	8.3
July 11-12 ----------		--	4.64	1.81	12.53		a2.38	3.62	12.97	--	.01		1,170	1.59		66	2,000	8.3
July 13-14, 16-18 ----		--	5.89	2.63	19.31		2.98	4.64	20.17	--	.04		1,700	2.31		69	2,930	7.6
July 15, 19-20 -------		--	8.08	3.70	28.56		3.31	6.48	30.46	--	.09		2,490	3.39		71	4,170	8.0
July 21-22, 27-28 ----		--	8.43	4.11	33.86		f3.27	6.70	36.38	--	.05		2,790	3.79		73	4,710	8.5
July 23-26, 29-31 ----		--	9.33	4.52	42.09		3.39	7.64	44.84	--	.07		3,490	4.75		75	5,840	8.1
Aug. 1, 3-7 ---------		--	10.43	4.60	45.85		a3.06	8.68	49.07	--	.07		3,750	5.10		75	6,220	8.3
Aug. 2, 8-10 --------		--	11.18	5.51	55.84		2.75	9.08	60.64	--	.06		4,530	6.16		77	7,390	8.2
Aug. 11, 17-20-------		--	10.33	5.26	63.65		2.85	7.20	69.10	--	.09		4,700	6.39		80	7,610	8.1
Aug. 12-13 ----------		--	5.49	2.55	24.01		c2.76	3.56	25.66	--	.09		2,010	2.73		75	3,450	8.3
Aug. 14-16 ----------		--	7.83	4.19	29.09		g3.01	5.16	42.87	--	.07		3,150	4.28		76	5,190	8.5
Aug. 21-24 ----------		--	10.98	5.76	67.05		2.90	7.52	73.33	--	.04		4,880	6.64		80	8,020	7.9
Aug. 25-31 ----------		--	14.12	6.83	95.41		2.38	7.89	106.04	--	.05		6,770	9.21		82	11,000	8.0
Sept. 1-5----------		--	13.57	7.24	98.63		2.33	9.62	107.45	--	.04		7,190	9.78		83	11,600	7.6
Sept. 6-7----------		--	12.97	6.99	69.16		2.49	8.95	77.56	--	.12		5,350	7.28		78	8,820	7.6
Sept. 8-9----------		--	4.19	2.30	19.86		1.92	2.08	22.28	--	.07		1,620	2.20		75	2,840	7.6
Sept. 10----------		--	2.34	.90	5.42		1.38	.46	6.77	--	.05		568	.77		63	964	7.8
Sept. 11-12----------		--	2.54	.99	8.98		2.03	1.10	9.31	--	.07		768	1.04		72	1,350	7.8
Sept. 13-14----------		--	4.44	1.73	16.01		2.16	1.37	18.61	--	.04		1,410	1.92		72	2,430	7.8
Sept. 15----------		--	8.28	4.28	60.44		3.10	8.24	61.48	--	.18		4,540	6.17		83	7,730	8.1
Sept. 16-20----------		--	4.99	2.30	33.41		2.34	3.29	34.97	--	.10		2,640	3.59		82	4,430	7.9
Sept. 21-25, 27 ------		--	6.84	3.45	39.58		2.72	4.20	42.87	--	.08		2,930	3.98		79	5,040	8.0
Sept. 26, 28-30 ------		--	11.68	5.43	72.25		3.34	5.56	80.38	--	.08		5,440	7.40		81	8,670	8.1

a Includes 0.10 equivalents per million of carbonate (CO_3).
c Includes 0.20 equivalents per million of carbonate (CO_3).
e Includes 0.07 equivalents per million of carbonate (CO_3).
f Includes 0.27 equivalents per million of carbonate (CO_3).
g Includes 0.40 equivalents per million of carbonate (CO_3).

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 (revised).
RECORDS AVAILABLE.--Chemical analyses: June 1948 to September 1951.
Water temperatures: February 1949 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 3,600 micromhos Mar. 2; minimum, 416 micromhos May 14.
Percent sodium: Maximum, 71 Apr. 5-6, June 14, 18-30; minimum, 50 Aug. 11-12.
EXTREMES, 1948-51.--Percent sodium: Maximum, 71 Apr. 5-6, 1951, June 14, 18-30, 1951; minimum, 11 Nov. 11-20, 1948.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residue on evaporation and for concentrations more than 1,000 ppm are sum of determined constituents unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Discharge records for gaging station near Amarillo for water year October 1950 to September 1951 given in Water-Supply Paper 1211. Total acre feet values reported are adjusted to reflect small discharge of sewage effluent entering Canadian River between sampling point and gaging station. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 17, 1950 --	6,490	20	2.69	1.73	5.39		3.62	3.06	3.02	0.04	0.07		603	0.82	5,320	55	974	7.5
Oct. 4-10 ----------	936	17	3.24	2.14	9.26		3.36	5.39	5.78	.04	.07		913	1.24	1,160	63	1,460	8.2
Oct. 11-16, 18-20 --	462	17	3.29	2.88	11.68		3.75	6.43	7.61	.04	.02		1,080	1.47	679	65	1,770	7.4
Oct. 21-26, 30-31 --	294	19	3.19	3.04	12.20		3.93	6.54	7.90	.02	.04		1,120	1.52	447	66	1,910	8.1
Oct. 27-29 ---------	89	18	3.89	3.70	15.51		3.69	8.60	10.72	.03	.06		1,410	1.92	171	67	2,330	8.0
Nov. 1-10 ----------	327	20	3.14	2.80	9.62		4.49	5.52	5.50	.03	.02		963	1.31	428	62	1,520	8.1
Nov. 11-15 --------	151	20	2.89	3.04	10.30		5.15	5.77	5.25	.04	.02		965	1.31	198	63	1,520	8.0
Nov. 16-20 --------	131	20	2.59	2.22	6.60		4.90	3.41	3.05	.04	.01		671	.91	119	58	1,080	7.9
Nov. 21-30 --------	256	21	2.64	2.38	7.95		4.61	4.35	3.95	.04	.02		780	1.06	271	61	1,250	8.1
Dec. 1-10 ----------	206	19	2.94	2.47	8.14		4.16	5.10	4.23	.04	.02		824	1.12	231	60	1,310	7.9
Dec. 11-20 --------	335	17	3.59	3.29	10.96		4.67	6.00	7.11	.04	.02		1,060	1.44	482	61	1,750	7.8
Dec. 21-24, 29-31---	300	16	3.74	3.04	12.18		4.57	6.31	8.04	.04	.00		1,130	1.54	462	64	1,830	7.8
Dec. 25-28 --------	157	18	2.79	2.22	5.90		4.67	2.79	3.41	.04	.00		648	.88	138	54	1,100	7.2
Jan. 1-10, 1951 ----	466	16	3.49	3.62	11.34		4.39	5.64	8.35	.05	.02		1,090	1.48	690	81	1,810	7.7
Jan. 11-20 ---------	637	17	3.64	3.54	12.28		4.85	5.77	8.77	.05	.02		1,150	1.56	994	63	1,910	7.8
Jan. 21-30 ---------	329	18	3.19	2.96	10.62		4.29	5.62	6.80	.04	.02		1,000	1.36	447	63	1,650	8.0

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR TASCOSA, TEX.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-10, 1951	494	21	3.14	3.21	8.70		4.28	5.06	5.64	0.05	0.02		901	1.23	608	58	1,490	8.2
Feb. 11-19	345	20	3.00	3.12	12.42		4.49	6.25	7.76	.04	.00		1,110	1.51	521	67	1,820	8.2
Feb. 20-21, 23, 27-28	545	20	2.99	3.21	10.63		4.75	5.66	6.35	.06	.01		1,000	1.36	741	63	1,640	8.1
Feb. 22, 24-26	1,270	15	1.80	1.73	7.33		4.00	3.48	3.30	.05	.03		a648	.88	1,120	67	1,090	8.0
Mar. 1, 16-20	371	18	3.99	3.87	12.54		3.80	8.93	7.61	.04	.02		1,250	1.70	631	61	1,990	8.0
Mar. 2-3, 14-15	133	16	4.79	5.10	22.64		4.10	12.57	15.79	.05	.02		1,980	2.69	358	70	3,190	7.9
Mar. 21-31	1,050	18	4.09	3.95	13.92		3.79	8.74	9.36	.04	.03		1,340	1.82	1,910	63	2,190	8.3
Apr. 1-4, 7-10	391	23	3.39	3.54	13.08		3.97	7.02	8.97	.04	.01		1,210	1.65	645	65	2,030	8.2
Apr. 5-6	71	16	3.59	4.11	18.84		3.65	8.43	14.38	.05	.03		1,600	2.18	155	71	2,720	8.3
Apr. 11-13, May 13,14	76	22	3.49	2.88	11.69		4.06	6.77	7.19	.04	.00		1,100	1.50	114	65	1,810	8.0
May 14, 15, 16	24,260	16	1.30	.72	3.08		3.10	.85	1.13	--	.02		a297	.40	9,700	60	515	7.8
May 16, 17-20	42,780	17	2.30	1.48	6.74		3.49	3.29	3.67	.03	.04		635	.86	36,790	64	1,060	7.9
May 21-26, 31	3,930	22	2.50	1.64	7.64		3.39	4.04	4.23	.05	.07		724	.98	3,850	65	1,200	8.1
May 27-30	988	27	3.39	2.71	11.49		3.65	6.37	7.50	.05	.02		1,080	1.47	1,450	65	1,770	8.1
June 1-3	401	23	4.54	3.87	16.53		4.00	9.18	11.56	.06	.14		1,520	2.07	830	66	2,480	8.1
June 4, 5, 7-11	2,840	23	2.54	1.89	10.51		3.98	5.54	5.30	.05	.07		936	1.27	3,610	70	1,500	8.1
June 5, 6, 12-13, 15-17	7,350	20	1.65	1.07	4.85		2.85	2.25	2.34	.04	.09		468	.64	4,700	64	785	8.1
June 14, 18-30	2,660	22	2.35	1.64	9.75		3.80	5.14	4.68	.05	.07		848	1.15	3,060	71	1,390	8.1
July 1-2, 3, 5-7, 11-12, 13	5,190	20	2.50	2.30	10.97		3.46	6.10	6.15	.04	.02		b1,000	1.36	7,060	70	1,620	8.0
July 3, 4, 8-10, 13, 14, 21-25	15,240	20	2.05	1.48	4.60		3.15	2.52	2.40	.05	.01		512	.70	10,670	57	830	8.2
July 13, 15-20	10,650	22	2.54	1.61	7.23		3.82	3.71	3.98	.05	.02		725	.99	10,540	62	1,160	8.2
July 26-31	3,540	18	2.40	1.73	6.32		3.05	4.21	3.13	.05	.01		690	.94	3,330	60	1,090	8.1

a Sum of determined constituents.
b Residue on evaporation.

Aug. 1-3, 5, 10 ----	2,290	15	2.35	1.56	6.29	2.82	3.87	3.44	.04	.03		664	.90	2,060	62	1,030	7.8
Aug. 4, 6-9 --------	276	21	3.09	3.21	12.11	3.64	6.72	7.95	.05	.05		1,120	1.52	420	66	1,860	7.8
Aug. 11-12 ---------	950	20	1.70	1.15	2.87	2.79	1.67	1.13	.07	.06		350	.48	456	50	566	7.9
Aug. 13-15 ---------	305	20	2.30	1.56	5.29	3.05	3.23	2.76	.06	.05		575	.78	238	58	923	8.0
Aug. 25-31 ---------	531	20	3.89	3.12	13.64	4.11	9.39	7.05	.05	.05		1,280	1.74	924	66	2,070	8.1
Sept. 7-8 ----------	998	15	1.40	.90	4.40	2.39	2.27	1.97	--	.07		413	.56	559	66	686	8.2
Sept. 9-12, 19 ------	359	15	4.09	3.29	9.95	2.98	8.37	5.92	.04	.02		1,070	1.46	524	57	1,720	8.1
Total or weighted average -	c 141,800	18	2.20	1.48	6.39	3.41	3.23	3.41	0.04	0.04		622	0.85	120,500	63	1,020	--

c 143,200 acre feet above gaging station.

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 1951.
Water temperatures: September 1944 to February 1945, September 1946 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 11,800 micromhos Dec. 31; minimum, 579 micromhos June 15.
Percent sodium: Maximum, 74 Dec. 1-10, Jan. 4-7, Apr. 10; minimum, 49 May 19-20.
EXTREMES, 1944-45, 1946-51.--Specific conductance: Maximum, 13,100 micromhos Jan. 21-24, 1949; minimum, 77.4 micromhos Jan.2,5-7,1948.
Percent sodium: Maximum, 80 Nov. 6-14, Dec. 21-23, 1947; minimum, 25 Sept. 12-15, 1944.
REMARKS.--Records of specific conductance of daily samples available in district office at Stillwater, Okla. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1211.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-7, 1950 -------	73,210	--	4.04	2.06	8.79		3.08	1.56	10.21	--	0.04	--	946	1.29	94,280	59	1,590	--
Oct. 8-10 ----------	21,320	--	4.84	2.30	10.93		2.56	1.31	14.10	--	.10	--	1,190	1.62	34,540	60	1,970	--
Oct. 11-20 ----------	51,610	14	4.99	2.22	12.52	0.26	3.13	1.37	15.23	0.02	.07	--	1,270	1.73	89,220	63	2,070	8.0
Oct. 21-22 ----------	8,569	--	5.19	2.71	13.26		3.08	1.23	16.78	--	.07	--	1,410	1.92	16,450	63	2,230	--
Oct. 23-25 ----------	9,223	--	6.14	3.04	16.09		3.26	1.21	20.73	--	.07	--	1,710	2.33	21,470	64	2,710	--

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 26-28, 1951	6,902	--	7.24	3.54	19.72		3.57	1.14	25.72	--	0.07	--	2,140	2.91	20,110	65	3,260	--
Oct. 29-31	5,814	--	7.64	4.03	25.20		3.23	1.17	32.43	--	.04	--	2,640	3.59	20,890	68	3,930	--
Nov. 1-10	17,650	11	9.78	4.69	35.70	0.59	3.10	1.14	45.13	0.01	.01	--	3,140	4.27	75,450	70	5,120	7.4
Nov. 11-20	14,740	8.6	11.38	5.76	45.22	.46	3.69	1.17	58.10	.02	.03	--	4,060	5.52	81,480	72	6,400	7.5
Nov. 21-30	12,260	6.6	12.62	6.41	51.75	.79	3.29	1.12	67.12	.00	.05	--	4,420	6.01	73,790	72	7,390	7.4
Dec. 1-10	11,010	--	14.57	6.58	58.71		3.93	1.06	74.74	--	.13	--	5,070	6.90	75,990	74	7,940	--
Dec. 11-20	12,140	13	16.12	7.40	62.18	.82	4.46	1.10	79.53	.00	.14	--	5,330	7.25	88,070	72	8,690	7.6
Dec. 21-31	13,920	11	16.22	7.40	62.62	.82	4.38	1.12	81.23	.00	.10	--	5,450	7.41	103,300	72	8,870	7.4
Jan. 1-3, 1951	4,467	--	15.17	6.74	59.85		4.20	1.31	76.15	--	.10	--	5,240	7.13	31,860	73	8,380	--
Jan. 4-7	6,728	--	10.78	5.43	45.44		3.74	1.46	56.41	--	.04	--	3,950	5.37	36,180	74	6,450	--
Jan. 8-10	5,831	--	18.11	8.06	74.64		4.03	1.69	95.04	--	.05	--	6,570	8.94	52,150	74	10,300	--
Jan. 11-13, 19-20	12,770	--	14.37	6.74	55.58		3.67	1.77	71.07	--	.18	--	4,970	6.76	86,420	72	7,900	--
Jan. 14-17	16,640	--	10.38	5.18	35.25		4.06	1.48	45.13	--	.14	--	3,320	4.52	75,210	69	5,350	--
Jan. 18	4,443	--	18.31	7.98	73.35		2.70	1.69	95.04	--	.21	--	6,500	8.84	39,310	74	10,400	--
Jan. 21-24	9,620	--	12.88	5.67	46.74		3.57	1.85	59.79	--	.08	--	4,430	6.02	58,010	72	6,990	--
Jan. 25-31	13,110	--	9.63	4.60	32.24		4.13	2.23	40.05	--	.06	--	3,100	4.22	55,340	69	5,030	--
Feb. 1-10	16,750	--	11.58	5.51	38.46		4.10	1.98	49.36	--	.11	--	3,700	5.03	84,380	69	5,820	--
Feb. 11-15	8,957	--	13.72	6.50	50.83		3.70	1.83	65.43	--	.09	--	4,590	6.24	55,970	72	7,550	--
Feb. 16	1,741	--	9.93	5.10	33.95		3.59	1.90	43.43	--	.06	--	3,120	4.24	7,400	69	5,170	--
Feb. 17-18	16,240	--	6.59	3.45	20.79		2.43	1.21	27.14	--	.05	--	2,030	2.76	44,890	67	3,420	--
Feb. 19-20	102,300	--	3.34	1.48	9.58		1.62	.75	11.99	--	.04	--	949	1.29	132,200	67	1,630	--
Feb. 21-22, 27-28	163,900	--	2.64	1.23	7.15		1.75	.58	8.80	--	.09	--	670	.91	149,500	65	1,200	--
Feb. 23-26	97,030	--	1.90	.90	4.94		1.54	.52	5.64	--	.04	--	479	.65	63,270	64	843	--
Mar. 1-2	18,600	--	3.59	1.89	9.02		1.95	.96	11.56	--	.03	--	923	1.26	23,380	62	1,600	--
Mar. 3-4, 6-10	40,130	--	5.89	3.04	15.93		2.59	1.94	20.31	--	.03	--	1,580	2.15	86,300	64	2,660	--
Mar. 5	9,045	--	7.78	4.03	23.65		3.21	1.75	30.46	--	.04	--	2,220	3.02	27,330	67	3,740	--
Mar. 11-13, 19-20	138,900	--	4.89	2.22	11.64		2.10	.83	15.79	--	.03	--	1,200	1.63	226,800	62	2,080	--
Mar. 14-18	92,030	--	2.40	1.23	5.43		1.64	.56	6.82	--	.04	--	596	.81	74,670	60	1,010	--
Mar. 21-23	20,930	--	5.89	2.88	16.70		2.92	1.21	21.29	--	.05	--	1,640	2.23	46,720	66	2,760	--
Mar. 24-28	23,900	--	6.99	3.54	22.08		2.92	1.46	28.20	--	.03	--	2,120	2.88	68,970	68	3,490	--
Mar. 29-31	11,310	--	7.68	4.03	25.48		2.84	1.60	32.72	--	.03	--	2,460	3.35	37,860	69	4,010	--

Apr. 1-4, 9	18,370	--	8.98	4.44	31.64	2.66	1.42	40.89	--	.09	--	2,990	4.07	74,760	70	4,780	7.7
Apr. 5, 8	10,890	--	9.53	4.60	36.58	2.15	1.10	47.38	--	.08	--	3,490	4.75	51,730	72	5,340	7.7
Apr. 6-7	22,390	--	3.84	1.64	11.68	1.70	1.00	14.38	--	.08	--	1,130	1.54	34,450	68	1,880	8.1
Apr. 10	3,967	--	11.83	5.76	49.02	2.13	1.79	62.61	--	.08	--	4,470	6.08	24,140	74	6,900	8.2
Apr. 11-12, 15-16	13,530	--	9.18	4.77	36.15	2.34	1.14	46.54	--	.08	--	3,380	4.60	62,240	72	5,310	7.8
Apr. 13-14, 17-20	16,130	--	7.54	4.11	27.60	2.41	1.50	35.25	--	.09	--	2,600	3.54	57,070	70	4,230	7.9
Apr. 21, 28-30	17,770	--	5.99	3.12	19.06	2.38	1.19	24.54	--	.06	--	1,820	2.48	44,030	68	3,020	7.6
Apr. 22-23	25,590	--	3.44	1.64	10.23	1.67	.75	12.83	--	.06	--	1,000	1.36	34,830	67	1,680	7.4
Apr. 24, 27	15,150	--	7.64	3.62	28.95	1.90	.96	37.23	--	.12	--	2,640	3.59	54,460	72	4,290	7.6
Apr. 25-26	13,650	--	9.53	4.60	36.47	1.92	.92	47.66	--	.10	--	3,400	4.62	63,160	72	5,410	7.5
May 1, 6-7	21,680	--	4.94	2.47	14.48	2.48	.83	18.47	--	.11	--	1,380	1.88	40,730	66	2,370	7.8
May 2, 9-10	19,300	--	3.49	1.89	9.13	2.38	.79	11.28	--	.06	--	940	1.28	24,690	63	1,560	7.8
May 3, 8	24,020	--	3.89	2.06	11.37	2.72	.98	13.54	--	.08	--	1,090	1.48	35,640	66	1,820	7.7
May 4	17,000	--	7.24	3.70	26.07	a 2.15	.90	33.84	--	.12	--	2,520	3.43	58,310	70	3,930	8.3
May 5	13,230	--	6.19	2.80	16.95	b 2.76	1.00	22.00	--	.18	--	1,830	2.49	32,960	65	2,950	8.4
May 11-12	8,271	--	3.99	2.22	10.10	2.85	.96	12.41	--	.09	--	1,030	1.40	11,600	62	1,700	7.8
May 13-14	5,117	--	5.09	2.63	13.59	2.64	.96	17.63	--	.08	--	1,420	1.93	9,890	64	2,290	7.8
May 15-17	7,240	--	6.59	3.54	21.09	2.46	.96	27.78	--	.06	--	2,200	2.99	21,680	68	3,360	7.6
May 18	2,182	--	8.43	4.60	30.25	2.82	.90	39.48	--	.08	--	3,070	4.18	9,120	70	4,650	8.1
May 19-20	196,800	--	3.99	2.14	5.83	3.03	2.85	6.06	--	.02	--	758	1.03	203,000	49	1,220	8.2
May 21-25, 28-31	251,900	--	4.59	2.14	8.87	2.82	2.10	10.58	--	.10	--	963	1.31	330,200	57	1,590	8.1
May 26-27, 29-30	85,130	--	3.49	1.73	5.69	2.44	1.87	6.54	--	.06	--	702	.95	81,350	52	1,160	8.2
June 1-4, 8-9	98,120	--	3.64	1.56	7.08	2.61	1.58	8.04	--	.05	--	796	1.08	106,300	58	1,320	8.2
June 5	10,510	--	5.94	2.55	16.61	c 2.61	1.71	20.73	--	.05	--	1,770	2.41	25,330	66	2,700	8.7
June 6-7, 10	58,510	--	4.19	1.89	8.90	2.66	1.83	10.44	--	.05	--	986	1.34	78,530	59	1,620	7.9
June 11-12	154,700	--	3.54	1.40	7.79	2.26	1.12	9.31	--	.04	--	838	1.14	176,500	61	1,420	8.1
June 13, 16, 19-20	213,200	--	2.60	1.07	4.33	2.05	1.06	4.85	--	.04	--	510	.69	148,000	54	876	7.5
June 14-15, 17-18	225,300	--	2.10	.79	3.31	1.87	.79	3.50	--	.04	--	392	.53	120,200	53	677	7.9
June 21, 25-26, 28-29	99,610	--	2.64	1.32	4.75	2.23	1.29	5.16	--	.03	--	557	.76	75,530	55	940	--
June 22-24, 27, 30	102,500	--	2.99	1.40	5.84	2.23	1.44	6.54	--	.02	--	664	.90	92,670	57	1,110	7.6
July 1-2, 5	41,140	--	3.79	2.06	7.76	2.36	1.90	9.31	--	.04	--	855	1.16	47,880	57	1,450	7.2
July 3-4	38,020	--	2.64	1.40	4.91	1.95	1.52	5.42	--	.06	--	569	.77	29,450	55	963	8.1
July 6-10	56,550	--	4.69	2.55	12.21	2.36	1.67	15.37	--	.05	--	1,260	1.71	96,990	63	2,080	7.5
July 11-19	70,690	16	3.89	1.89	8.26	.23	2.77	1.87	9.36	.04	.04	0.39	888	1.21	85,450	58	1,480	7.9
July 20	6,605	--	4.79	2.30	13.66	d 2.72	2.19	15.79	--	.05	--	1,390	1.89	12,500	66	2,190	8.4
July 21-26, 28, 31	49,470	--	4.69	2.30	10.40	2.77	1.94	12.64	--	.04	--	1,090	1.48	73,400	60	1,880	7.8
July 27, 29-30	22,850	--	6.59	3.21	19.88	2.62	1.71	25.24	--	.11	--	1,980	2.69	61,590	67	3,190	8.1

a Includes 0.07 equivalents per million of carbonate (CO_3).
b Includes 0.17 equivalents per million of carbonate (CO_3).
c Includes 0.33 equivalents per million of carbonate (CO_3).
d Includes 0.20 equivalents per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951 ------	41,830	15	4.29	1.97	10.48	0.25	2.82	1.81	11.99	0.04	0.03	0.31	1,080	1.47	61,500	62	1,780	8.1
Aug. 11-13 ----------	13,960	--	3.29	1.89	9.20		2.26	1.29	10.77	--	.06	--	912	1.24	17,340	64	1,580	7.7
Aug. 14-17, 19 ------	8,991	--	5.54	2.55	17.36		2.59	1.50	21.29	--	.07	--	1,710	2.33	20,930	68	2,810	7.3
Aug. 18, 20 ---------	3,505	--	6.54	3.62	23.71		2.44	1.42	29.90	--	.11	--	2,280	3.10	10,880	70	3,610	7.5
Aug. 21-22, 25 ------	3,527	--	5.84	3.45	18.97		2.74	1.35	24.11	--	.06	--	1,820	2.48	8,740	67	3,020	7.8
Aug. 23-24 ----------	2,104	--	6.94	3.62	24.06		2.79	1.31	30.46	--	.06	--	2,160	2.94	6,190	69	3,560	8.1
Aug. 26-29 ----------	3,146	--	7.88	4.03	27.84		2.75	1.40	35.54	--	.06	--	2,670	3.63	11,430	70	4,260	8.2
Aug. 30-31 ----------	1,190	--	9.28	4.77	36.87		2.67	1.35	46.82	--	.08	--	3,450	4.69	5,590	72	5,400	7.4
Sept. 1-5, 9 ---------	9,580	--	10.43	5.43	41.42		2.24	1.12	53.87	--	.05	--	3,760	5.11	49,030	72	5,910	7.3
Sept. 6, 10 ----------	7,359	--	5.34	2.63	20.56		1.79	.75	25.95	--	.04	--	1,900	2.58	19,030	72	3,140	7.3
Sept. 7-8----------	5,357	--	4.29	2.38	14.94		1.77	.77	19.04	--	.03	--	1,410	1.92	10,280	69	2,370	7.1
Sept. 11-13, 16 ------	27,730	--	3.69	1.89	13.55		1.49	.54	17.06	--	.04	--	1,240	1.69	46,810	71	2,170	7.7
Sept. 14-15 ---------	17,410	--	5.19	2.38	20.14		1.36	.62	25.66	--	.07	--	1,940	2.64	45,990	73	3,060	7.6
Sept. 17-20----------	16,460	--	3.09	1.64	11.75		1.48	.42	14.52	--	.06	--	1,180	1.60	26,440	71	1,840	7.5
Sept 21-23, 27, 30 --	7,041	--	4.09	1.81	13.47		1.66	.46	17.20	--	.05	--	1,220	1.66	11,690	70	2,190	7.7
Sept. 24-25, 28-29 ---	5,649	--	6.04	2.55	20.66		1.66	.58	26.93	--	.08	--	1,880	2.56	14,460	71	3,260	7.3
Sept. 26----------	962	--	7.28	3.21	27.05		1.80	.71	34.97	--	.06	--	2,370	3.22	3,100	72	4,120	7.9
Total or weighted average --	3,326,623	--	4.44	2.14	11.70		2.39	1.35	14.38	--	0.05	--	1,170	1.59	5,318,950	64	1,940	--

RED RIVER BASIN

RED RIVER AT DENISON DAM NEAR DENISON, TEX.

LOCATION.--Immediately below dam on Red River, 1¼ miles upstream from Shawnee Creek, 1¾ 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.--38,290 square miles above dam, 38,330 square miles above gaging station.
RECORDS AVAILABLE.--Chemical analyses: May 1944 to September 1951.
Water temperatures: October 1945 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,740 micromhos May 31; minimum, 1,210 micromhos Sept. 21, 24, 26-28.
Percent sodium: Maximum, 56 Oct. 1-31, Jan. 1-31, May 1-31; minimum, 52 July 1-31, Aug. 1-31.
EXTREMES, 1944-51.--Percent sodium: Maximum, 59 July 3-10, 1944; minimum, 31 Nov. 1-10, 1945.
REMARKS.--Values reported for dissolved solids concentrations are residue on evaporation. Records of specific conductance of daily samples available in district office at Austin, Tex. Discharge records for gaging station near Colbert, Okla., for water year October 1950 to September 1951 given in Water-Supply Paper 1211. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	493,700	12	4.09	1.64	7.37		2.02	3.56	7.47		0.05		837	1.14	562,800	56	1,350	7.8
Nov. 1-30	174,400	11	4.19	1.97	7.05		2.10	3.68	7.39		.04		820	1.12	195,300	53	1,370	7.6
Dec. 1-31	184,200	11	4.49	1.89	7.40		2.10	3.83	7.84		.01		850	1.16	213,700	54	1,430	7.5
Jan. 1-31, 1951	177,700	8.8	4.49	2.06	8.19		2.20	4.06	8.46		.02		920	1.25	222,100	56	1,500	8.0
Feb. 1-28	183,500	10	4.54	1.89	7.76		2.20	3.93	8.04		.02		873	1.19	218,400	55	1,470	7.7
Mar. 1-31	143,500	10	4.59	1.89	7.83		2.23	4.02	8.04		.02		893	1.21	173,600	55	1,460	7.5
Apr. 1-30	124,400	13	4.49	2.14	7.82		2.39	4.00	8.04		.02		911	1.24	154,300	54	1,500	7.7
May 1-31	853,900	11	4.59	1.89	8.23		2.49	3.68	8.52		.02		959	1.30	1,110,000	56	1,560	7.8
June 1-30	1,545,000	11	4.94	2.38	8.61		2.44	4.31	9.17		.01		1,010	1.37	2,117,000	54	1,670	8.0
July 1-31	837,400	12	4.29	2.14	6.88		2.23	3.71	7.33		.02		840	1.14	954,600	52	1,390	7.9
Aug. 1-31	191,800	14	4.09	1.81	6.39		2.18	3.39	8.71		.03		788	1.07	205,200	52	1,290	7.7
Sept. 1-30	152,500	14	3.84	1.73	6.23		2.18	3.27	8.35		.02		725	.99	151,000	53	1,220	7.6
Total or weighted average	5,062,000	11	4.54	2.06	7.78		2.31	3.89	8.18		0.02		913	1.24	6,277,000	54	1,500	--

RED RIVER BASIN--Continued

WASHITA RIVER NEAR TABLER, OKLA.

LOCATION.--At gaging station at county highway bridge, 1 mile downstream from Little Washita River, 5 miles south of Tabler, Grady County, and 7½ miles upstream from Winter Creek.
DRAINAGE AREA.--4,760 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1946 to September 1951.
Water temperatures: September 1946 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,160 micromhos July 30; minimum, 383 micromhos May 21.
Percent sodium: Maximum, 24 Aug. 1-10: minimum, 1 May 17-20, 24-25.
EXTREMES, 1946-51.--Specific conductance: Maximum, 2,560 micromhos Feb. 26-27, 1947; minimum, 288 micromhos July 20-21, 1950.
Percent sodium: Maximum, 35 Oct. 21-29, 1948: minimum, 1 Aug. 16, 1950, May 17-20, 24-25, 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Stillwater, Okla. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1211.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950-----	5,994	24	8.13	4.28	3.22	0.12	3.70	9.37	2.45	0.03	0.04	--	1,020	1.39	8,320	20	1,350	8.1
Oct. 11-20 ---------	4,425	--	7.74	4.85	3.66		3.58	9.93	2.71	--	.03	--	1,090	1.48	6,570	23	1,420	--
Oct. 21-31 ---------	4,259	23	9.98	4.85	3.78	.10	4.88	10.70	2.88	.03	.04	--	1,190	1.62	6,900	20	1,560	8.2
Nov. 1-10----------	3,584	21	9.83	5.18	3.83	.17	4.77	10.87	2.93	.02	.03	--	1,200	1.63	5,850	20	1,590	7.9
Nov. 11-20---------	3,862	--	10.33	5.10	3.56		5.15	10.76	3.05	--	.03	--	1,220	1.66	6,410	19	1,600	--
Nov. 21-30---------	4,257	21	11.53	5.10	3.78	.15	6.33	10.99	2.96	.02	.02	--	1,270	1.73	7,360	19	1,670	7.8
Dec. 1-10----------	4,253	--	10.98	4.85	4.00		6.05	10.99	2.74	--	.05	--	1,270	1.73	7,350	20	1,680	--
Dec. 11-20---------	4,828	20	11.53	4.85	3.61	.08	6.10	10.93	2.74	.03	.06	--	1,240	1.69	8,150	18	1,630	7.7
Dec. 21-31---------	5,064	--	11.43	4.85	3.42		5.88	11.06	2.71	--	.05	--	1,260	1.71	8,690	17	1,650	--
Jan. 1-10, 1951-----	5,863	19	10.73	4.36	3.35	.18	5.54	10.45	2.34	.02	.06	--	1,160	1.58	9,260	18	1,520	8.0
Jan. 11-20 ---------	5,094	--	11.33	4.85	2.92		5.83	10.85	2.37	--	.05	--	1,260	1.71	8,740	15	1,590	--
Jan. 21-31 ---------	4,433	18	11.58	4.85	3.78	.15	5.96	11.53	2.62	.02	.05	--	1,280	1.74	7,720	19	1,630	8.0
Feb. 1-10----------	4,528	--	11.28	4.93	2.97		5.13	11.16	2.82	--	.07	--	1,230	1.67	7,580	15	1,640	--
Feb. 11-20---------	5,825	18	10.98	4.52	3.52	.16	5.55	11.08	2.54	.02	.06	--	1,210	1.65	9,600	18	1,570	8.0
Feb. 21-28---------	6,847	--	10.53	4.44	2.54		4.82	10.72	1.92	--	.05	--	1,120	1.52	10,440	15	1,480	--
Mar. 1-10----------	5,730	--	11.43	5.51	2.68		4.95	12.35	2.26	--	.06	--	1,290	1.75	10,060	14	1,640	--
Mar. 11-20---------	6,276	21	10.58	4.60	3.35	.16	5.11	10.95	2.12	.02	.05	--	1,190	1.62	10,170	18	1,520	8.1
Mar. 21-31---------	5,014	--	11.48	5.43	2.72		5.00	11.99	2.60	--	.04	--	1,290	1.75	8,810	14	1,650	--

Apr. 1-10	4,272	--	10.03	5.02	3.17		3.79	11.74	2.65	--	.04	--	1,180	1.60	6,860	17	1,540	8.1
Apr. 11-20	3,925	19	10.18	4.85	4.09	.17	4.11	12.08	2.96	.02	.03	0.27	1,390	1.89	7,430	21	1,630	8.1
Apr. 21-23, 30	2,936	--	11.48	3.86	2.51		3.80	12.16	1.86	--	.03	--	1,250	1.70	5,000	14	1,510	8.2
Apr. 24-29	2,267	--	11.88	5.02	3.84		a5.08	12.80	2.82	--	.04	--	1,380	1.88	4,260	19	1,710	8.7
May 1-2	4,165	--	6.29	2.30	.61		b2.34	6.06	.68	--	.12	--	591	.80	3,350	7	843	8.6
May 3-10	4,861	--	10.43	4.28	2.92		2.82	12.39	2.37	--	.05	--	1,160	1.58	7,680	17	1,530	8.2
May 11-16	2,884	--	11.53	4.85	2.83		b3.64	12.74	2.76	--	.07	--	1,390	1.89	5,460	15	1,640	8.5
May 17-20	117,700	--	4.19	1.23	.07		c1.85	3.25	.31	--	.08	--	378	.51	60,540	1	525	8.4
May 21-23	86,080	--	3.19	1.15	.15		1.72	2.46	.27	--	.05	--	329	.45	38,550	3	444	8.2
May 24-25	26,480	--	5.24	1.97	.07		d1.97	4.85	.40	--	.06	--	546	.74	19,680	1	674	8.4
May 26-27	11,190	--	6.74	2.63	.22		e2.84	6.00	.68	--	.07	--	710	.97	10,810	2	867	8.4
May 28-31	14,300	--	7.93	3.12	.89		b3.57	7.29	1.02	--	.06	--	846	1.15	16,470	7	1,040	8.5
June 1-5, 7-8	21,030	--	7.68	3.45	1.76		3.08	8.47	1.27	--	.07	--	866	1.18	24,800	14	1,160	8.2
June 6, 9-10	21,120	--	6.44	2.38	.98		d2.54	6.14	1.04	--	.08	--	628	.85	18,060	10	897	8.4
June 11-12, 14-15	43,890	--	3.99	1.15	.63		1.95	3.35	.40	--	.07	--	368	.50	21,990	11	554	8.1
June 13, 16-20	36,670	--	5.84	1.81	.44		f2.31	5.18	.51	--	.09	--	534	.73	26,660	5	754	8.3
June 21, 24-26	12,000	--	5.84	2.22	1.14		c3.05	5.10	.99	--	.06	--	586	.80	9,570	12	854	8.4
June 22-23	8,688	--	4.29	1.56	.75		e2.51	3.39	.62	--	.08	--	410	.56	4,850	11	624	8.6
June 27-30	8,331	--	8.28	3.62	2.12		3.97	8.56	1.44	--	.05	--	914	1.24	10,360	15	1,230	8.2
July 1-10	16,420	--	6.69	4.11	2.93		2.67	9.26	1.80	--	.00	--	962	1.31	21,500	21	1,270	7.7
July 11-20	8,214	26	7.93	5.26	3.70	.14	3.06	11.20	2.45	.02	.05	1.0	1,160	1.58	12,970	22	1,450	7.9
July 21-24, 26-30	7,111	--	9.33	5.76	3.72		3.77	11.97	3.02	--	.05	--	1,250	1.70	12,100	20	1,600	8.0
July 25, 31	1,676	--	6.89	3.95	2.24		3.38	7.66	1.97	--	.07	--	848	1.15	1,930	17	1,130	8.2
Aug. 1-10	4,050	--	5.79	4.03	3.07		2.56	7.97	2.31	--	.05	--	888	1.21	4,900	24	1,180	7.9
Aug. 11-20	3,901	24	8.98	4.77	3.70	.14	3.20	11.43	2.68	.02	.05	.56	1,190	1.62	6,320	21	1,500	7.8
Aug. 21-31	3,751	--	9.18	5.10	3.65		4.03	11.06	2.79	--	.05	--	1,210	1.65	6,180	20	1,550	7.9
Sept. 1-7, 9	1,785	--	7.19	5.59	3.42		3.15	10.22	2.79	--	.04	--	1,030	1.40	2,500	21	1,430	8.0
Sept. 8	488	--	4.49	3.45	2.14		3.31	5.50	1.13	--	.14	--	598	.81	397	21	888	8.2
Sept. 10-20	11,920	--	4.49	2.30	1.44		2.39	4.60	1.18	--	.06	--	529	.72	8,580	17	789	8.0
Sept. 21-30	3,447	--	5.59	2.55	1.86		3.08	5.77	1.10	--	.05	--	598	.81	2,810	19	855	8.2
Total or weighted average	585,688	--	6.14	2.55	1.26		2.77	6.02	1.07	--	0.06	--	665	0.90	530,547	13	888	--

a Includes 0.57 equivalents per million of carbonate (CO_3).
b Includes 0.23 equivalents per million of carbonate (CO_3).
c Includes 0.13 equivalents per million of carbonate (CO_3).
d Includes 0.10 equivalents per million of carbonate (CO_3).
e Includes 0.17 equivalents per million of carbonate (CO_3).
f Includes 0.07 equivalents per million of carbonate (CO_3).

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 1951. Water temperatures: October 1947 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 663 micromhos June 22; minimum, 67.2 micromhos Jan. 6. Percent sodium: Maximum, 73 Nov. 14-20, Nov. 21-25, 27-30; minimum, 54 July 7-31, Aug. 1-31.
EXTREMES, 1945-46, 1947-50.--Percent sodium: Maximum, 86 Dec. 26-27, 1948; minimum, 27 June 3-7, 10, 1946.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	53,930	13	0.45	0.33	1.60		0.48	0.33	1.55		0.02		160	0.22	11,860	67	262	6.7
Oct. 11-20	27,090	16	.50	.27	1.04		.79	.20	.79		.02		131	.18	4,880	57	193	7.3
Oct. 21-31	30,190	16	.45	.21	.84		.67	.16	.65		.02		123	.17	5,130	56	178	7.3
Nov. 1-8	26,120	15	.50	.37	1.28		.69	.18	1.27		.01		160	.22	5,750	60	240	7.4
Nov. 9-13, 26	20,410	14	.28	.14	1.17		.38	.27	.93		.02		124	.17	3,470	70	165	7.2
Nov. 14-20	24,870	15	.44	.25	1.86		.49	.27	1.78		.01		174	.24	5,970	73	278	7.2
Nov. 21-25, 27-30	31,930	16	.37	.22	1.63		.48	.20	1.55		.01		157	.21	6,710	73	248	7.2
Dec. 1-10	38,680	17	.46	.33	1.91		.49	.33	1.86		.02		a172	.23	8,900	71	296	7.1
Dec. 11-20	36,560	16	.39	.32	1.65		.44	.21	1.69		.02		160	.22	8,040	70	270	6.7
Dec. 21-31	35,500	20	.41	.30	1.58		.46	.20	1.61		.02		157	.21	7,460	69	263	6.8
Jan. 1-3, 20-31, 1951	133,200	14	.38	.36	1.54		.33	.38	1.58		.00		155	.21	27,970	68	264	7.1
Jan. 4-10	180,900	7.5	.12	.18	.54		.16	.19	.48		.01		a56	.08	14,470	64	94.2	6.8
Jan. 11-19	142,200	12	.22	.24	.78		.23	.29	.70		.02		a84	.11	15,640	63	137	6.8
Feb. 1-10	88,540	15	.39	.33	1.28		.26	.42	1.30		.02		a131	.18	15,940	64	239	7.0
Feb. 11-19	136,700	12	.38	.31	1.20		.26	.44	1.18		.01		a123	.17	23,240	63	215	6.8
Feb. 20-28	188,600	11	.41	.37	1.26		.23	.56	1.24		.01		a131	.18	33,950	62	234	6.7

a Sum of determined constituents.

Mar. 1-10	210,000	13	.46	.35	1.27	.39	.56	1.13		.01		154	.21	44,100	61	233	7.4
Mar. 11-20	174,500	16	.60	.42	1.47	.62	.56	1.30		.01		164	.22	38,390	59	260	7.5
Mar. 21-28	80,470	17	.60	.40	1.62	.56	.54	1.50		.02		179	.24	19,310	62	285	7.5
Mar. 29-30, Apr. 1-3	175,500	10	.20	.21	.87	.16	.42	.68		.02		a87	.12	21,060	68	123	7.0
Mar. 31, Apr. 4-10	319,500	12	.27	.27	.90	.23	.46	.73		.02		98	.13	41,540	63	157	6.9
Apr. 11-20	161,500	16	.38	.33	1.15	.36	.52	.96		.02		a125	.17	27,460	62	203	6.9
Apr. 21-30	66,780	18	.49	.37	1.55	.56	.52	1.33		.01		a158	.21	14,020	64	267	6.9
May 1-5, 9, 15-20	131,200	18	.55	.37	1.81	.54	.48	1.69		.01		180	.24	31,490	66	318	7.4
May 6-8, 10-14	153,800	14	.36	.28	1.20	.36	.33	1.13		.01		a120	.16	24,610	65	186	6.8
May 21-31	63,790	18	.70	.45	2.07	.67	.60	1.92		.02		a204	.28	17,860	64	360	7.4
June 1-10	34,060	22	.65	.45	1.45	.75	.42	1.35		.02		170	.23	7,830	57	280	7.6
June 11-20	36,320	21	.70	.40	1.66	.82	.38	1.55		.02		182	.25	9,080	60	307	7.3
June 21-30, July 1-6	139,100	18	.70	.37	1.30	.90	.40	1.04		.03		173	.24	33,380	55	237	7.1
July 7-31	93,300	19	.80	.34	1.35	1.00	.25	1.18		.06		165	.22	20,530	54	271	7.4
Aug. 1-31	46,680	22	.60	.34	1.17 | 0.06	.90	.18	1.07	0.02	.03	0.15	a143	.19	8,870	54	230	7.5
Sept. 1-10	9,430	23	.48	.27	1.32	.82	.16	1.07		.02		a138	.19	1,790	64	224	7.1
Sept. 11-19, 24-27	42,880	18	.38	.24	1.42	.57	.17	1.27		.03		135	.18	7,720	70	222	7.0
Sept. 20-23, 28-30	32,480	11	.24	.15	.75	.31	.12	.68		.03		93	.13	4,220	66	127	6.7
Total or weighted average	3,167,000	14	0.42	0.31	1.26	0.43	0.40	1.13		0.02		133	0.18	570,100	64	216	--

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 1951.
Water temperatures: October 1947 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 370 micromhos Aug. 29; minimum, 53.7 micromhos Sept. 23.
Percent sodium: Maximum, 68 Dec. 1-10, Jan. 1-10; minimum, 49 July 11-20.
EXTREMES, 1947-51.--Percent sodium: Maximum, 74 Dec. 21-31, 1948; minimum, 14 June 4-18, 1950.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 8-10, 1950	13,760	16	0.45	0.29	1.26		0.49	0.38	1.10	0.01	0.02		a131	0.18	2,480	63	208	7.1
Oct. 4-7	10,610	17	.55	.34	1.78		.51	.38	1.75	.01	.02		182	.25	2,650	67	301	6.9
Oct. 11-20	15,950	17	.45	.41	1.40		.52	.35	1.35	.00	.02		155	.21	3,350	62	251	6.7
Oct. 21-31	16,860	17	.43	.40	1.50		.57	.25	1.50	.00	.01		156	.21	3,540	64	259	7.0
Nov. 1-10	16,800	17	.46	.31	1.39		.61	.23	1.30	.01	.02		149	.20	3,360	64	236	7.0
Nov. 11-20	18,980	16	.37	.36	1.34		.57	.21	1.27	.00	.02		136	.18	3,420	65	226	7.0
Nov. 21-30	24,440	14	.33	.31	1.34		.44	.23	1.30	.00	.01		134	.18	4,400	67	217	6.9
Dec. 1-10	25,650	17	.40	.32	1.54		.56	.23	1.47	.01	.00		151	.21	5,390	68	252	6.9
Dec. 11-20	27,510	15	.36	.37	1.21		.48	.33	1.13	.00	.00		136	.18	4,950	62	213	7.0
Dec. 21-31	26,240	18	.40	.31	1.30		.52	.27	1.21	.00	.00		136	.18	4,720	65	218	7.0
Jan. 1-10, 1951	56,870	14	.29	.27	1.21		.38	.35	1.02	.02	.01		118	.16	9,100	68	179	7.4
Jan. 11-20	49,210	14	.34	.30	1.16		.34	.46	.99	.02	.00		125	.17	8,370	64	200	7.3
Jan. 21-31	44,570	15	.39	.34	1.34		.38	.50	1.18	.02	.00		142	.19	8,470	64	228	7.3
Feb. 1-10	44,790	16	.42	.36	1.56		.36	.48	1.50	--	.02		153	.21	9,410	67	260	7.3
Feb. 11-19	44,970	15	.45	.37	1.18		.33	.56	1.10	.00	.02		158	.21	9,440	59	256	6.5
Feb. 20-28	83,940	14	.42	.37	1.50		.23	.64	1.41	.00	.01		152	.21	17,630	65	230	6.4

a Sum of determined constituents.

Mar. 1-10	82,810	15	.48	.41	1.34		.20	.69	1.33	.00	.02		166	.23	19,050	60	256	6.4
Mar. 11-20	66,390	17	.50	.43	1.58		.36	.73	1.41	--	.01		170	.23	15,270	63	281	7.1
Mar. 21-28	49,510	19	.55	.47	1.45		.48	.69	1.30	--	.01		166	.23	11,390	59	266	7.2
Mar. 29-31, Apr. 7-10	121,400	15	.36	.29	.83		.34	.44	.68	.01	.01		a100	.14	17,000	56	158	7.2
Apr. 1-6	170,000	12	.24	.21	.71		.30	.33	.51	--	.02		a80	.11	18,700	61	109	7.1
Apr. 11-20	90,470	18	.49	.40	1.39		.33	.75	1.18	.02	.01		a154	.21	19,000	61	254	6.9
Apr. 21-30	40,640	18	.60	.44	1.48		.46	.77	1.27	.02	.00		a166	.23	9,350	59	280	7.1
May 1-10	43,200	18	.55	.46	1.35		.52	.69	1.13	.02	.01		157	.21	9,070	57	261	7.0
May 11-20	30,250	15	.49	.32	.87		.49	.42	.73	.01	.04		a112	.15	4,540	52	185	6.9
May 21-31	36,020	12	.55	.37	1.06		.61	.44	.90	.01	.03		132	.18	6,480	54	222	7.0
June 1-10	26,040	14	.65	.40	1.29		.77	.40	1.16	.01	.02		146	.20	5,210	55	260	7.2
June 11-20	29,870	18	--	--	--		.92	.38	1.35	.01	.02		170	.23	6,870	--	284	7.1
June 21-30	30,660	18	.60	.44	1.72		.87	.38	1.50	.01	.02		182	.25	7,660	62	300	7.1
July 1-10	35,190	20	.55	.44	1.47		.84	.29	1.30	.01	.02		164	.22	7,740	60	270	7.5
July 11-20	24,520	19	.60	.72	1.26		.85	.27	1.44	.01	.02		183	.25	6,130	49	289	7.1
July 21-31	18,230	26	.70	.43	1.66		.95	.29	1.52	--	.02		206	.28	5,100	60	310	7.7
Aug. 1-10	10,170	23	.65	.44	1.76		1.05	.23	1.55	--	.02		194	.26	2,640	62	309	7.7
Aug. 11-20	6,190	25	.65	.43	1.91		1.25	.21	1.52	--	.01		199	.27	1,670	64	324	7.8
Aug. 21-31	5,640	30	.65	.44	1.64		1.25	.23	1.21	.02	.02		184	.25	1,410	60	296	7.2
Sept. 1-20	10,690	27	.60	.38	1.70	0.01	1.08	.18	1.41	.02	.01	0.12	a175	.24	2,570	63	295	7.0
Sept. 21, 30	4,330	20	--	--	--		.77	--	.93	--	.03		--	--	--	--	227	7.2
Sept. 22-25, 27	17,550	6.0	.14	.17	.32		.18	.23	.21	--	.02		56	.08	1,400	51	75.1	6.6
Sept. 26, 28-29	7,320	11	--	--	--		.26	--	.51	--	.02		--	--	--	--	126	--
Total or weighted average	1,478,000	16	0.44	0.35	1.26		0.44	0.48	1.10	0.01	0.02		139	0.19	280,800	62	222	--

a Sum of determined constituents.

SAN JACINTO RIVER BASIN

SAN JACINTO RIVER NEAR HUFFMAN, TEX.

LOCATION.--At Sheldon Pumping Plant of City of Houston, 5½ miles downstream from gaging station near Huffman, which is at Beaumont, Sour Lake & 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 at gaging station.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to July 1948, December 1948 to September 1951.
Water temperatures: January 1949 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 890 micromhos Feb. 17; minimum, 160 micromhos Sept. 24.
Percent sodium: Maximum, 76 Sept. 21-22, 25-30; minimum, 57 Apr. 1-10.
EXTREMES, 1945-51.--Percent sodium: Maximum, 79 Nov. 16, 18, 26, 1947; minimum, 18 June 3-10, 1950.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Total acre feet reported for Huffman gaging station. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	4,420	18	0.95	0.37	1.96		1.00	0.15	2.09		0.04		228	0.31	1,370	60	367	7.3
Oct. 11-20	2,650	20	.90	.31	2.56		1.20	.13	2.42		.02		260	.35	928	68	422	7.3
Oct. 21-31	2,800	19	1.10	.39	2.86		1.13	.12	3.07		.02		290	.39	1,090	66	492	7.3
Nov. 1-10	2,620	17	1.30	.34	2.92		1.08	.10	3.36		.02		308	.42	1,100	64	515	7.5
Nov. 11-20	2,620	16	.85	.37	3.24		1.05	.09	3.30		.01		290	.39	1,020	73	504	7.4
Nov. 21-30	2,680	15	1.15	.47	4.20		1.08	.16	4.57		.01		394	.54	1,450	72	658	7.3
Dec. 1-10	2,940	18	1.10	.48	3.88		1.06	.12	4.26		.01		334	.45	1,320	71	621	7.1
Dec. 11-20	2,900	19	1.00	.42	3.12		1.03	.12	3.38		.00		283	.38	1,100	69	516	7.1
Dec. 21-31	3,450	18	1.10	.54	2.84		1.05	.10	3.33		.00		278	.38	1,310	63	508	7.1
Jan. 1-10, 1951	5,470	16	1.05	.34	3.54		.97	.14	3.81		.02		326	.44	2,410	72	560	7.8
Jan. 11-20	4,170	16	1.15	.35	4.30		1.00	.14	4.65		.01		378	.51	2,130	74	657	7.8
Jan. 21-31	4,070	16	1.15	.36	2.99		1.08	.11	3.36		.01		297	.40	1,630	67	511	7.7

Feb. 1-9	3,780	16	1.10	.37	4.17	1.02	.12	4.48		.01		348	.47	1,780	74	607	7.8
Feb. 10-19	4,900	17	1.20	.40	4.56	1.05	.13	4.96		.01		a364	.50	2,450	74	705	7.6
Feb. 20-28	7,770	17	1.35	.35	2.75	1.15	.18	3.10		.02		a266	.36	2,800	62	500	7.6
Mar. 1-10	4,330	16	1.30	.36	2.68	1.23	.16	2.93		.02		a258	.35	1,520	62	494	7.6
Mar. 11-20	3,740	16	1.40	.30	3.46	1.44	.12	3.58		.01		310	.42	1,570	67	565	7.8
Mar. 21-27	4,710	15	1.35	.24	3.59	1.38	.10	3.67		.02		a304	.41	1,930	69	570	7.8
Mar. 28-31	27,430	7.8	.80	.37	--	.80	--	1.58		.03		--	--	--	--	281	7.7
Apr. 1-10	16,700	20	1.25	.29	2.01	1.20	.18	2.14		.02		a217	.30	5,010	57	383	7.9
Apr. 11-20	4,990	22	1.30	.32	2.90	1.25	.16	3.07		.04		306	.42	2,100	64	513	7.7
Apr. 21-30	3,510	19	1.40	.30	2.62	1.34	.12	2.82		.03		a258	.35	1,230	61	493	7.7
May 1-10	3,430	20	1.30	.30	2.95	1.33	.10	3.10		.02		a274	.37	1,270	65	517	7.8
May 11-20	3,230	21	1.40	.40	3.17	1.33	.12	3.47		.04		322	.44	1,420	63	558	7.7
May 21-31	3,330	21	1.30	.41	3.14	1.34	.11	3.38		.01		310	.42	1,400	65	540	7.8
June 1-10	4,030	19	1.05	.78	2.56	1.00	.13	3.22		.05		a262	.36	1,450	58	500	7.5
June 11, 13-14	1,110	17	1.00	.53	--	1.03	--	2.71		.04		270	.37	411	--	436	7.5
June 12, 15-16	1,290	11	--	--	--	.54	--	.96		.04		174	.24	310	--	185	7.5
June 17-20	1,230	21	1.00	.45	--	1.10	--	3.95		.04		364	.50	615	--	599	7.4
June 21-30	2,220	23	1.10	.43	3.86	1.10	.16	4.09		.03		375	.51	1,130	72	613	6.9
July 1-10	1,830	20	1.20	.37	3.81	1.15	.11	4.09		.03		368	.50	915	71	624	7.1
July 11-19	1,740	23	1.20	.38	3.48	1.26	.12	3.67		.02		333	.45	783	69	579	7.5
July 20-31	2,000	23	1.15	.41	3.72	1.16	.14	3.95		.03		346	.47	940	70	603	7.5
Aug. 1-10	1,480	22	1.10	.41	3.61	1.18	.08	3.84		.02		333	.45	666	70	581	7.5
Aug. 11-20	1,170	22	1.10	.37	3.77	1.25	.08	3.89		.01		339	.46	538	72	604	7.5
Aug. 21-31	1,410	22	1.10	.40	3.70	1.20	.09	3.89		.02		336	.46	649	71	595	7.4
Sept. 1-10	1,470	22	1.20	.38	3.42	1.25	.08	3.67		.01		318	.43	632	68	567	7.5
Sept. 11-20	4,900	18	.95	.50	2.62	.97	.12	2.96		.02		258	.35	1,720	64	461	7.3
Sept. 21-22, 25-30	9,780	18	.50	.43	2.96	.95	.11	2.79		.03		271	.37	3,620	76	422	7.8
Sept. 23-24	2,960	8.6	--	--	--	.41	--	.93		.02		--	--	--	--	162	7.5
Total or weighted average	171,200	17	1.05	0.37	2.74	1.06	0.13	2.96		0.02		265	0.36	61,630	66	468	--

a Sum of determined constituents.

BRAZOS RIVER BASIN

BRAZOS RIVER AT RICHMOND, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59 in Richmond, Fort Bend County, about 925 feet downstream from Texas & New Orleans Railroad bridge, and at mile 93.
DRAINAGE AREA.--44,050 square miles, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1951.
Water temperatures: November 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,540 micromhos Sept. 4; minimum, 321 micromhos June 22.
Percent sodium: Maximum, 64 Sept. 1-10; minimum, 30 June 21-25.
EXTREMES, 1945-51.--Percent sodium: Maximum, 76 Dec. 3-4, 1945; minimum, 18 Aug. 27-31, 1947.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residue on evaporation and for concentrations more than 1,000 ppm are sum of determined constituents unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	72,670	9.5	3.99	1.15	6.46		2.06	2.85	6.63	0.01	0.05	--	760	1.03	74,850	56	1,250	7.5
Oct. 11-21	51,290	11	6.19	1.64	9.83	0.04	2.47	5.41	10.10	.02	.01	0.22	1,080	1.47	75,400	56	1,820	8.0
Oct. 22-31	25,090	12	5.54	1.73	8.22	.03	3.23	4.16	7.90	.02	.01	.16	971	1.32	33,120	53	1,550	8.0
Nov. 1-10	19,760	11	5.19	1.73	7.39	.08	3.56	3.62	7.19	.02	.01	.14	895	1.22	24,110	51	1,430	8.0
Nov. 11-20	18,680	11	5.19	1.81	7.17	.16	3.85	3.48	6.99	.02	.01	.22	886	1.20	22,420	50	1,430	8.2
Nov. 21-30	15,630	13	5.24	1.89	7.35	.09	4.20	3.60	8.99	.02	.00	.15	910	1.24	19,380	50	1,460	8.2
Dec. 1-10	14,790	14	4.99	1.81	7.00	.12	4.02	3.16	6.57	.01	.02	.36	839	1.14	16,860	50	1,380	7.9
Dec. 11-20	15,070	12	5.29	1.81	7.04	.13	4.51	2.96	6.80	.01	.02	.31	859	1.17	17,630	49	1,410	7.8
Dec. 21-26	13,880	9.5	4.79	1.56	6.00	.10	3.93	2.91	5.75	.01	.01	.23	760	1.03	14,300	48	1,250	7.9
Dec. 27-31	9,160	9.0	5.49	1.81	7.87	--	3.83	3.73	7.76	.01	.00	.28	921	1.25	11,450	52	1,530	7.9
Jan. 1-10, 1951	18,630	8.4	5.19	1.73	7.26	.10	3.92	3.35	6.99	.01	.00	.37	852	1.16	21,610	51	1,430	7.9
Jan. 11-20	16,640	11	5.39	1.73	7.83	.02	3.82	3.46	7.56	.02	.03	.11	904	1.23	20,470	52	1,510	8.1
Jan. 21-31	21,060	9.5	5.09	1.64	8.39	.06	3.61	3.44	7.95	.01	.02	.22	968	1.32	27,800	55	1,540	7.9

Feb. 1-10	22,040	8.8	5.84	1.73	9.52	.01	3.18	4.39	9.53	.01	.02	.17	1,010	1.37	30,190	56	1,730	8.0
Feb. 11-19	18,720	14	5.09	1.73	8.96	.07	3.02	3.98	8.86	.01	.02	.25	953	1.30	24,340	57	1,620	7.7
Feb. 20-28	26,140	13	4.79	1.48	7.91	.07	2.85	3.71	7.73	.01	.03	.27	854	1.16	30,320	56	1,470	7.8
Mar. 1-10	19,090	11	4.39	1.40	6.61	.06	3.11	2.98	6.26	.01	.02	.30	a730	.99	18,900	53	1,270	7.9
Mar. 11-20	13,850	13	4.69	1.64	6.17	.06	3.97	2.62	5.98	.01	.02	.23	a730	.99	13,710	49	1,260	8.0
Mar. 21-26, 31	12,660	15	4.39	1.81	6.09	--	3.77	2.39	6.15	.03	.03	.05	745	1.01	12,790	50	1,280	7.9
Mar. 27-30	15,610	13	2.99	1.23	4.17	--	2.46	1.44	4.29	.02	.01	--	494	.67	10,460	50	892	7.9
Apr. 1, 14-20	18,670	18	3.59	1.23	3.44	--	3.54	1.62	3.13	.02	.02	.20	493	.67	12,510	42	841	8.0
Apr. 2-13	51,470	16	2.10	.71	2.00	--	2.03	1.15	1.61	.02	.04	.03	300	.41	21,100	42	506	7.5
Apr. 21-30	4,500	19	4.14	1.56	4.30	.04	4.39	1.71	3.78	.02	.01	.38	580	.79	3,560	43	1,010	7.9
May 1-10	18,670	14	3.64	1.56	5.26	.05	3.41	2.12	5.13	.02	.01	.32	a617	.84	15,680	50	1,070	7.6
May 11-20	31,970	14	3.09	1.15	5.00	.04	2.29	2.23	4.79	.02	.02	.37	588	.80	25,580	54	1,000	7.3
May 21-31	23,220	16	3.69	1.32	6.04	.13	2.56	2.69	5.92	.02	.02	.20	668	.91	21,130	54	1,170	7.5
June 1, 4-10	50,800	16	2.89	.81	3.65	.08	2.25	1.69	3.53	.02	.06	.17	448	.61	30,990	49	791	8.0
June 2-3, 11-20	113,700	16	2.10	.51	1.39	.06	2.03	.85	1.16	.02	.08	.21	a247	.34	38,660	34	424	7.8
June 21-25	56,450	17	2.00	.58	1.09	--	1.97	.71	1.02	.02	.06	--	222	.30	16,940	30	386	8.0
June 26-30	27,090	17	2.30	.82	2.35	--	2.05	1.00	2.43	.02	.04	--	a325	.44	11,920	43	574	7.9
July 1-9	23,170	16	2.89	.77	3.26	.10	2.39	1.46	3.24	.02	.01	.16	a421	.57	13,210	46	733	8.0
July 10-20	18,800	15	4.69	1.56	9.22	.12	2.20	4.04	9.08	.02	.01	.21	964	1.31	24,630	59	1,610	7.7
July 21-25, 30-31	9,780	19	4.59	1.81	9.61	.03	2.02	4.37	9.65	.02	.04	.15	b1,020	1.39	13,590	60	1,710	7.6
July 26-29	7,560	17	3.39	1.15	5.70	--	2.34	2.50	5.42	.02	.02	.19	654	.89	6,730	56	1,100	7.8
Aug. 1-10	21,120	13	6.04	2.30	13.13	.01	1.92	5.79	13.68	.02	.06	.21	1,290	1.75	36,960	61	2,240	7.7
Aug. 11-20	16,660	12	6.14	2.30	13.57	.04	2.08	5.66	14.10	.02	.04	.30	1,310	1.78	29,650	62	2,360	7.6
Aug. 21-31	14,120	14	5.99	2.22	13.91	.07	2.18	5.70	14.24	.02	.04	.16	1,330	1.81	25,560	63	2,320	7.7
Sept. 1-10	11,180	11	6.09	2.38	14.83	.04	1.97	6.06	15.17	.02	.03	.16	1,400	1.90	21,240	64	2,440	7.5
Sept. 11-20	38,940	10	5.34	1.97	11.87	.04	1.93	4.71	12.41	.02	.03	.18	1,140	1.55	60,360	62	2,010	7.5
Sept. 21-30	28,240	15	3.19	.81	4.91	.08	1.93	2.14	5.05	.02	.05	.40	570	.78	22,030	55	978	7.4
Total or weighted average	1,027,000	13	3.99	1.32	6.04	0.06	2.62	2.79	6.04	0.02	0.04	0.21	696	0.95	975,600	53	1,180	--

a Sum of determined constituents.
b Residue on evaporation.

COLORADO RIVER BASIN

COLORADO RIVER AT ROBERT LEE, TEX.

LOCATION.--At gaging station at bridge on State Highway 208 in Robert Lee, Coke County, half a mile upstream from Mountain Creek.
DRAINAGE AREA.--15,770 square miles, of which 11,600 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1951.
Water temperatures: October 1947 to September 1951.
Sediment records: January 1949 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 9,530 micromhos Apr. 5; minimum, 371 micromhos June 4.
Percent sodium: Maximum, 79 June 5; minimum, 46 June 3, 4.
EXTREMES, 1947-51.--Percent sodium: Maximum, 79 Aug. 15, 1949, June 5, 1951; minimum, 17 July 14, 1949.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residue on evaporation and for concentrations more than 1,000 ppm are sum of determined constituents unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	313	12	2.94	1.32	8.47		2.11	3.29	7.28		0.05		783	1.06	332	67	1,360	8.0
Oct. 5-10	177	12	3.89	1.81	11.27		2.31	4.39	10.21		.06		1,020	1.39	246	66	1,800	8.1
Oct. 11-20	88	9.8	5.09	2.22	13.33		2.36	5.52	12.75		.01		1,240	1.69	149	65	2,170	7.8
Oct. 21-31	33	12	5.79	2.63	15.19		2.34	6.60	14.67		.00		1,420	1.93	64	64	2,430	7.8
Nov. 1-10	3.8	14	6.19	2.96	15.98		2.57	7.04	15.51		.01		1,510	2.05	7.8	64	2,560	7.6
Nov. 11-20	0	14	5.84	2.96	15.59		2.70	6.68	15.00		.01		1,460	1.99	0	64	2,490	7.6
Nov. 21-30	0	13	5.79	2.96	15.36		2.77	6.45	14.89		.00		1,440	1.96	0	64	2,470	7.7
Dec. 1-10	5.0	11	6.09	3.37	15.66		2.84	6.77	15.51		.00		1,490	2.03	10	62	2,560	7.6
Dec. 11-20	13	8.4	5.79	3.12	13.89		2.92	6.06	13.82		.00		1,350	1.84	24	61	2,320	7.8
Dec. 21-31	9.3	8.8	5.89	3.12	14.30		2.97	6.18	14.16		.00		1,380	1.88	17	61	2,370	7.8
Jan. 1-10, 1951	7.3	6.8	5.29	3.21	15.50		2.11	6.66	15.23		.00		1,430	1.94	14	65	2,450	8.1
Jan. 11-20	13	5.6	7.34	3.70	18.49		2.03	9.22	18.28		.00		1,770	2.41	31	63	2,960	8.1
Jan. 21-31	10	5.1	8.43	3.87	19.46		1.97	10.56	19.23		.00		1,920	2.61	26	61	3,130	7.9
Feb. 1-10	12	3.7	9.48	4.28	19.97		2.38	11.33	20.02		.00		2,030	2.76	33	59	3,250	8.2
Feb. 11-19	18	6.2	10.33	4.61	19.17		1.90	12.16	20.02		.03		2,060	2.80	50	56	3,320	7.7
Feb. 20-28	35	4.1	12.48	4.85	21.67		1.57	14.30	23.13		.00		2,370	3.22	113	56	3,820	7.7
Mar. 1-10	18	4.7	12.97	5.51	25.86		1.34	15.22	27.78		.00		2,680	3.64	66	58	4,310	7.8
Mar. 11-20	7.7	6.2	12.28	5.35	27.26	--	1.21	14.47	28.77		.02		2,700	3.67	28	61	4,420	7.4
Mar. 21-28	.8	5.0	9.98	5.10	25.44	--	1.05	12.76	25.95		.00		2,420	3.29	2.6	63	4,060	7.3
Mar. 29-31	56	5.6	17.42	6.91	37.40	--	1.38	21.24	38.36		.03		3,720	5.06	283	61	5,880	7.6

Apr. 1-10	20	5.1	21.66	9.54	61.75	--	1.25	27.06	62.89		--		5,540	7.53	151	66	8,700	7.4
Apr. 11-20	.2	4.8	19.46	9.29	56.95		.93	24.98	59.79		--		5,170	7.03	1.4	66	8,330	7.3
Apr. 21-24	0	3.1	12.28	6.74	36.51		.90	15.97	38.64		.02		3,340	4.54	0	66	5,560	7.2
Apr. 25-30	25	3.4	24.55	9.95	55.09		.95	29.98	58.66		--		5,440	7.40	185	61	8,700	7.2
May 1-17	1.2	3.6	20.76	8.47	53.99		1.13	25.40	56.69		--		5,030	6.84	8.2	65	7,690	7.2
May 18, 19	1,850	6.8	22.36	9.70	48.17		1.61	27.27	51.33		.02		4,860	6.61	12,230	60	7,540	7.9
May 19, 20-28	7,930	17	2.30	.75	2.67		1.57	1.56	2.54		.05		379	.52	4,120	47	632	7.9
May 29-31	90	15	3.49	1.15	5.44		1.56	2.98	5.50		.04		664	.90	81	54	1,110	7.5
June 1-2, 3, 6-10	1,830	15	3.64	1.56	10.87		1.95	3.87	10.21		.04		a 1,020	1.39	2,540	68	1,770	7.7
June 3	569	13	3.24	.99	4.43		1.61	2.56	4.43		.06		558	.76	432	51	957	7.6
June 3, 4	3,710	17	1.90	.56	2.10		1.75	.85	1.86		.10		294	.40	1,480	46	511	7.6
June 3, 5	1,440	24	4.74	1.97	16.90		2.21	4.62	16.70		.08		1,420	1.93	2,780	72	2,570	8.2
June 5	1,310	21	6.49	3.12	35.19		3.24	7.70	33.84		.02		2,670	3.63	4,760	79	4,600	8.2
June 11, 13, 29-30	96	15	4.09	1.73	11.89		1.88	4.46	11.34		.03		1,070	1.46	140	67	1,910	7.5
June 12, 16, 24-28	1,450	16	3.69	1.40	7.78		1.92	3.33	7.59		.03		834	1.13	1,640	60	1,390	7.5
June 14-15, 16	278	13	4.29	2.55	16.56		1.74	5.87	15.74		.05		1,410	1.92	534	71	2,480	8.1
June 16, 17-23	5,390	16	2.45	.81	4.89		1.87	1.75	4.48		.05		520	.71	3,830	60	897	7.6
July 1-2, 3	17	17	3.79	1.48	8.87		1.97	3.81	8.32		.04		901	1.23	21	63	1,520	8.2
July 3	5,370	29	4.69	2.55	25.79		15.85	1.33	15.85		.00		1,850	2.52	13,530	78	3,230	7.6
July 4-10	7,450	18	1.50	.64	4.41		2.13	1.54	2.82		.06		412	.56	4,170	67	711	8.0
July 11-14	91	23	2.30	1.15	6.67		2.00	2.69	5.42		.01		.645	.88	80	66	1,120	8.0
July 15-20	18	17	3.79	1.73	9.94		2.13	4.31	8.97		.05		966	1.31	24	64	1,640	7.9
July 21-31	5.6	19	4.89	2.38	13.64		1.93	6.20	12.75		.03		1,270	1.73	9.7	65	2,210	7.9
Aug. 1-11	0	17	6.74	3.54	18.65		1.52	8.79	18.56		.06		1,750	2.38	0	64	2,990	7.8
Aug. 12, 25-28	3,950	13	1.45	.49	3.01		1.77	1.31	1.81		.06		311	.42	1,660	61	537	7.7
Aug. 13-14, 23, 24, 29-31	6,960	15	1.95	.72	4.55		1.84	1.89	3.44		.05		454	.62	4,320	63	779	7.8
Aug. 15-22, 23	3,820	13	4.09	2.14	11.72		1.56	5.41	10.94		.04		1,090	1.48	5,650	65	1,900	7.7
Sept. 1-10	142	15	2.50	1.23	6.99		2.08	2.98	5.64		.02		667	.91	129	65	1,150	7.9
Sept. 11-19	217	12	4.04	1.73	11.09		2.00	4.93	9.93		.00		1,020	1.39	302	66	1,790	7.7
Sept. 20-30	0	14	5.54	2.71	14.58		1.93	6.79	14.10		.01		1,380	1.88	0	64	2,380	7.9
Total or weighted average	54,840	17	3.44	1.48	9.70		3.23	3.19	8.18		0.05		888	1.21	66,360	66	1,510	--

a Residue on evaporation.

COLORADO RIVER BASIN--Continued

COLORADO RIVER AT AUSTIN, TEX.

LOCATION.--At raw-water intake of Austin City Water Plant, 4½ miles upstream from gaging station, at Austin, which is at southeast edge of Austin, Travis County, at Montopolis Bridge on U. S. Highway 183, 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, of which 11,900 square miles is probably noncontributing.

RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1951.
Water temperatures: October 1947 to September 1951.

EXTREMES, 1950-51.--Specific conductance: Maximum, 543 micromhos Mar. 29, Sept. 4, 6; minimum, 346 micromhos Dec. 7.
Percent sodium: Maximum, 37 May 1-31; minimum, 24 Oct. 1-31.

EXTREMES, 1947-51.--Specific conductance: Maximum, 566 micromhos Mar. 1-31, 1948; minimum, 447 micromhos Oct. 1-31, 1948.
Percent sodium: Maximum, 37 May 1-31, 1951; minimum, 24 Oct. 1-31, 1950.

REMARKS.--Values reported for dissolved solids concentrations are residue on evaporation. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950 ---	35,410	9.2	2.05	1.32	1.09		2.69	0.60	1.13	0.01	0.02		260	0.35	12,390	24	462	7.7
Nov. 1-30 ---------	41,490	7.7	2.00	1.32	1.30		2.64	.64	1.30	.01	.02		268	.36	14,940	28	462	7.5
Dec. 1-31 ---------	45,120	9.2	2.00	1.32	1.48		2.69	.71	1.38	.01	.01		268	.36	16,240	31	475	7.6
Jan. 1-31, 1951 ----	50,790	10	2.20	1.32	1.52		2.88	.69	1.44	.01	.01		282	.38	19,300	30	493	7.9
Feb. 1-28 ---------	35,710	8.2	2.15	1.23	1.73		2.92	.67	1.50	.02	.02		282	.38	13,570	34	491	7.9
Mar. 1-31 --------	14,470	5.4	2.15	1.32	1.62		2.85	.73	1.47	.01	.02		287	.39	5,640	32	517	7.7
Apr. 1-30 --------	44,890	11	2.00	1.40	1.58		2.72	.75	1.47	.02	.02		283	.38	17,060	32	496	7.6
May 1-31 ---------	107,600	11	1.95	1.15	1.79		2.72	.69	1.47	--	.02		283	.38	40,890	37	495	7.9
June 1-30 ---------	98,330	11	1.90	1.32	1.66		2.59	.71	1.52	.02	.03		271	.37	36,380	34	490	8.0
July 1-31 ---------	120,900	13	1.80	1.81	1.27		2.46	.75	1.64	.02	.01		283	.38	45,940	26	494	8.0
Aug. 1-31 ---------	121,900	12	2.00	1.32	1.88		2.56	.77	1.83	.02	.01		295	.40	48,760	36	525	8.1
Sept. 1-30 --------	47,950	12	2.00	1.32	1.91	0.09	2.52	.81	1.89	.02	.01	0.28	299	.41	19,660	36	529	8.0
Total or weighted average -	764,600	11	1.95	1.40	1.61		2.64	0.73	1.55	0.02	0.02	--	282	0.38	293,500	32	497	--

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, and 12 miles upstream from Jones Creek and at mile 67.
DRAINAGE AREA.--41,150 square miles, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: April 1944 to September 1951.
Water temperatures: October 1945 to September 1948, March 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 649 micromhos Aug. 19; minimum, 283 micromhos June 5.
Percent sodium: Maximum, 39 Sept. 1-30; minimum, 21 June 1-5, 10, 13.
EXTREMES, 1944-51.--Percent sodium: Maximum, 39 July 11-20, 1948, Sept. 1-30, 1951; minimum, 7 Jan. 19-24, 1945.
REMARKS.--Values reported for dissolved solids concentration are residue 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 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	40,680	10	2.54	1.32	1.47		3.33	0.67	1.30	0.01	0.02		312	0.42	17,090	28	527	7.7
Nov. 1-30	44,300	15	2.50	1.48	1.36		3.28	.69	1.33	.02	.02		306	.42	18,610	25	526	7.9
Dec. 1-31	50,750	5.5	2.50	1.32	1.63		3.28	.71	1.44	.01	.01		296	.40	20,300	30	536	7.7
Jan. 1-31, 1951	51,810	5.6	2.50	1.32	1.66		3.28	.69	1.49	.01	.01		304	.41	21,240	30	538	8.1
Feb. 1-28	55,180	5.6	2.45	1.32	1.64		3.28	.69	1.41	.01	.02		293	.40	22,070	30	520	7.7
Mar. 1-31	50,990	9.6	2.69	1.23	2.05		3.70	.77	1.47	--	.03		a328	.45	13,450	34	567	7.9
Apr. 1-30	33,660	14	2.45	1.23	1.55		3.11	.83	1.24	.02	.03		321	.44	14,810	30	520	7.6
May 1-31	50,990	10	2.00	1.07	1.82		2.72	.71	1.44	--	.02		278	.38	19,380	37	500	7.7
June 1-5, 10, 13	19,700	17	2.00	.55	.68		2.13	.58	.48	--	.04		206	.28	5,520	21	325	7.9
June 6-9, 11-12, 14-30	101,000	15	2.20	1.15	1.47		2.74	.69	1.35	.02	.02		292	.40	40,400	30	485	8.2
July 1-31	45,430	13	2.10	1.32	1.81		2.79	.75	1.64	.02	.03		295	.40	18,170	35	540	7.9
Aug. 1-31	46,570	15	2.15	1.32	1.93		2.75	.77	1.86	.01	.01		329	.45	20,960	36	555	7.6
Sept. 1-30	76,000	13	2.00	.99	1.92		2.52	.71	1.64	.02	.02		282	.38	28,880	39	486	7.7
Total or weighted average	646,000	11	2.30	1.23	1.65		2.97	0.71	1.44	0.02	0.02		297	0.40	258,400	32	513	--

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, and 10 miles upstream from Coleto Creek.
DRAINAGE AREA.--5,311 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1948 to September 1951. Water temperatures: November 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,820 micromhos June 24; minimum, 279 micromhos June 15. Percent sodium: Maximum, 58 June 23-24; minimum, 24 June 4, 6, 15.
EXTREMES, 1945-46, 1948-51.--Percent sodium: Maximum, 67 July 23-24, 1950; minimum, 18 May 22-29, 1950.
REMARKS.--Values reported for dissolved solids concentrations are residue on evaporation unless otherwise noted. Continuous records of specific conductance of daily samples for October 1945 To September 1951 available in district office at Austin, Tex. Some daily chloride determinations also available. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	8,190	16	2.69	1.64	2.30	--	3.47	0.65	2.48	0.01	0.02	--	400	0.54	4,420	35	677	7.8
Oct. 11-12, 21-31	8,790	17	2.79	1.64	2.17	0.00	3.67	.69	2.28	.02	.01	0.22	402	.55	4,830	33	648	7.7
Oct. 13-20	4,820	20	3.09	2.06	3.70	.06	3.56	1.06	4.29	.02	.01	.23	512	.70	3,370	42	875	7.7
Nov. 1-10	6,870	17	2.79	1.64	1.87	.06	3.80	.65	1.75	.02	.01	.09	347	.47	3,230	29	601	7.6
Nov. 11-20	6,620	14	2.89	1.64	1.83	.03	3.90	.69	1.78	.02	.01	.17	348	.47	3,110	29	610	7.7
Nov. 21-30	7,550	16	3.04	1.73	1.83	.06	4.03	.67	1.81	.02	.02	.19	363	.49	3,700	27	638	7.8
Dec. 1-10	8,030	15	2.84	1.64	1.78	.11	3.92	.65	1.83	.01	.04	.21	358	.49	3,930	28	622	8.0
Dec. 11-20	7,740	13	3.09	1.73	2.26	.12	4.03	.67	2.57	.01	.02	.42	412	.56	4,330	31	711	7.9
Dec. 21-31	9,360	12	3.29	1.56	2.00	.10	4.24	.62	2.14	.01	.04	.26	409	.56	5,240	29	687	8.0
Jan. 1-10, 1951	7,590	11	3.19	1.64	1.91	--	4.21	.65	2.03	.02	.04	.34	386	.52	3,950	28	667	8.0
Jan. 11-20	8,040	11	2.99	1.64	2.13	.05	3.85	.69	2.23	.01	.04	.17	380	.52	4,180	31	672	8.0
Jan. 21-31	8,540	13	2.94	1.64	2.17	.03	3.87	.67	2.23	.01	.03	.15	376	.51	4,360	32	665	8.2
Feb. 1-10	7,590	12	2.94	1.64	2.26	.04	3.80	.71	2.37	.01	.03	.18	382	.52	3,950	33	680	8.1
Feb. 11-19	7,610	11	2.69	1.81	2.52	.03	3.43	.71	2.74	.01	.05	.26	402	.55	4,190	36	696	8.1
Feb. 20-28	8,300	11	2.89	1.73	2.52	.04	3.65	.71	2.76	.01	.05	.31	418	.57	4,730	35	718	8.0
Mar. 1-10	8,520	13	3.19	1.89	3.09	.04	3.88	.79	3.55	.01	.04	.34	482	.66	5,620	38	829	8.0
Mar. 11-20	7,450	16	2.59	1.89	2.44	.01	3.46	.73	2.74	.02	.05	.18	a387	.53	3,950	35	701	8.0
Mar. 21-31	10,310	16	2.89	1.89	2.17	.00	3.83	.71	2.40	.02	.06	.11	a385	.52	5,360	31	686	8.0

a Sum of determined constituents.

Apr. 1-5, 9-10	8,250	15	3.29	1.81	2.44	.01	4.00	.73	2.79	--	.04	.33	428	.58	4,780	32	753	8.4
Apr. 6-8	3,090	14	3.59	2.14	5.09	--	3.61	.96	6.20	--	.05	--	a606	.82	2,530	47	1,120	8.1
Apr. 11-20	8,540	18	2.59	1.81	3.00	.00	3.05	.77	3.44	.02	.06	.09	433	.59	5,040	41	760	8.3
Apr. 21-30	7,200	17	3.09	1.89	2.74	.00	3.79	.73	3.07	.02	.02	.17	436	.59	4,250	35	768	8.3
May 1-10	11,400	18	2.99	1.81	2.13	.00	3.80	.65	2.34	.02	.02	.15	a379	.52	5,930	31	678	8.2
May 11, 17-18	2,460	17	2.79	1.64	3.69	--	2.85	.77	4.46	.02	.02	--	522	.71	1,750	45	902	7.9
May 12-16, 19-20	6,800	18	3.69	1.81	5.70	.00	3.02	.87	7.25	.02	.03	.04	710	.97	6,600	51	1,210	7.8
May 21-31	14,020	19	2.79	1.40	1.96	.00	3.59	.62	2.00	.02	.05	.25	350	.48	6,730	32	630	7.8
June 1-3, 5, 7-10, 14, 16	81,580	16	2.30	.90	1.87	.00	2.54	.50	2.12	.02	.04	.32	307	.42	34,260	37	547	7.6
June 4, 6, 15	30,450	14	1.70	.54	.71	--	2.00	.29	.62	--	.04	--	175	.24	7,310	24	303	7.7
June 11-13, 17-20	13,470	17	2.89	.90	5.09	--	1.95	.69	6.29	.02	.03	.46	592	.81	10,910	57	993	7.5
June 21-22, 25-30	8,040	24	3.04	1.32	2.44	.12	3.21	.71	2.82	.02	.03	.22	400	.54	4,340	35	708	8.1
June 23-24	2,110	30	4.39	1.97	8.78	--	2.82	1.21	11.25	.03	.05	--	1,020	1.39	2,930	58	1,670	8.3
July 1-10	6,910	23	2.84	1.40	1.91	.11	3.57	.60	2.09	.02	.02	.21	a357	.49	3,390	31	634	8.0
July 11-20	6,000	20	2.64	1.48	2.13	.06	3.47	.60	2.28	.02	.00	.24	a357	.49	2,940	34	645	8.0
July 21-31	6,140	21	2.30	1.48	2.17	.07	3.11	.62	2.26	.02	.03	.22	356	.48	2,950	36	614	7.9
Aug. 1-10	3,600	22	2.20	1.56	2.26	.02	3.10	.62	2.28	.02	.03	.22	358	.49	1,760	37	614	7.9
Aug. 11-20	3,760	22	2.35	1.56	2.13	.03	3.26	.60	2.14	.02	.03	.22	354	.48	1,800	35	611	8.0
Aug. 21-31	4,080	23	2.10	1.56	2.39	.05	2.98	.67	2.43	.02	.02	.20	360	.49	2,000	39	625	7.8
Sept. 1-10	3,610	22	2.40	1.56	2.44	.02	3.24	.69	2.48	.02	.02	.21	380	.52	1,880	38	654	7.8
Sept. 11-20	9,500	19	2.35	1.32	2.09	.01	3.16	.58	2.03	.02	.02	.22	338	.46	4,370	36	588	7.8
Sept. 21-30	9,230	18	2.10	1.15	1.57	.00	2.84	.50	1.49	.02	.04	.05	279	.38	3,510	33	486	8.0
Total or weighted average	392,200	16	2.64	1.40	2.26	0.03	3.20	0.62	2.51	0.02	0.03	0.23	371	0.50	196,100	36	648	--

a Sum of determined constituents.

NUECES RIVER BASIN

NUECES RIVER NEAR MATHIS, TEX.

LOCATION.--At intake tower at Lake Corpus Christi near Mathis, San Patricio County, 0.8 mile upstream from gaging station near Mathis, which is at bridge on U. S. Highway 59, 200 feet downstream from Texas & New Orleans Railroad bridge, and 4 miles southwest of Mathis.

DRAINAGE AREA.--16,660 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1951.
Water temperatures: October 1947 to September 1951.

EXTREMES, 1950-51.--Specific conductance: Maximum, 893 micromhos May 13, 16; minimum, 252 micromhos Sept. 16.
Percent sodium: Maximum, 50 May 1-24; minimum, 36 June 1-30, July 1-31, Aug. 1-31.

EXTREMES, 1947-51.--Percent sodium: Maximum, 59 June 1-30, 1948; minimum, 28 Apr. 1-26, 1949.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in districe office at Austin, Tex. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	13,290	24	2.50	0.52	1.84		3.11	0.60	1.10	0.02	0.02		302	0.41	5,450	38	479	8.0
Nov. 1-30	3,550	21	2.54	.42	1.98		3.15	.64	1.13	--	.02		311	.42	1,490	40	473	8.1
Dec. 1-31	2,930	22	2.64	.40	2.17		3.36	.71	1.13	.02	.00		313	.43	1,260	42	501	7.9
Jan. 1-31, 1951	2,610	28	2.74	.51	2.22		3.51	.69	1.27	.01	.00		328	.45	1,170	41	524	8.1
Feb. 1-28	2,500	23	2.89	.54	2.14		3.59	.71	1.27	--	.01		332	.45	1,120	38	540	8.0
Mar. 1-31	2,620	19	2.94	.52	2.28		3.62	.77	1.33	.01	.01		345	.47	1,230	40	565	7.8
Apr. 1-30	2,860	21	3.14	.57	2.54		3.90	.77	1.58	--	.00		386	.52	1,490	41	610	7.9
May 1-24	15,420	22	3.44	.58	4.06		4.10	1.04	2.93	--	.01		468	.64	9,870	50	803	7.8
May 25-31	44,210	20	1.60	.27	1.55		2.20	.46	.73	--	.04		222	.30	1,330	45	350	7.7
June 1-30	137,900	24	1.85	.40	1.27		2.26	.54	.68	--	.03		217	.30	41,370	36	354	7.6
July 1-31	4,120	25	2.25	.34	1.48		2.72	.62	.70	--	.02		257	.35	1,440	36	419	7.5
Aug. 1-31	4,140	29	2.50	.46	1.70		3.11	.62	.87	.01	.03		307	.42	1,740	36	457	8.1
Sept. 1-12	1,520	30	2.70	.45	2.00		3.44	.69	.99	.02	.01		328	.45	684	39	502	8.3
Sept. 13-30	184,500	19	1.60	.27	1.31		2.03	.54	.56	.02	.02		207	.28	51,660	41	322	8.0
Total or weighted average	422,200	21	1.85	0.34	1.48		2.31	0.56	0.76	--	0.02		231	0.31	130,900	40	369	--

RIO GRANDE BASIN

RIO GRANDE ABOVE CULEBRA CREEK NEAR LOBATOS, COLO.

LOCATION.--Two and one-half miles south of La Sauses, 7 miles downstream from Conejos River, and 11 miles upstream from gaging station near Lobatos, which is 7 miles downstream from Culebra Creek and 10 miles east of Lobatos, Conejos County.
DRAINAGE AREA.--7,700 square miles above gaging station (includes 2,940 square miles in closed basin).
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 721 micromhos May 6; minimum, 224 micromhos Feb. 12.
Percent sodium: Maximum, 46 Aug. 1-10; minimum, 25 Dec. 11-20.
EXTREMES, 1946-51.--Specific conductance: Maximum, 1,070 micromhos July 26, 1948; minimum, 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.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Discharge records for gaging station near Lobotos for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	1,270	34	2.30	0.64	1.87	0.14	2.41	2.10	0.42	0.03	0.01	0.1	325	0.44	561	38	466	7.8
Oct. 11-20	1,160	--	2.35	.90	1.70	--	--	--	--	--	--	--	346	.47	548	34	501	--
Oct. 21-31	1,350	--	2.59	.99	1.96	--	--	--	--	--	--	--	350	.48	643	35	552	--
Nov. 1-10	1,030	--	2.99	1.07	2.26	--	--	--	--	--	--	--	438	.60	614	36	630	--
Nov. 11-20	2,480	--	2.94	1.07	2.13	--	--	--	--	--	--	--	423	.58	1,430	35	602	--
Nov. 21-30	2,940	--	2.00	.72	1.17	--	--	--	--	--	--	--	256	.35	1,020	30	384	--
Dec. 1-10	3,070	--	1.95	.67	1.13	--	--	--	--	--	--	--	273	.37	1,140	30	382	--
Dec. 11-20	4,970	--	1.60	.57	.74	--	--	--	--	--	--	--	210	.29	1,420	25	290	--
Dec. 21-31	5,230	--	1.80	.60	.96	--	--	--	--	--	--	--	230	.31	1,640	29	329	--
Jan. 1-10, 1951	5,290	--	1.65	.60	.67	.16	2.05	1.02	.18	.02	.02	.1	239	.33	1,720	27	324	--
Jan. 11-20	5,730	--	1.60	.50	.78	--	--	--	--	--	--	--	203	.28	1,580	27	286	--
Jan. 21-31	6,150	--	1.40	.44	.70	--	--	--	--	--	--	--	182	.25	1,520	28	257	--
Feb. 1-10	5,120	--	1.50	.46	.74	--	--	--	--	--	--	--	190	.26	1,320	27	269	--
Feb. 11-20	5,900	--	1.35	.42	.70	--	--	--	--	--	--	--	173	.24	1,390	28	250	--
Feb. 21-28	4,840	--	1.75	.54	1.00	--	--	--	--	--	--	--	230	.31	1,510	30	331	--
Mar. 1-10	4,970	--	1.75	.54	.91	--	--	--	--	--	--	--	223	.30	1,510	28	317	--
Mar. 11-20	3,300	--	2.20	.81	1.35	--	--	--	--	--	--	--	291	.40	1,310	31	431	--
Mar. 21-31	2,110	--	2.59	.90	1.70	--	--	--	--	--	--	--	345	.47	990	33	518	--

RIO GRANDE BASIN--Continued

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

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	2,440	36	2.59	0.90	1.96	0.14	2.61	2.44	0.45	0.03	0.02	0.1	375	0.51	1,240	35	544	7.7
Apr. 11-19	1,880	--	2.10	.77	1.39	--	--	--	--	--	--	--	273	.37	698	33	412	--
Apr. 20-30	1,300	--	3.19	1.23	2.87	--	--	--	--	--	--	--	472	.64	834	39	702	--
May 1-10	372	--	3.09	1.23	2.83	--	--	--	--	--	--	--	472	.64	239	40	707	--
May 11-21	361	--	2.54	.99	2.30	--	--	--	--	--	--	--	381	.52	187	39	579	--
May 22, 24-27	569	--	2.79	.99	2.48	--	--	--	--	--	--	--	412	.56	319	40	624	--
May 23, 28-31	1,950	--	1.60	.54	1.04	--	--	--	--	--	--	--	214	.29	568	33	317	--
June 1-5	718	--	1.90	.75	1.52	--	--	--	--	--	--	--	296	.40	289	36	422	--
June 6-12	373	--	2.94	1.15	2.57	--	--	--	--	--	--	--	458	.62	232	39	667	--
June 13-20	549	--	2.00	.75	1.61	--	--	--	--	--	--	--	308	.42	230	37	442	--
June 21-30	395	--	1.85	.71	1.48	--	--	--	--	--	--	--	294	.40	158	37	420	--
July 1-10	a79	37	1.90	.68	1.61	.16	2.80	1.27	.23	.04	.01	.1	293	.40	32	37	418	7.9
July 11-20	a0	--	1.95	.82	2.04	--	--	--	--	--	--	--	318	.43	0	42	466	--
July 21-31	a0	--	1.85	.79	2.04	--	--	--	--	--	--	--	317	.43	0	44	460	--
Aug. 1-10	a16	--	1.70	.77	2.13	--	--	--	--	--	--	--	308	.42	7	46	446	--
Aug. 11-20	a9	--	1.60	.72	1.65	--	--	--	--	--	--	--	276	.38	3	42	393	--
Aug. 21-31	480	--	1.55	.57	1.70	--	--	--	--	--	--	--	270	.37	176	45	388	--
Sept. 1-10	682	--	1.65	.61	1.57	--	--	--	--	--	--	--	258	.35	239	41	380	--
Sept. 11-20	474	--	1.60	.55	1.48	--	--	--	--	--	--	--	254	.35	164	41	367	--
Sept. 21-30	383	--	1.70	.67	1.78	--	--	--	--	--	--	--	280	.38	146	43	410	--
Total or weighted average	79,980	--	1.85	0.64	1.17	--	--	--	--	--	--	--	253	0.34	27,630	32	366	--

a No flow at gaging station July 10-31, Aug. 1-3, 9-17.

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

LOCATION.--At gaging station in San Ildefonso Pueblo Grant 250 feet downstream from new highway bridge, 1¾ miles southwest of San Ildefonso Pueblo, Santa Fe County, 2½ miles downstream from Rio Pojoaque and 7 miles west of Pojoaque.
DRAINAGE AREA.--14,300 square miles (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1951.
Water temperatures: October 1948 to September 1951.
Sediment Records: October 1947 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,230 micromhos, Aug. 26; minimum, 236 micromhos, June 28.
Percent sodium: Maximum, 32 Oct. 1-10, 11-20; minimum, 18 Aug. 26.
EXTREMES, 1946-51.--Specific conductance: Maximum, 1,230 micromhos, Aug. 26, 1951; minimum, 188 micromhos, June 16, 1948.
Percent sodium: Maximum, 32 Sept. 11-18, 22-30, 1947; Oct. 1-10, 11-20, 1951; minimum, 14 June 11-20, 1949.
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 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950 ----	6,040	30	2.25	0.74	1.39		2.93	1.23	0.28		0.01		273	0.37	2,240	32	424	8.1
Oct. 11-20 --------	5,350	27	2.00	.70	1.26		2.62	1.10	.28		.01		247	.34	1,800	32	391	8.1
Oct. 21-31 --------	11,740	30	2.50	.82	1.09		2.62	1.62	.24		.01		281	.38	4,490	25	427	7.5
Nov. 1-10 ---------	5,530	32	2.10	.74	1.22		2.75	1.15	.27		.01		259	.35	1,950	30	397	7.6
Nov. 11-20 --------	6,520	28	2.25	.77	1.30		2.87	1.27	.31		.01		271	.37	2,400	30	420	7.4
Nov. 21-30 --------	9,070	30	2.25	.79	1.35		2.64	1.48	.34		.01		278	.38	3,430	31	427	7.5
Dec. 1-10 --------	7,770	29	2.10	.69	1.17		2.64	1.15	.27		.01		250	.34	2,640	30	385	7.4
Dec. 11-20 --------	10,780	30	2.05	.68	1.04		2.47	1.19	.25		.01		244	.33	3,580	28	376	7.4
Dec. 21-31 --------	10,670	29	1.95	.67	.96		2.46	1.06	.21		.01		231	.31	3,350	27	357	7.5
Jan. 1-10, 1951 ----	10,020	27	2.00	.74	1.09		2.52	1.12	.21		.01		239	.33	3,260	28	375	7.8
Jan. 11-20 --------	10,000	28	2.00	.75	1.09		2.54	1.08	.24		.01		240	.33	3,260	28	369	7.8
Jan. 21-31 --------	11,320	30	1.95	.67	.96		2.41	.98	.21		.01		226	.31	3,480	27	353	7.6
Feb. 1-10 ---------	10,250	31	2.05	.67	1.00		2.54	1.02	.21		.02		237	.32	3,300	27	366	7.4
Feb. 11-20 --------	29,910	23	2.69	.99	.91		2.61	1.96	.13		.02		288	.39	11,720	20	448	7.5
Feb. 21-28 --------	19,790	24	2.40	.99	.83		2.43	1.75	.13		.02		266	.36	7,160	20	416	7.6

RIO GRANDE BASIN--Continued

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

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951 ---	11,230	30	1.95	0.72	0.96		2.39	1.08	0.21		0.02		232	0.32	3,540	26	360	7.6
Mar. 11-20 --------	9,730	29	2.00	.55	1.09		2.46	1.12	.20		.02		237	.32	3,140	30	381	7.8
Mar. 21-31 --------	8,380	28	2.05	.67	1.17		2.56	1.17	.27		.01		247	.34	2,810	30	393	7.8
Apr. 1-10 ---------	7,740	29	2.15	.67	1.26		2.64	1.25	.27		.01		258	.35	2,720	31	410	7.8
Apr. 11-20 --------	7,000	29	2.15	.68	1.26		2.61	1.29	.31		.01		261	.35	2,480	31	414	7.7
Apr. 21-30 --------	7,610	26	2.05	.69	1.00		2.57	1.08	.27		.01		238	.32	2,460	27	377	7.7
May 1-10 ---------	7,940	26	2.05	.64	.91		2.54	.94	.27		.02		227	.31	2,450	25	357	7.9
May 11-20 --------	18,780	22	2.30	.71	.74		2.54	1.23	.18		.02		236	.32	6,030	20	373	8.0
May 21-31 --------	23,960	21	2.10	.66	.74		2.26	1.12	.11		.02		215	.29	7,010	21	344	7.7
June 1-10 ---------	18,470	20	1.85	.55	.70		2.02	.94	.11		.01		190	.26	4,770	23	305	7.7
June 11-20 --------	14,340	19	1.70	.50	.61		1.97	.81	.08		.01		175	.24	3,410	22	278	7.5
June 21-30 --------	18,280	20	1.65	.47	.52		1.88	.73	.07		.01		166	.23	4,130	20	259	7.5
July 1-10 ---------	16,660	21	1.85	.48	.61		2.16	.79	.08		.01		184	.25	4,170	21	292	7.5
July 11-20 --------	4,130	25	2.20	.60	1.13		2.82	.98	.23		.01		243	.33	1,360	29	385	7.5
July 21-31 ---------	12,150	23	2.10	.59	.87		2.44	1.10	.14		.01		224	.30	3,700	24	357	7.5
Aug. 1-10 ---------	17,410	23	2.79	.90	.91		2.49	1.98	.14		.03		288	.39	6,820	20	456	7.8
Aug. 11-21 --------	4,310	26	2.10	.65	1.09		2.72	1.02	.23		.01		240	.33	1,410	28	381	7.9
Aug. 22-25, 27-31--	7,910	25	3.29	.82	1.22		3.52	1.75	.24		.02		329	.45	3,540	23	522	8.0
Aug. 26 ----------	1,330	15	8.89	2.47	--		3.51	10.12	.28		.01		884	1.20	1,600	18	1,230	7.8
Sept. 1-10 ---------	5,560	25	2.25	.76	1.17		2.79	1.21	.23		.02		257	.35	1,940	28	409	7.9
Sept. 11-20 --------	3,910	27	1.85	.66	1.09		2.64	.87	.24		.01		227	.31	1,210	30	361	8.1
Sept. 21-30 --------	3,710	27	1.85	.67	1.04		2.65	.83	.25		.00		225	.31	1,140	29	358	8.0
Total or weighted average -	395,400	25	2.20	0.72	0.96		2.47	1.27	0.19		0.01		242	0.33	129,900	25	379	--

RIO GRANDE BASIN--Continued

RIO GRANDE (TIFFANY CHANNEL) AT TIFFANY, N. MEX.

LOCATION.--At water-stage recorder at Atchison Topeka and Santa Fe Railway bridge at Tiffany, Socorro County, 3.9 miles upstream from San Marcial.
DRAINAGE AREA.--27,700 square miles (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: April 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,160 micromhos Aug. 24; minimum, 826 micromhos Feb. 21.
Percent sodium: Maximum, 63 May 1-10; minimum, 34 Aug. 23-24.
EXTREMES, April 1950 to September 1951.--Specific conductance: Maximum, 2,340 micromhos Sept. 22, 1950; minimum, 826 micromhos Feb. 21, 1951.
Percent sodium: Maximum, 63 May 1-10, 1951; minimum, 34 Aug. 23-24, 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Daily discharge for Tiffany Channel is not published separately but is included in discharge records for water year October 1950 to September 1951 for Rio Grande at San Marcial, given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	80		4.89	1.48	7.48								888	1.21	97	55	1,370	
Oct. 11-20	33		4.44	1.64	7.65								888	1.21	40	56	1,370	
Oct. 21-31	16		4.49	1.73	7.61								846	1.15	18	55	1,360	
Nov. 1-10	8.7		4.59	1.81	8.39								942	1.28	11	57	1,490	
Nov. 11-20	12		4.64	1.89	9.31								1,020	1.39	17	59	1,620	
Nov. 21-30	71		5.14	1.97	9.04								1,000	1.36	97	56	1,520	
Dec. 1-10	88		5.04	2.14	9.26								1,020	1.39	122	56	1,550	
Dec. 11-20	140		5.34	2.22	9.52								1,050	1.43	200	56	1,580	
Dec. 21-31	201		5.14	2.06	9.13								1,030	1.40	282	56	1,540	
Jan. 1-10, 1951	282		4.79	2.47	9.44								972	1.32	373	57	1,490	
Jan. 11-20	377		4.89	2.63	9.83								956	1.30	490	57	1,460	
Jan. 21-31	359		4.74	2.06	8.00								944	1.28	461	54	1,450	
Feb. 1-10	518		4.79	2.14	8.61								912	1.24	642	55	1,420	
Feb. 11-20	1,080		4.39	2.30	7.78								858	1.17	1,260	54	1,330	
Feb. 21-28	1,100		4.14	1.81	5.26								696	.95	1,040	47	1,090	

RIO GRANDE BASIN--Continued

RIO GRANDE (TIFFANY CHANNEL) AT TIFFANY, N. MEX.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951 ----	732		4.59	2.06	9.65								1,000	1.36	996	59	1,560	
Mar. 11-20 --------	476		4.49	1.89	8.61								959	1.30	621	57	1,480	
Mar. 21-31 --------	508		4.49	1.97	9.04								991	1.35	685	58	1,550	
Apr. 1-10 ---------	740		4.79	2.14	9.65								1,050	1.43	1,060	58	1,640	
Apr. 11-20 --------	765		4.99	2.30	11.31								1,180	1.60	1,230	61	1,840	
Apr. 21-30 --------	730		5.19	2.30	12.18								1,250	1.70	1,240	62	1,960	
May 1-10 ----------	728		4.84	2.22	12.18								1,230	1.67	1,220	63	1,930	
May 11-20 ---------	698		4.99	2.30	10.96								1,160	1.58	1,100	60	1,800	
May 21-31 ---------	1,200		4.89	2.14	10.52								1,120	1.52	1,830	60	1,740	
June 1-10 ---------	861		4.29	1.89	8.70								963	1.31	1,130	58	1,450	
June 11-20 --------	573		4.49	1.73	8.09								909	1.24	708	57	1,390	
June 21-30 --------	190		4.44	1.81	8.78								962	1.31	249	58	1,470	
July 1-10 ----------	73		4.44	1.97	9.44								1,010	1.37	100	60	1,560	
July 11-20 ---------	44		4.19	1.89	9.35								982	1.34	59	61	1,540	
July 21-31 ---------	12		4.19	1.73	8.57								947	1.29	15	59	1,470	
Aug. 1-10 ---------	230		5.19	1.89	7.13								947	1.29	296	50	1,390	
Aug. 11-20 -------	10		4.69	1.97	8.78								980	1.33	13	57	1,510	
Aug. 21-22, 25-31--	1,250		6.94	2.30	7.09								1,060	1.44	1,800	43	1,500	
Aug. 23-24 --------	167		12.87	4.11	8.78								1,730	2.35	393	34	2,160	
Sept. 1-10 ---------	509		4.99	1.81	7.35								918	1.25	635	52	1,380	
Sept. 11-20 --------	66		4.44	1.89	7.96								898	1.22	81	56	1,410	
Sept. 21-30 --------	6.9		4.39	1.89	7.35								876	1.19	8	54	1,390	
Total or weighted average-	14,930		4.99	2.14	9.00								1,010	1.37	20,620	56	1,550	

RIO GRANDE AT SAN MARCIAL, N. MEX.

LOCATION.--At gaging station in Pedro Armendaris Grant 33, at Atchison, Topeka & Santa Fe Railway bridge, 1.1 miles downstream from San Marcial, Socorro County.
DRAINAGE AREA.--27,700 square miles (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: July 1946 to September 1951.
Water temperatures: January 1949 to September 1951.
Sediment records: July 1946 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,150 micromhos May 7; minimum, 580 micromhos Feb. 26.
Percent sodium: Maximum 65 May 1-10; minimum, 31 Aug. 24.
EXTREMES, 1946-51.--Specific conductance: Maximum, 2,470 micromhos Sept. 28, 1948; minimum, 345 micromhos June 18, 1948.
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 sums of determined constituents. Records of specific conductance of daily samples available in district office in Albuquerque, N. Mex. Records of chemical analyses and sediment loads for years prior to 1946 have been published in Water Bulletins of International Boundary Commission. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	1,670	22	6.59	2.14	7.26		4.46	8.76	3.02		0.03		1,010	1.37	2,290	45	1,500	7.7
Oct. 11-20	442	35	4.59	1.56	7.44		4.24	5.37	4.29		.01		856	1.16	515	55	1,350	7.8
Oct. 21-31	316	35	4.59	1.56	7.78		4.20	5.23	4.79		.01		872	1.19	375	56	1,390	7.8
Nov. 1-10	165	37	4.79	1.73	8.44		4.47	5.29	5.36		.04		928	1.26	208	56	1,490	7.7
Nov. 11-20	636	31	5.39	2.06	6.35		4.62	6.06	3.33		.01		859	1.17	743	46	1,320	7.3
Nov. 21-30	2,980	27	4.69	1.73	4.57		4.03	5.16	1.78		.04		681	.93	2,760	42	1,030	7.5
Dec. 1-10	4,670	25	4.19	1.32	3.44		3.72	4.08	1.16		.04		555	.75	3,520	38	847	7.3
Dec. 11-20	6,720	27	3.89	1.32	3.48		3.65	3.68	1.33		.03		537	.73	4,910	40	828	7.3
Dec. 21-31	8,530	28	3.69	1.23	2.91		3.44	3.31	1.04		.02		484	.66	5,610	37	749	7.3
Jan. 1-10, 1951	7,380	28	3.65	1.23	3.00		3.46	3.44	1.21		.03		500	.68	5,020	38	772	7.3
Jan. 11-20	8,150	24	3.69	1.15	3.20		3.52	3.29	1.21		.02		494	.67	5,480	40	770	8.1
Jan. 21-31	8,700	25	3.84	1.15	3.99		3.70	3.54	1.72		.02		551	.75	6,520	44	864	8.2
Feb. 1-10	7,640	22	3.54	1.07	3.23		3.31	3.27	1.24		.02		482	.66	5,010	41	750	8.2
Feb. 11-20	19,120	22	3.39	.99	2.62		3.18	2.94	.85		.03		431	.59	11,210	37	668	8.2
Feb. 21-28	18,380	20	3.09	.99	2.02		2.82	2.64	.62		.02		376	.51	9,400	33	580	8.2
Mar. 1-10	7,240	30	3.79	1.23	3.96		3.80	3.58	1.81		.02		563	.77	5,540	44	888	7.5
Mar. 11-20	736	33	4.69	1.64	8.31		4.64	5.12	4.60		.02		888	1.21	889	57	1,440	7.5
Mar. 21-31	686	33	4.69	1.81	9.09		4.51	5.85	5.42		.02		967	1.31	902	58	1,540	7.7

RIO GRANDE BASIN--Continued

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

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	361	35	4.89	1.97	9.48		4.52	6.18	5.95		0.04		1,020	1.39	501	58	1,640	7.7
Apr. 11-20	117	32	5.04	2.22	11.18		4.65	7.02	7.14		.03		1,150	1.56	183	61	1,840	7.6
Apr. 21-30	a20	31	5.24	2.38	12.52		4.67	7.74	7.98		.03		1,250	1.70	34	62	2,000	7.4
May 1-10	a17	32	4.94	2.38	13.31		4.65	7.77	8.52		.03		1,280	1.74	30	65	2,060	7.5
May 11-20	a66	29	5.24	2.22	11.91		4.46	7.79	7.19		.03		1,200	1.63	108	61	1,920	7.5
May 21-31	a301	27	5.29	1.97	11.13		4.62	7.68	6.49		.03		1,150	1.56	471	81	1,830	7.5
June 1-10	b8.9	31	4.44	1.97	10.04		4.47	6.47	5.78		.03		1,030	1.40	12	61	1,650	7.7
Aug. 1-7	887	23	8.08	2.96	7.87		4.16	13.53	1.61		.02		1,240	1.69	1,460	42	1,720	7.7
Aug. 8-20	544	21	4.44	1.48	4.48		2.95	6.33	1.18		.05		669	.91	495	43	997	7.8
Aug. 21-31	10,300	19	8.08	2.55	5.96		2.80	12.62	1.21		.05		1,080	1.47	15,130	36	1,500	7.8
Sept. 1-10	c1,270	19	6.44	2.14	6.09		3.61	9.68	1.41		.01		937	1.27	1,620	42	1,350	7.5
Total or weighted average	118,100	24	4.14	1.32	3.61		3.38	4.41	1.30		0.03		567	0.77	90,950	40	861	--

a No flow during part of period.
b No flow June 5 to Aug. 3.
c No flow Sept. 9-30.

RIO GRANDE BASIN--Continued

RIO GRANDE BELOW ELEPHANT BUTTE OUTLET, N. Mex.

LOCATION.--At gaging station 3,800 feet downstream from Elephant Butte Dam in Pedro Armendaris Grant, N. Mex.
DRAINAGE AREA.--25,923 square miles (from International Boundary and Water Commission Water Bulletin Number 20).
RECORDS AVAILABLE.--Chemical analyses, 1933 to 1951.
REMARKS.--Chemical analysis by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950 --	15	8,260	--	2.94	1.05	3.38	--	2.95	3.14	1.25	--	0.01	0.13		0.66	5,450	46	720	8.0
November ------	12	8,650	--	3.01	1.04	3.37	--	2.89	3.28	1.34	--	--	.14		.68	5,880	45	741	7.9
December ------	12	6,370	--	3.18	1.14	3.37	--	2.85	3.39	1.54	--	--	.11		.73	4,650	44	774	7.8
January, 1951 --	21	55,100	23	3.25	1.11	3.38	0.18	2.90	3.50	1.58	0.04	--	.11		.70	38,570	43	781	8.0
February-------	20	53,300	--	3.24	1.15	3.46	--	2.95	3.50	1.60	--	--	.17		.70	37,310	44	783	7.8
March ---------	20	64,800	--	3.25	1.23	3.60	--	a2.91	3.58	1.66	--	0	.13		.72	46,660	45	797	8.1
April----------	25	61,600	--	3.09	1.23	3.76	--	b2.81	3.69	1.72	--	0	.07		.74	45,580	47	802	8.1
May----------	20	29,700	--	3.38	1.23	4.02	--	3.10	3.84	1.75	--	--	.12		.77	22,870	47	855	7.8
June ----------	24	62,800	--	3.58	1.37	4.19	--	b3.13	4.04	2.08	--	.01	.13		.82	51,500	46	906	8.1
July----------	20	54,800	20	3.74	1.51	4.90	.26	2.99	4.56	2.75	.05	.01	.17		.92	50,420	47	1,030	8.0
August ---------	20	31,000	--	3.80	1.55	5.89	--	b2.97	4.96	3.58	--	.01	.10		1.02	31,620	52	1,150	8.1
September------	25	14,700	--	4.75	2.05	7.56	--	c2.83	6.46	5.20	--	.01	.19		1.31	19,260	53	1,430	8.0
Total ----------		451,100	--	--	--	--	--	--	--	--	--	--	--		--	359,770	--	--	--

a Includes 0.20 equivalents per million of carbonate (CO_3).
b Includes 0.24 equivalents per million of carbonate (CO_3).
c Includes 0.12 equivalents per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE NEAR EL PASO, TEX.

LOCATION.--At gaging station 5 miles northwest of El Paso, Tex., 6 miles northwest of Juarez, Chihuahua, and 1.9 river miles above the American Dam.
DRAINAGE AREA.--29,267 square miles (from International Boundary and Water Commission Water Bulletin Number 20).
RECORDS AVAILABLE.--Chemical analyses, 1933 to 1951.
REMARKS.--Chemical analyses by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in International Boundary and Water Commission Water Bulletin Numbers 20 and 21.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm.	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	28	18,300	--	4.49	2.01	10.28	--	3.50	7.58	6.06	--	--	0.26		1.56	28,500	61	1,680	7.8
November	30	10,900	--	4.56	2.20	12.12	--	3.53	8.63	6.80	--	--	.30		1.70	18,500	64	1,880	7.8
December	31	9,700	--	4.66	2.28	12.45	--	3.68	8.86	7.15	--	0.03	.31		1.76	17,100	64	1,960	7.8
January 1951	31	8,460	38	4.46	2.35	12.60	0.28	3.55	8.80	7.35	0.04	.01	.33		1.76	14,900	64	1,970	8.0
February	28	6,570	--	4.54	2.30	13.28	--	a3.61	9.05	7.60	--	0	.35		1.80	11,800	66	2,010	8.1
March	31	24,600	--	3.78	1.57	6.47	--	2.85	5.33	3.78	--	.07	.18		1.12	27,600	55	1,240	7.6
April	30	32,300	--	3.57	1.62	6.97	--	b2.87	5.46	4.02	--	--	.19		1.10	35,500	57	1,250	7.9
May	31	17,900	--	4.08	1.81	9.12	--	3.00	6.91	5.20	--	.01	.24		1.35	24,200	61	1,520	7.7
June	30	33,900	--	4.06	1.62	6.54	--	c3.00	5.34	3.70	--	.04	.18		1.08	36,600	54	1,190	8.1
July	30	45,500	24	3.46	1.77	6.26	.26	2.88	5.25	3.50	.05	.03	.17		1.03	46,900	53	1,160	7.7
August	31	47,800	--	3.88	1.82	6.89	--	b3.21	5.47	4.00	--	.01	.23		1.14	54,500	55	1,260	8.0
September	30	17,100	--	4.75	2.15	10.08	--	3.75	7.23	6.00	--	--	.23		1.49	25,500	59	1,680	8.1
Total		273,030	--	--	--	--	--	--	--	--	--	--	--		--	341,600	--	--	--

a Includes 0.24 equivalents per million of carbonate (CO_3).
b Includes 0.10 equivalents per million of carbonate (CO_3).
c Includes 0.20 equivalents per million of 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 1951.
REMARKS.--Chemical analyses by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in International Boundary and Water Commission Water Bulletin Numbers 20 and 21.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950--	6	10,000	--	10.16	4.94	28.18	--	a3.40	14.04	26.45	--	0.03	0.47		3.82	38,200	65	4,280	7.9
November -----	5	10,800	--	10.74	5.04	28.69	--	3.77	14.46	26.76	--	.01	.44		3.87	41,800	65	4,370	7.8
December -----	5	8,660	--	10.14	4.82	28.30	--	3.32	13.88	26.40	--	.03	.47		3.69	32,000	65	4,260	7.8
January, 1951,-	5	5,300	47	10.50	5.19	29.18	0.25	3.30	14.27	27.80	0.05	.01	.48		3.92	20,800	65	4,430	7.9
February------	7	2,940	--	12.05	6.34	34.72	--	2.99	15.90	34.51	--	.01	.50		4.64	13,600	65	5,190	7.9
March --------	5	1,710	--	12.85	7.96	42.58	--	1.54	18.87	43.24	--	.05	.59		5.55	9,490	67	6,140	7.8
April ---------	4	478	--	17.28	10.26	52.96	--	2.86	21.57	56.32	--	.01	.73		7.01	3,350	66	7,650	7.8
May ----------	3	18.6	--	11.72	5.37	24.96	--	2.16	11.11	28.22	--	.03	.35		3.59	66.8	59	4,130	7.8
June ----------	2	20.2	--	15.65	7.35	36.13	--	3.90	15.23	39.84	--	.04	.53		5.10	103	61	5,640	7.8
July----------	2	973	44	15.15	4.99	19.30	.29	2.70	10.38	26.40	.04	.05	.17		3.74	3,640	49	3,860	7.8
August --------	1	7,900	--	3.29	.98	3.35	--	2.12	1.93	3.55	--	.04	.12		.69	5,450	44	802	7.9
September-----	6	1,280	--	18.57	9.83	51.46	--	b3.20	21.75	55.20	--	.01	.72		6.85	8,770	64	7,510	7.9
Total ----------		50,079.8	--	--	--	--	--	--	--	--	--	--	--		--	177,270	--	--	--

a Includes 0.20 equivalents per million of carbonate (CO_3).
b Includes 0.40 equivalents per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

RIO GRANDE AT UPPER PRESIDIO, TEX.

LOCATION.--At gaging station 7.8 river miles above the junction of the Rio Conchos, and about 10 miles northwest of the towns of Presidio, Tex., and Ojinaga, Chihuahua, and 285.7 river miles below the American Dam at El Paso. Tex.
DRAINAGE AREA.--35,000 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20).
RECORDS AVAILABLE.--Chemical analyses, 1935 to 1951.
REMARKS.--Chemical analyses by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in International Boundary and Water Commission Water Bulletin Numbers 20 and 21.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	5	19,700	--	6.68	1.90	10.93	--	2.05	8.11	9.72	--	0.06	.24		1.71	33,700	56	1,990	7.8
November ---	5	6,370	--	9.83	5.17	29.98	--	2.77	15.15	27.66	--	--	.51		3.98	25,400	67	4,460	7.8
December ---	5	5,510	--	10.47	5.39	29.90	--	2.61	15.24	28.36	--	0	.52		3.97	21,900	65	4,520	8.0
January, 1951	5	3,350	36	12.79	6.09	32.91	0.29	2.88	16.68	32.80	0.05	--	.56		4.54	15,200	63	5,050	7.9
February ----	5	1,010	--	18.51	7.31	36.40	--	2.88	19.39	38.74	--	.01	.62		5.30	5,350	60	5,730	7.8
March-------	2	91.2	--	24.84	9.58	41.54	--	3.52	25.59	47.28	--	.01	.59		8.65	606	55	8,960	7.7
April--------	0	18.0	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--
May---------	2	296	--	--	--	6.08	--	a3.23	--	3.15	--	--	.08		.95	281	--	1,000	8.1
June --------	2	b574	--	--	--	2.74	--	1.83	--	1.28	--	--	.05		.90	517	--	889	7.9
July---------	6	4,610	15	2.30	.55	2.69	.17	2.59	1.96	1.12	.04	.08	.08		.50	2,300	47	585	8.0
August ------	2	1,700	--	2.24	.51	2.43	--	2.57	2.15	.48	--	.04	.10		.48	816	47	507	7.8
September ---	5	5,600	--	2.65	.54	2.43	--	2.25	2.34	1.05	--	.05	.16		.51	2,860	43	566	7.9
Total ----------		48,829.2	--	--	--	--	--	--	--	--	--	--	--		--	108,930	--	--	--

a Includes 0.20 equivalents per million of carbonate (CO_3).
b Sampled June 2-9 incl. No flow, June 10-30.

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 1951.
REMARKS.--Chemical analyses by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in International Boundary and Water Commission Water Bulletin Numbers 20 and 21.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	7	135,000	--	4.01	0.91	4.11	--	2.62	4.19	2.32	--	0.05	0.19		.80	108,000	46	908	7.8
November---	8	68,700	--	4.10	1.62	6.00	--	2.57	5.31	3.80	--	.03	.20		1.06	72,800	51	1,170	7.8
December---	9	65,900	--	3.90	1.70	5.80	--	2.59	5.27	3.68	--	.03	.27		1.03	67,900	51	1,150	7.9
January, 1951	8	56,300	33	4.31	1.89	5.50	0.15	a2.85	5.46	3.35	0.08	.03	.24		1.05	59,100	46	1,170	8.1
February ---	6	64,700	--	3.88	1.55	4.99	--	2.75	5.09	2.52	--	.03	.25		.95	61,500	48	1,030	7.8
March------	9	69,000	--	3.01	1.31	3.56	--	b2.47	3.89	1.44	--	.04	.16		.75	51,800	45	785	7.9
April-------	7	33,800	--	3.02	1.52	3.71	--	b2.61	4.08	1.65	--	.04	.19		.76	25,700	45	839	8.0
May--------	10	83,600	--	2.82	.92	2.57	--	2.51	2.76	1.10	--	.06	.08		.59	49,300	41	635	7.9
June-------	10	104,000	--	3.52	.76	2.63	--	2.69	3.09	.92	--	.06	.14		.61	63,400	38	659	7.9
July--------	8	77,700	31	3.59	.92	3.26	15	2.60	4.12	1.16	.06	.04	.06		.73	56,700	41	773	8.0
August------	7	48,400	--	3.55	1.36	3.20	--	2.90	3.86	1.28	--	.05	.17		.74	35,800	39	772	7.8
September --	7	57,500	--	3.74	1.05	3.32	--	c3.15	3.73	1.10	--	.07	.10		.73	42,000	41	774	8.1
Total----------		864,600	--	--	--	--	--	--	--	--	--	--	--		--	694,000	--	--	--

a Includes 0.20 equivalents per million of carbonate (CO_3).
b Includes 0.12 equivalents per million of carbonate (CO_3).
c Includes 0.22 equivalents per million of carbonate (CO_3).

RIO GRANDE BASIN--Continued

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, 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 1951.
REMARKS.--Chemical analyses by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in International Boundary and Water Commission Water Bulletin Numbers 20 and 21.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	26	200,900	--	4.21	1.21	4.44	--	a2.51	4.03	3.26	--	0.08	0.15		0.90	181,000	45	986	8.0
November----	10	100,400	--	4.16	1.91	5.61	--	2.91	4.37	4.26	--	.04	.17		1.06	106,000	48	1,170	7.7
December----	22	100,800	--	4.10	2.17	6.20	--	2.77	4.57	5.02	--	.04	.18		1.08	109,000	50	1,260	8.0
January, 1951	27	90,660	29	3.74	2.41	6.99	0.13	2.16	4.99	5.88	0.05	.05	.10		1.14	103,000	53	1,350	8.0
February ----	24	69,260	--	4.16	2.34	6.65	--	2.60	5.21	5.42	--	.07	.17		1.15	103,000	51	1,340	7.8
March-------	27	102,500	--	3.18	1.98	5.41	--	b2.17	4.14	4.24	--	.06	.17		.95	97,400	51	1,100	7.9
April--------	24	60,230	--	3.56	2.24	6.07	--	2.21	4.36	5.01	--	.07	.13		1.02	61,400	51	1,240	7.9
May---------	9	173,400	--	3.13	1.04	2.58	--	2.63	2.15	2.04	--	.04	.09		.62	108,000	38	688	7.7
June---------	26	156,300	--	3.74	.95	2.62	--	2.87	2.39	1.90	--	.03	.10		.61	95,300	36	712	8.0
July---------	26	79,160	24	3.44	1.35	3.67	.15	2.71	3.58	2.30	.06	.06	.15		.76	60,200	43	843	7.9
August-------	26	71,070	--	3.31	1.25	3.47	--	a2.63	3.14	2.26	--	.06	.16		.72	51,200	43	810	8.2
September ---	25	86,170	--	3.74	1.45	4.11	--	b2.85	3.46	3.00	--	.06	.10		.82	70,700	44	931	8.0
Total----------		1,310,870	--	--	--	--	--	--	--	--	--	--	--		--	1,146,200	--	--	--

a Includes 0.20 equivalents per million of carbonate (CO_3).
b Includes 0.12 equivalents per million of 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), Tamaulipas, 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 1951.

REMARKS.--Chemical analyses by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in International Boundary and Water Commission Water Bulletin Numbers 20 and 21.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	31	222,700	--	4.40	0.97	3.25	--	2.76	3.96	2.10	--	0.04	0.12		0.75	167,000	38	868	7.9
November ---	30	105,100	--	3.95	1.92	6.03	--	2.39	4.70	4.88	--	.03	.19		1.01	106,000	51	1,210	7.8
December ---	31	101,900	--	3.59	2.07	5.82	--	2.27	4.56	4.64	--	.06	.22		1.01	103,000	51	1,180	7.8
January, 1951	31	93,660	19	4.00	2.43	6.90	0.12	2.43	4.95	5.86	0.05	.04	.19		1.15	108,000	51	1,350	8.0
February ----	28	82,570	--	3.96	2.48	7.18	--	a2.20	5.43	6.08	--	.04	.18		1.19	98,300	53	1,400	7.9
March ------	31	105,700	--	4.35	2.40	6.59	--	2.53	5.76	4.94	--	.06	.21		1.18	125,000	49	1,350	7.8
April--------	30	74,610	--	3.69	1.86	5.07	--	2.37	4.13	4.28	--	.14	.17		.94	70,100	48	1,110	7.9
May---------	10	321,700	--	3.23	.89	2.50	--	2.57	2.27	1.98	--	.04	.10		.58	187,000	38	680	7.7
June --------	30	295,500	--	2.95	b1.08	1.83	--	2.35	2.05	1.35	--	.11	.09		.54	160,000	31	578	7.8
July---------	31	54,020	16	2.96	1.51	4.14	.15	2.21	3.63	2.90	.05	.04	.20		.78	42,100	47	891	7.7
August ------	31	75,640	--	3.44	1.37	3.90	--	2.45	3.86	2.42	--	.04	.18		.78	59,000	44	870	7.9
September ---	30	457,000	--	2.95	.72	2.63	--	2.40	2.37	1.55	--	.03	.10		.60	274,000	42	642	7.5
Total ----------		1,990,100	--	--	--	--	--	--	--	--	--	--	--		--	1,499,500	--	--	--

a Includes 0.10 equivalents per million of carbonate (CO_3).
b By difference.

RIO GRANDE BASIN--Continued

PECOS RIVER BELOW ALAMOGORDO DAM, N. MEX.

LOCATION.--At gaging station 1,200 feet downstream from Alamogordo Dam, 1½ miles downstream from Alamogordo Creek, and 4½ miles northeast of Guadalupe, DeBaca County.
DRAINAGE AREA.--4,390 square miles (contributing area).
RECORDS AVAILABLE.--Chemical analyses: June 1937 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,860 micromhos Aug. 1-2; minimum, 1,270 micromhos Oct. 15, Aug. 6.
Percent sodium: Maximum, 12 Dec. 11-20: minimum, 8 July 21-25, July 26 to Aug. 2.
EXTREMES, 1937-51.--Specific conductance: Maximum, 3,200 micromhos Jan. 14, 1948; minimum, 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 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	2,230	12	12.82	2.88	1.70		2.15	14.01	1.35		0.01		1,130	1.54	3,430	10	1,470	7.3
Oct. 11-20	2,090	11	13.02	2.80	1.78		2.16	14.01	1.47		.01		1,140	1.55	3,240	10	1,460	7.3
Oct. 21-31	148	13	14.02	3.62	2.09		2.31	15.74	1.69		.01		1,270	1.73	256	11	1,620	7.6
Nov. 1-10	116	14	13.97	3.95	2.26		2.38	16.07	1.75		.01		1,300	1.77	205	11	1,660	7.3
Nov. 11-20	124	14	14.27	3.62	2.22		2.29	16.09	1.75		.01		1,300	1.77	219	11	1,650	7.3
Nov. 21-30	140	15	15.07	4.36	2.17		2.51	17.38	1.72		.00		1,390	1.89	265	10	1,730	8.0
Dec. 1-10	104	15	15.17	4.44	2.17		2.54	17.34	1.86		.00		1,400	1.90	198	10	1,730	8.0
Dec. 11-20	119	19	15.67	5.10	2.70		2.47	18.82	2.06		.01		1,510	2.05	244	12	1,860	7.9
Dec. 21-31	122	15	15.77	4.69	2.35		2.49	18.15	1.95		.00		1,460	1.99	242	10	1,800	8.0
Jan. 1-10, 1951	51	13	16.27	3.78	2.13		2.46	17.78	1.97		.01		1,430	1.94	99	10	1,770	7.7
Jan. 11-20	66	14	16.37	4.11	2.04		2.47	18.09	2.00		.01		1,450	1.97	130	9	1,810	7.6
Jan. 21-31	95	14	16.47	4.11	2.26		2.47	18.26	2.03		.01		1,470	2.00	190	10	1,820	7.4
Feb. 1-10	75	14	16.57	4.36	2.26		2.44	18.47	2.03		.00		1,480	2.01	151	10	1,840	7.5
Feb. 11-20	84	12	17.07	3.95	2.57		2.43	18.92	2.03		.01		1,520	2.07	174	11	1,860	7.8
Feb. 21-28	96	14	17.17	4.03	2.70		2.38	19.05	1.97		.01		1,530	2.08	200	11	1,870	7.8
Mar. 1-10	110	13	17.56	4.03	2.48		2.38	19.67	2.12		.01		1,560	2.12	233	10	1,910	7.8
Mar. 11-20	1,440	16	17.27	4.36	2.70		2.46	19.47	2.14		.01		1,560	2.12	3,060	11	1,910	7.8
Mar. 21-31	27,220	11	18.16	4.03	2.52		2.29	20.15	2.12		.01		1,590	2.16	58,860	10	1,940	7.8

Apr. 1-10 ---------	1,130	13	18.36	4.36	2.39		2.25	20.38	2.23		.01		1,610	2.19	2,470	10	1,970	7.4
Apr. 11-20 --------	1,400	14	18.46	4.36	2.35		2.26	20.57	2.26		.01		1,630	2.22	3,100	9	1,980	7.5
Apr. 21-30 --------	9,120	12	18.96	4.36	2.61		2.29	21.03	2.23		.01		1,660	2.26	20,590	10	2,010	7.5
May 1-10 ----------	10,540	12	19.46	4.52	2.61		2.26	21.44	2.40		.00		1,700	2.31	24,370	10	2,050	7.5
May 11-20 ---------	1,760	12	19.86	4.69	2.70		2.25	22.28	2.54		.01		1,760	2.39	4,210	10	2,110	7.4
May 21-31 --------	1,990	12	20.16	4.52	2.44		2.20	22.28	2.43		.00		1,750	2.38	4,740	9	2,110	7.4
June 1-10 ---------	1,090	14	19.56	4.69	2.46		2.21	21.86	2.43		.01		1,720	2.34	2,550	9	2,080	7.4
June 11-20 --------	8,870	12	20.46	4.61	2.44		2.15	22.69	2.48		.01		1,780	2.42	21,470	9	2,130	7.4
June 21-30 --------	26,640	14	20.66	4.69	2.65		2.20	22.90	2.48		.01		1,800	2.45	65,210	9	2,150	7.4
July 1-10 ----------	7,740	14	21.06	4.85	2.48		2.16	23.53	2.26		.01		1,830	2.49	19,260	9	2,170	7.4
July 11-20 ---------	24,650	15	20.16	4.77	2.87		2.18	22.69	2.54		.02		1,790	2.43	60,010	10	2,140	7.7
July 21-25 --------	7,340	15	17.56	4.11	2.00		2.79	16.78	2.09		.04		1,530	2.08	15,270	8	1,890	7.5
July 26-Aug. 2 -----	1,660	16	27.54	6.58	2.87		3.00	30.81	3.72		.06		2,420	3.29	5,460	8	2,800	7.5
Aug. 3-10 ---------	1,590	13	11.58	2.96	1.48		2.65	12.16	1.18		.06		1,020	1.39	2,210	9	1,360	7.7
Aug. 11-20 --------	1,800	13	12.77	3.21	1.61		2.44	13.51	1.49		.06		1,120	1.52	2,740	9	1,470	7.7
Aug. 21-31 --------	2,020	13	13.97	3.70	1.96		2.44	15.26	1.66		.05		1,250	1.70	3,430	10	1,610	7.7
Sept. 1-10 --------	1,860	13	13.82	3.29	2.00		2.36	14.97	1.66		.04		1,230	1.67	3,110	10	1,580	7.4
Sept. 11-20 --------	1,670	14	17.17	4.26	2.26		2.29	19.36	2.26		.03		1,540	2.09	3,920	10	1,910	7.4
Sept. 21-30 --------	1,800	13	20.26	5.02	2.76		2.47	22.69	2.65		.03		1,800	2.45	4,410	10	2,140	7.4
Total or weighted average-	149,400	13	19.06	4.44	2.52		2.28	21.24	2.28		0.01		1,680	2.28	339,900	10	2,020	--

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR ARTESIA, N. MEX.

LOCATION.--At gaging station at bridge on Artesia-Lovington highway, 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 (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 12,500 micromhos June 18; minimum, 2,060 micromhos Oct. 6, June 6. Percent sodium: Maximum, 60 June 7; minimum, 12 Mar. 25-31.
EXTREMES, 1937-51.--Specific conductance: Maximum, 17,200 micromhos Aug. 20, 1945; minimum, 898 micromhos Sept. 22, 1941. Percent sodium: Maximum, 71 May 16, 1950; minimum, 12 Mar. 25-31, 1951.
REMARKS.--Records of specific conductance of daily samples are available in District office in Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-5, 1950	3,760	14	21.76	10.28	23.35		2.95	27.69	24.82		0.09		3,420	4.65	17,490	42	4,850	7.2
Oct. 6-10	5,020	14	16.17	5.18	10.09		2.29	19.13	10.01		.08		1,980	2.69	13,520	32	2,740	7.4
Oct. 11-20	3,050	17	22.75	10.77	24.26		2.21	30.19	25.24		.05		3,580	4.87	14,850	42	5,000	7.2
Oct. 21-31	2,410	17	23.95	13.49	30.44		2.16	34.77	31.59		.03		4,220	5.74	13,830	45	5,910	7.2
Nov. 1-10	1,780	17	25.85	15.05	34.09		2.57	36.23	36.66		.06		4,620	6.28	11,180	45	6,480	7.6
Nov. 11-20	1,860	17	26.65	16.45	37.40		3.41	36.85	41.18		.08		4,950	6.73	12,520	46	6,990	7.7
Nov. 21-30	2,000	15	26.35	16.69	36.87		3.46	36.43	39.77		.06		4,860	6.61	13,220	46	6,850	7.7
Dec. 1-10	1,840	15	27.45	16.78	39.27		3.61	37.06	42.30		.07		5,060	6.88	12,660	47	7,160	7.8
Dec. 11-20	1,750	16	28.14	17.43	40.40		3.47	39.56	44.56		.05		5,310	7.22	12,640	47	7,460	7.7
Dec. 21-31	1,970	15	27.64	17.19	39.87		3.51	38.93	43.43		.05		5,210	7.09	13,960	47	7,350	7.8
Jan. 1-10, 1951	1,910	14	27.35	17.02	40.27		3.51	38.31	42.30		.06		5,140	6.99	13,350	48	7,290	7.7
Jan. 11-20	1,810	14	28.14	16.86	41.18		3.47	39.14	44.28		.06		5,290	7.19	13,020	48	7,470	7.7
Jan. 21-31	1,660	12	28.34	18.09	43.05		3.52	39.76	45.97		.04		5,440	7.40	12,280	48	7,680	7.8
Feb. 1-10	1,700	15	28.24	18.09	41.57		3.64	39.35	45.97		.06		5,390	7.33	12,460	47	7,590	7.8
Feb. 11-20	1,880	18	27.74	17.27	41.61		3.20	38.93	43.71		.07		5,260	7.15	13,450	48	7,400	7.5
Feb. 21-28	1,230	14	28.84	18.01	44.79		2.93	40.60	47.38		.07		5,560	7.56	9,300	49	7,840	7.7
Mar. 1-10	1,520	12	29.44	18.67	46.96		2.61	42.89	49.07		.06		5,790	7.87	11,970	49	8,120	7.4
Mar. 11-20	1,370	13	28.84	19.33	49.14		2.70	42.68	51.33		.05		5,920	8.05	11,030	50	8,350	7.5
Mar. 21-23	692	13	29.84	19.90	46.96		2.62	44.34	50.20		.08		5,920	8.05	5,570	49	8,430	7.5
Mar. 24	2,160	21	26.65	8.96	13.35		3.21	32.89	12.58		.02		3,100	4.22	9,110	27	3,930	7.5
Mar. 25-31	18,380	14	23.25	55.76	4.09		2.41	26.23	4.96		.03		2,150	2.92	53,740	12	2,670	7.6

Apr. 1-3	1,720	17	23.95	6.33	7.65		2.56	27.06	7.61	.05		2,400	3.26	5,610	20	2,970	7.5
Apr. 4-10	1,220	17	26.85	10.44	20.00		2.70	33.73	20.31	.05		3,570	4.86	5,920	35	4,720	7.4
Apr. 11-20	1,490	17	29.14	15.21	33.54		2.46	40.39	34.97	.07		4,820	6.56	9,770	43	6,610	7.4
Apr. 21-30	1,330	15	31.54	19.24	46.96		2.25	45.18	49.07	.06		5,940	8.08	10,740	48	8,210	7.2
May 1-10	12,470	16	25.05	6.99	7.96		2.51	28.94	8.18	.03		2,540	3.45	43,080	20	3,170	7.3
May 11-20	2,134	21	29.44	14.39	28.44		2.20	39.35	31.87	.13		4,530	6.16	13,150	39	6,170	7.3
May 21-23	843	19	22.95	9.21	17.44		2.61	28.73	17.77	.04		3,080	4.19	3,530	35	4,140	7.5
May 24-31	1,200	18	26.45	14.80	44.35		2.20	37.27	45.97	.03		5,240	7.13	8,550	52	7,460	7.4
June 1-5, 8-10	541	17	31.04	20.31	55.66		2.75	45.59	60.07	--		6,570	8.94	4,830	52	9,250	7.3
June 6	361	21	10.38	3.12	8.22		3.43	9.91	8.63	.01		1,340	1.82	658	38	2,060	7.6
June 7	101	14	12.67	6.00	27.66		2.49	14.47	28.77	.05		2,770	3.77	380	60	4,460	7.2
June 11-22	1,420	25	33.33	22.78	67.83		2.82	49.55	72.20	--		7,560	10.3	14,600	55	10,700	7.3
June 23-30	12,410	17	26.65	6.74	7.09		2.43	31.02	6.43	.04		2,590	3.52	43,710	18	3,070	7.5
July 1-10	11,680	15	26.15	6.74	7.52		2.21	30.40	4.28	.03		2,580	3.51	40,980	19	3,100	7.5
July 11-14	1,850	16	22.26	8.88	19.48		2.03	27.27	21.01	.06		3,140	4.27	7,900	38	4,370	7.6
July 15-20	10,470	16	25.35	5.92	5.65		2.13	28.73	5.53	.05		2,370	3.22	33,750	15	2,820	7.7
July 21-31	13,610	16	23.25	6.33	7.96		2.21	26.86	8.01	.08		2,390	3.25	44,240	21	2,970	7.7
Aug. 1-5	861	17	25.65	10.53	20.31		2.51	32.48	21.72	.13		3,540	4.81	4,150	36	4,760	7.7
Aug. 6-13	407	17	29.74	15.21	43.48		2.00	40.81	45.97	.07		5,450	7.41	3,020	49	7,620	7.8
Aug. 14-18	140	15	24.65	8.55	21.35		1.85	31.85	21.43	.08		3,450	4.69	657	39	4,690	7.6
Aug. 19-23	440	18	33.33	15.13	60.01		2.23	45.80	62.61	--		6,740	9.17	4,030	55	9,580	7.6
Aug. 24-27	1,450	13	22.65	5.76	10.78		2.11	26.23	11.56	.09		2,520	3.43	4,970	28	3,300	7.7
Aug. 28-31	212	15	23.05	9.21	24.66		2.25	28.94	26.09	.10		3,540	4.81	1,020	43	4,990	7.7
Sept. 1-10	277	15	29.34	16.61	46.96		2.03	41.43	50.20	.06		5,720	7.78	2,150	51	8,080	7.2
Sept. 11-17	480	13	23.75	11.68	26.87		1.80	32.27	29.61	.04		3,910	5.32	2,550	43	5,480	7.3
Sept. 18-30	363	16	33.33	23.85	65.66		1.98	48.30	72.20	.06		7,430	10.1	3,670	53	10,500	7.3
Total or weighted average	139,200	16	25.15	9.54	17.52		2.54	31.23	18.42	0.05		3,270	4.45	618,800	34	4,300	--

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR ORLA, TEX.

LOCATION.--At gaging station 600 feet upstream from Pasotex pipe-line crossing, 6 miles southeast of Orla, Reeves County, 11 miles downstream from Salt (Screwbean) Draw, and 14 miles downstream from Red Bluff Dam.

DRAINAGE AREA.--21,300 square miles (contributing area).

RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1951.

EXTREMES, 1950-51.--Specific conductance: Maximum, 11,600 micromhos Sept. 5-8; minimum, 2,500 micromhos Oct. 2. Percent sodium: Maximum, 58 Sept. 1-30; minimum, 44 Oct. 1-4.

EXTREMES, 1940-51.--Maximum, 64 Sept. 1-10, 1947, Sept. 19-30, 1948; minimum, 9 Aug. 17-19, 1944.

REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples from November 1941 to September 1951 available in district office at Austin, Tex. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1212.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	657	11	12.03	2.80	11.74		1.15	13.22	12.13		0.07		1,660	2.26	1,480	44	2,560	7.3
Oct. 5-6, 8-10	139	17	23.85	11.68	43.51		1.62	29.98	47.38		.06		4,810	6.54	909	55	7,110	7.6
Oct. 7, 11-31	1,950	17	22.85	12.50	30.98		1.90	32.48	31.87		.08		4,090	5.56	10,840	47	5,710	7.6
Nov. 1-30	2,100	17	23.35	9.95	31.64		2.16	34.56	28.20		.02		4,060	5.52	11,590	49	5,440	7.8
Dec. 1-31	776	13	26.55	13.40	33.89		2.03	37.68	34.13		.01		4,570	6.22	4,830	46	6,220	7.7
Jan. 1-31, 1951	673	9.0	27.94	15.71	41.18		2.18	39.76	42.87		.02		5,200	7.07	4,760	49	7,200	7.8
Feb. 1-28	6,340	16	24.75	12.83	32.26		2.20	35.18	32.43		.03		4,320	5.88	37,280	46	6,020	7.8
Mar. 1-5, 27-31	2,740	15	25.85	13.73	35.74		2.21	36.43	36.66		.02		4,640	6.31	17,290	47	6,540	7.7
Mar. 6-26	472	9.5	28.94	15.21	47.35		1.90	41.64	47.95		.01		5,620	7.64	3,610	52	7,920	7.6
Apr. 1-30	22,840	16	24.55	12.01	30.97		2.13	34.35	31.02		.03		4,180	5.68	129,700	46	5,790	7.9
May 1-31	23,820	23	24.55	13.73	33.24		1.43	36.23	33.84		.02		4,430	6.02	143,400	46	6,180	7.5
June 1-30	8,910	21	24.75	13.98	37.27		1.84	37.47	36.66		.03		4,700	6.39	56,930	49	6,600	7.5
July 1-31	28,750	23	26.25	14.56	38.31		1.67	38.52	38.92		.01		4,890	6.65	191,200	48	6,910	7.7
Aug. 1-31	9,030	27	26.65	13.65	41.11		1.77	37.89	41.74		.01		5,030	6.84	61,770	50	7,180	7.7
Sept. 1-30	1,160	23	29.44	18.01	65.38		1.57	44.14	67.12		--		6,880	9.36	10,860	58	10,100	7.2
Total or weighted average	110,300	21	25.20	13.49	35.35		1.79	36.43	35.54		0.02		4,580	6.23	687,200	48	6,420	--

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, 1935 to 1951.
REMARKS.--Chemical analyses by the Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1950 to September 1951 given in International Boundary and Water Commission Water Bulletin Numbers 20 and 21.

Chemical analyses, water year October 1950 to September 1951

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	16	14,700	--	9.66	7.97	26.14	--	a2.65	14.06	27.31	--	0.04	0.28		3.80	55,900	60	4,240	7.9
November	15	12,100	--	8.06	6.47	20.16	--	b2.40	11.13	21.20	--	.04	.22		2.99	36,200	58	3,420	7.9
December	15	14,000	--	9.90	8.30	26.32	--	2.70	14.30	27.56	--	.03	.27		3.78	52,900	59	4,310	7.8
January, 1951	15	15,200	12	10.85	9.67	31.70	0.22	2.32	16.63	33.40	0.06	.03	.33		4.50	68,400	60	5,040	7.8
February	14	14,300	--	11.40	9.83	32.86	--	2.52	17.23	34.60	--	.04	.32		4.63	66,200	61	5,190	7.8
March	15	13,600	--	9.89	8.78	29.47	--	2.22	15.08	31.00	--	.06	.30		4.26	57,900	61	4,730	7.8
April	15	10,600	--	10.15	8.80	29.22	--	2.18	15.23	30.44	--	.04	.26		4.12	43,700	61	4,660	7.8
May	17	20,100	--	4.85	3.38	11.20	--	2.05	5.83	11.76	--	.04	.14		1.67	33,600	58	2,000	7.7
June	15	9,520	--	6.93	5.82	18.76	--	2.17	9.62	19.55	--	.04	.22		2.75	26,200	60	3,140	8.0
July	15	7,120	16	6.38	5.45	16.72	.20	2.37	8.60	17.40	.06	.04	.24		2.46	17,500	58	2,840	7.9
August	15	8,560	--	8.47	6.99	22.38	--	2.55	11.90	23.40	--	.03	.32		3.29	28,200	59	3,710	7.8
September	14	7,680	--	6.95	5.53	17.24	--	2.60	9.02	18.10	--	.04	.25		2.54	19,500	58	2,940	7.9
Total		147,480	--	--	--	--	--	--	--	--	--	--	--		--	506,200	--	--	--

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

Part 9. COLORADO RIVER BASIN

COLORADO RIVER MAIN STEM

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLO.

LOCATION.--At Shoshone power plant, 6 miles upstream from gaging station, which is at power plant at Glenwood Springs, Garfield County, and half a mile upstream from Roaring Fork.
DRAINAGE AREA.--4,560 square miles above gaging station.
RECORDS AVAILABLE.--Chemical analyses: October 1941 to September 1951.
Water temperatures: May 1949 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,110 micromhos Oct. 18, Nov. 3; minimum, 199 micromhos June 1.
Percent sodium: Maximum, 45 Mar. 11-20; minimum, 19 June 21-30.
EXTREMES, 1941-51.--Specific conductance: Maximum, 1,370 micromhos Jan. 20, 1943; minimum, 153 micromhos May 24, 1948.
Percent sodium: Maximum, 51 Mar. 21-31, 1944; minimum, 13 June 11-20, 1949.
REMARKS.--Values reported for dissolved solids are residue on evaporation.--Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Discharge records for gaging station at Glenwood Springs for water year October 1950 to September 1951 given in Water-Supply Paper 1213. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	17,850	12	3.99	1.56	3.61		2.49	3.12	3.72		0.01		560	0.76	13,570	39	918	
Oct. 11-20	14,840	12	4.19	1.64	3.91		2.62	3.39	3.72		.02		606	.82	12,170	40	983	
Oct. 21-31	15,950	13	4.14	1.64	4.04		2.65	3.41	3.72		.02		606	.82	13,080	41	991	
Nov. 1-10	16,070	12	3.94	1.56	3.52		2.59	3.14	3.24		.02		554	.75	12,050	39	904	
Nov. 11-20	17,830	12	3.59	1.40	3.22		2.46	2.81	3.16		.02		504	.69	12,300	39	829	
Nov. 21-30	19,140	13	3.29	1.23	2.78		2.33	2.60	2.71	0.01	.01		472	.64	12,250	38	767	
Dec. 1-10	15,770	13	3.69	1.32	3.87		2.52	2.81	3.72		.01		548	.75	11,830	44	911	
Dec. 11-13, 18	6,830	13	3.34	1.23	3.65		2.31	2.52	3.55		.01		a496	.67	4,580	44	856	
Dec. 14-17, 19-20	13,410	13	2.54	.90	1.96		1.98	1.83	1.83		.01		342	.47	6,300	36	573	
Dec. 21-31	19,540	13	3.09	1.15	3.09		2.25	2.31	2.99		.01		460	.63	12,310	42	764	
Jan. 1-10, 1951	15,160	13	3.14	1.23	3.78		2.29	2.31	3.72		.01		500	.68	10,310	46	841	
Jan. 11-20	20,160	12	2.79	.99	2.91		2.05	1.96	2.85		.01		412	.56	11,290	43	699	
Jan. 21, 24-29, 31	19,040	11	2.40	.82	2.04		1.87	1.62	1.97		.01		328	.45	8,570	39	560	
Jan. 22-23, 30 b	5,040	13	--	--	--		2.11	2.12	3.61		.01		--	--	--	--	812	

a Sum of determined constituents.
b Not included for computation of weighted averages.

Feb. 1-10	22,510	11	2.50	.99	2.48		1.90	1.75	2.40		.01		367	.50	11,260	42	612
Feb. 11-18	16,490	12	2.69	1.07	2.61		1.97	1.94	2.45		.01		391	.53	8,740	41	641
Feb. 19-20 b	3,340	--	--	--	--		2.18	2.31	3.67		--		--	--	--	--	834
Feb. 21-28	15,710	13	2.54	1.07	2.26		1.90	1.77	2.12		.01		356	.48	7,540	39	591
Mar. 1-4, 7-10	16,410	13	2.35	.99	2.22		1.90	1.73	2.12		.02		351	.48	7,880	40	630
Mar. 5-6 b	2,980	--	c 4.00		--		2.16	2.12	3.95		.01		--	--	--		839
Mar. 11-20	18,410	13	2.64	1.15	3.13		2.13	2.06	3.05		.01		431	.59	10,860	45	744
Mar. 21-31	20,080	12	2.64	1.07	2.87		2.15	2.04	2.74		.01		416	.57	11,450	44	709
Apr. 1-10	21,440	11	2.64	1.15	2.78		2.18	1.98	2.65		.01		407	.55	11,790	42	693
Apr. 11-20	28,150	10	2.25	.90	2.13		2.03	1.62	2.09		.01		336	.46	12,950	40	575
Apr. 21-30	54,720	11	1.90	.74	1.09		1.84	1.08	.93		.02		230	.31	16,960	29	385
May 1-10	72,280	13	1.85	.66	.87		1.77	.96	.68		.02		204	.28	20,240	26	336
May 11-20	100,300	15	1.55	.60	.70		1.64	.71	.56		.02		184	.25	25,080	25	291
May 21-31	208,700	12	1.45	.52	.52		1.61	.58	.28		.02		155	.21	43,830	21	241
June 1-10	162,400	11	1.35	.54	.57		1.36	.62	.51		.01		150	.20	32,480	23	235
June 11-20	169,300	10	1.40	.54	.57		1.43	.71	.37		.01		160	.22	37,250	23	251
June 21-30	203,900	9.8	1.35	.45	.43		1.30	.62	.31		.01		142	.19	38,740	19	225
July 1-10	118,700	8.7	1.35	.50	.65		1.25	.69	.54		.01		161	.22	26,110	26	262
July 11-20	85,170	8.5	1.45	.36	.83		1.34	.52	.76		.01		a 154	.21	17,890	31	314
July 21-31	80,910	10	1.95	.79	1.04		1.61	1.31	.93		.01		239	.33	26,700	28	384
Aug. 1-10	61,430	12	2.20	.72	1.22		1.90	1.31	1.07		.02		240	.33	20,270	29	420
Aug. 11-20	34,570	12	2.59	.90	2.26		2.03	1.85	2.17		.01		368	.50	17,280	39	606
Aug. 21-31	36,280	14	2.89	.99	2.35		2.20	2.14	2.17		.01		398	.54	19,590	38	643
Sept. 1-10	25,590	13	3.04	1.15	2.70		2.26	2.31	2.59		.01		437	.59	15,100	39	715
Sept. 11-20	25,590	12	2.89	1.07	2.70		2.13	2.14	2.65		.01		421	.57	14,590	41	698
Sept. 21-30	25,690	12	3.14	.99	3.00		2.13	2.21	2.88		.01		419	.57	14,640	42	727
Total or weighted average	(d)	11	1.95	0.72	1.26		1.69	1.17	1.16		0.01		244	0.33	609,800	32	403

a Sum of determined constituents.
b Not included for computation of weighted averages.
c Hardness determined by Schwarzenbach method.
d For computation of the weighted averages the total discharge corresponding to 1,836,000 acre-feet was used. This represents 99 percent of runoff for water year October 1950 to September 1951.

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR CISCO, UTAH

LOCATION.--At gaging station, 1 mile downstream from Dolores River, 11 miles south of Cisco, Grand County, 97 miles upstream from Green River, and 235 miles upstream from San Juan River.
DRAINAGE AREA.--24,100 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1951.
Water temperatures: April 1949 to September 1951.
Sediment records: May 1930 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,370 micromhos Oct. 20; minimum, 396 micromhos May 31.
Percent sodium: Maximum, 48 Jan. 11-20, Apr. 11-20; minimum, 26 June 21-30.
EXTREMES, 1941-51.--Specific conductance: Maximum, 4,100 micromhos Sept. 30, 1946; minimum, 340 micromhos May 29, 1942.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 9-10, 1950	12,990	12	8.23	6.50	9.57		3.31	15.72	5.22		0.14		1,600	2.18	28,320	39	2,130	--
Oct. 12, 17-20	19,160	12	9.33	7.24	10.61		3.74	18.15	5.64		.15		1,820	2.48	47,520	39	2,370	--
Oct. 21-25	19,380	11	8.98	6.91	11.00		3.87	16.86	6.20		.15		1,780	2.42	46,900	41	2,360	--
Nov. 1-10	43,100	12	7.98	5.84	10.61		3.80	14.37	6.20		.18		1,630	2.22	95,680	43	2,220	--
Nov. 11-20	56,030	15	7.73	5.43	8.87		3.80	13.28	5.36		.13		1,440	1.96	109,800	40	1,990	--
Nov. 21-30	62,220	14	7.09	4.61	8.04		3.70	11.76	4.65		.13		1,300	1.77	110,100	41	1,780	--
Dec. 1-10	53,300	14	6.84	4.85	8.91		3.80	11.97	5.50		.13		1,380	1.88	100,200	43	1,880	--
Dec. 11-20	59,700	13	6.24	4.36	8.17		3.64	10.76	5.08		.13		1,260	1.71	102,100	44	1,740	--
Dec. 21-31	54,450	14	6.04	4.52	8.48		3.54	10.08	5.36		.13		1,220	1.66	90,390	45	1,760	--
Jan. 1-10, 1951	46,990	15	6.09	4.61	9.48		3.62	10.18	6.43		.14		1,310	1.78	83,640	47	1,870	--
Jan. 11-20	45,200	16	6.19	4.61	9.83		3.75	10.12	6.63		.16		1,310	1.78	80,460	48	1,910	--
Jan. 21-22, 24 a	16,380	--	--	--	--		--	--	--		--		1,140	1.55	25,390	--	1,710	--
Feb. 10-19	58,970	12	4.99	3.62	7.74		3.21	8.37	5.30		.14		1,070	1.46	86,100	47	1,600	7.6
Feb. 20-28	48,600	14	5.39	3.70	7.87		3.38	8.51	5.78		.11		1,100	1.50	72,900	46	1,620	--
Mar. 2, 6, 8-10	26,780	15	5.39	3.78	8.22		3.43	8.99	5.44		.10		1,130	1.54	41,240	47	1,660	--
Mar. 11-20	52,340	14	4.99	3.54	7.52		3.21	8.14	4.96		.10		1,050	1.43	74,850	47	1,570	--
Mar. 21-31	56,890	11	4.84	3.62	7.35		3.11	7.91	5.27		.10		1,040	1.41	80,210	46	1,560	--

a Not included for computation of weighted averages.

Apr. 1-10 ---------	49,980	13	4.99	3.54	7.13		3.11	7.85	4.77		.10		999	1.36	67,970	46	1,500	--
Apr. 11-20 --------	38,160	10	5.19	3.78	8.22		3.05	8.79	5.56		.10		1,110	1.51	57,620	48	1,650	--
Apr. 21-30 --------	84,650	15	4.14	2.63	4.78		2.85	5.25	3.13		.08		728	.99	83,800	41	1,100	--
May 1-7 a ---------	69,760	--	--	--	--		--	--	--		--		671	.91	63,480	--	1,030	--
May 11-20---------	201,600	14	2.89	1.56	2.17		2.16	2.96	1.18		.07		437	.59	118,900	33	641	--
May 21-31 a -------	434,200	--	--	--	--		--	--	--		--		334	.45	195,400	--	523	--
June 1-10 ---------	353,300	18	2.59	1.15	1.48		2.20	2.31	.73		.03		332	.45	159,000	28	512	--
June 11-20 --------	363,600	16	2.59	1.23	1.48		2.10	2.50	.71		.03		336	.46	167,300	28	517	--
June 21-30 --------	456,400	16	2.40	.99	1.22		1.93	2.06	.68		.02		295	.40	182,600	26	457	--
July 1, 5-10 -------	169,100	15	2.59	1.32	1.87		1.84	3.00	1.10		.03		386	.52	87,930	32	588	--
July 11, 13, 15-16,20	72,810	15	3.24	1.97	2.83		2.13	4.46	1.58		.04		531	.72	52,420	35	794	--
July 22-26, 31 -----	78,330	17	4.49	2.38	3.52		2.44	6.20	1.75		.07		688	.94	73,630	34	996	--
Aug. 1-4, 9 -------	50,060	15	5.04	2.96	4.74		2.79	7.12	2.71		.06		822	1.12	56,070	37	1,200	7.6
Aug. 11-20 --------	52,800	14	6.54	4.61	6.74		2.95	11.43	3.53		.11		1,170	1.59	83,950	38	1,600	7.6
Aug. 21-31 --------	74,720	15	8.83	4.85	7.57		3.41	14.09	3.78		.10		1,410	1.92	143,500	36	1,860	7.5
Sept. 1-10 ---------	54,550	14	7.68	4.85	7.96		3.34	12.78	3.89		.11		1,330	1.81	98,740	39	1,770	7.5
Sept. 11-20 --------	34,370	14	9.18	6.58	10.04		3.41	17.03	4.94		.15		1,680	2.28	78,360	39	2,180	7.7
Sept. 21-30 --------	41,590	12	6.98	6.58	9.44		3.41	16.45	4.60		.16		1,630	2.22	92,330	38	2,120	7.8
Total or weighted average-	(b)	15	4.24	2.63	4.30		2.61	6.06	2.54		0.07		726	0.99	3,139,000	38	1,040	--

a Not included for computation of weighted averages.
b For computation of the weighted averages the total discharge corresponding to 2,892,000 acre-feet was used. This represents 74 percent of the runoff for the water year October 1950 to September 1951.

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER AT LEES FERRY, ARIZ.

LOCATION.--At gaging station at head of Marble Gorge at Lees Ferry, Coconino County, just upstream from Paria River, 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.
RECORDS AVAILABLE.--Chemical analyses: July 1926, October 1926 to September 1927, October 1928 to September 1930, October 1942 to October 1945, October 1947 to September 1951.
Water temperatures: July 1949 to September 1951.
Sediment records: October 1928 to September 1933. November 1942 to September 1944. October 1947 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,790 micromhos Jan. 23, 1951; minimum, 400 micromhos June 24, 1951.
Percent sodium: Maximum, 41 Jan. 11-31, Feb. 11 to April 10; minimum, 21 June 1-10.
EXTREMES, 1942-45, 1947-51.--Specific conductance: Maximum, 2,280 micromhos Oct. 15, 1945; minimum, 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. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213. Values reported for dissolved solids are sums of determined constituents.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	127,400	13	6.44	3.95	6.52	0.20	3.64	10.70	2.65	0.03	0.07	0.4	1,070	1.46	185,400	38	1,550	7.7
Oct. 11-20	106,400	11	6.04	4.11	6.39	.21	3.52	10.45	2.88	.02	.07	.4	1,050	1.43	151,900	38	1,540	7.8
Oct. 21-31	107,600	8.8	6.09	4.61	7.09	.20	3.38	11.20	3.24	.02	.07	.4	1,120	1.52	163,900	39	1,620	7.9
Nov. 1-10	97,780	8.7	6.34	4.77	7.57	.22	3.54	11.72	3.64	.02	.06	.3	1,180	1.60	156,900	40	1,710	7.9
Nov. 11-20	112,200	9.1	6.19	4.69	7.35	.24	3.79	11.10	3.67	.02	.06	.3	1,150	1.56	175,500	40	1,680	7.4
Nov. 21-30	139,700	12	6.29	4.61	6.61	.20	3.90	10.64	3.30	.02	.07	.3	1,100	1.50	209,000	37	1,610	7.8
Dec. 1-10	140,800	12	5.39	3.95	5.87	.14	3.72	8.91	2.71	.02	.07	.1	949	1.29	181,700	38	1,400	7.9
Dec. 11-20	129,400	11	5.64	4.36	6.39	.10	3.75	9.29	3.22	.02	.07	.1	1,010	1.37	177,700	39	1,500	7.9
Dec. 21-31	144,800	11	5.29	4.11	6.04	.13	3.75	8.62	2.99	.02	.06	.1	949	1.29	186,900	39	1,420	7.9
Jan. 1-10, 1951	104,300	12	5.59	3.87	6.39	.13	3.77	9.06	3.33	.01	.07	.2	994	1.35	141,000	40	1,500	7.3
Jan. 11-20	125,700	12	6.04	4.11	7.04	.18	4.00	9.58	3.95	.02	.07	.4	1,080	1.47	125,700	41	1,630	7.5
Jan. 21-31	125,300	12	5.99	4.19	7.26	.16	4.08	9.51	3.95	.01	.08	.3	1,080	1.47	184,000	41	1,620	7.3

Feb. 1-10	98,240	12	5.39	3.70	6.26	.12	3.78	8.20	3.27	.01	.07	.4	942	1.28	125,900	40	1,430	7.4
Feb. 11-20	144,100	12	5.39	3.54	6.39	.14	3.65	8.41	3.44	.02	.07	.3	956	1.30	187,400	41	1,450	7.3
Feb. 21-28	118,100	9.5	4.74	3.45	5.74	.12	3.41	7.72	2.74	.01	.05	.4	857	1.17	137,600	41	1,310	7.3
Mar. 1-10	140,900	15	4.69	3.45	5.70	.15	3.39	7.58	2.88	.01	.07	.1	860	1.17	164,600	41	1,310	7.7
Mar. 11-20	135,700	16	4.94	3.70	6.13	.15	3.62	7.93	3.19	.02	.06	.1	914	1.24	168,700	41	1,390	7.7
Mar. 21-31	140,900	16	4.69	3.45	5.74	.08	3.57	7.35	3.02	.02	.06	.1	858	1.17	164,400	41	1,320	7.8
Apr. 1-10	158,200	14	4.39	3.29	5.39	.10	3.57	6.93	2.76	.02	.04	.1	811	1.10	174,500	41	1,250	7.8
Apr. 11-20	164,800	16	4.19	3.12	5.00	.13	3.39	6.45	2.43	.02	.05	a.1	760	1.03	170,300	40	1,170	7.8
Apr. 21-30	208,000	15	3.94	2.71	4.09	.10	3.39	5.31	2.09	.03	.05	a.1	659	.90	186,400	38	1,030	7.8
May 1-10	299,400	16	3.44	2.30	2.74	.12	3.29	3.75	1.35	.03	.04	a.1	511	.69	208,100	32	804	7.8
May 11-20	457,500	15	3.24	1.81	2.22	.10	2.97	3.29	1.10	.02	.04	a.1	446	.61	277,500	30	703	7.8
May 21-31	888,000	16	2.89	1.48	1.61	.12	2.74	2.69	.71	.02	.02	a.1	371	.50	448,000	26	593	7.7
June 1-10	1,086,000	15	2.50	1.15	1.00	.12	2.52	1.69	.48	.02	.03	a.1	283	.38	418,000	21	459	7.8
June 11-20	734,100	13	2.79	1.32	1.48	.07	2.72	2.29	.56	.01	.02	a.1	335	.46	334,500	26	531	8.0
June 21-30	1,065,000	12	2.59	1.07	1.22	.07	2.56	1.87	.45	.03	.02	a.1	293	.40	424,400	25	467	8.1
July 1-10	640,700	13	2.50	1.15	1.26	.09	2.52	1.87	.54	.01	.01	a.1	296	.40	257,900	25	476	7.9
July 11-20	376,800	11	2.69	1.32	1.74	.09	2.46	2.54	.79	.02	.02	a.1	350	.48	179,400	30	563	7.8
July 21-31	338,900	12	3.54	1.73	2.35	.10	2.79	3.91	1.07	.02	.03	.1	474	.64	218,500	30	746	8.0
Aug. 1-4	123,700	17	4.39	2.30	2.65	.26	3.67	4.75	1.13	.02	.02	.1	584	.79	98,250	28	873	7.8
Aug. 5-11	265,500	17	9.18	3.45	4.52	.25	3.56	12.14	1.61	.01	.01	.1	1,100	1.50	397,200	26	1,500	7.9
Aug. 12-20	199,200	15	4.79	2.14	3.35	.13	3.20	5.93	1.21	.01	.04	.1	646	.88	175,000	32	961	7.8
Aug. 21-31	198,300	12	5.19	2.47	3.91	.21	3.15	7.08	1.64	.01	.03	.1	739	1.01	199,300	33	1,090	7.8
Sept. 1-10	205,700	16	7.78	3.29	4.65	.21	3.59	10.47	1.89	.02	.04	.14	1,010	1.37	282,500	29	1,440	7.6
Sept. 11-20	111,900	13	5.79	3.37	4.48	.20	3.44	8.18	2.03	.02	.06	.11	853	1.16	129,800	32	1,250	7.5
Sept. 21-30	93,000	12	6.14	4.11	5.91	.22	3.28	10.37	2.85	.02	.05	.14	1,030	1.40	130,300	36	1,470	7.8
Total or weighted average	9,817,000	14	3.94	2.22	3.13	0.13	3.03	4.89	1.47	0.02	0.04	--	578	0.79	7,699,000	33	877	--

a Less than 0.1 part per million of boron.

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR GRAND CANYON, ARIZ.

LOCATION.--At gaging station at Kaibab Bridge, a quarter of a mile upstream from Bright Angel Creek, 11 miles by trail northeast of Grand Canyon Village, Coconino County, 26 miles downstream from Little Colorado River, and 267 miles upstream from Hoover Dam.

DRAINAGE AREA.--137,800 square miles.

RECORDS AVAILABLE.--Chemical analyses: August 1925 to November 1942, September 1943 to September 1951.
Water temperatures: October 1936 to October 1942, September 1943 to September 1951.
Sediment records: October 1925 to November 1942, September 1943 to September 1951.

EXTREMES, 1950-51.--Specific conductance: Maximum, 1,920 micromhos Oct. 2; minimum, 470 micromhos June 25.
Percent sodium: Maximum, 45 Jan. 11-20; minimum, 23 June 1-10.

EXTREMES, 1937-51.--Specific conductance: Maximum, 2,900 micromhos Sept. 6, 1940; minimum, 341 micromhos June 15, 1942.
Percent sodium (1941-51): Maximum, 48 Sept. 11-20, 1942; minimum, 20 June 1-10, 1950.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950 -----	134,200	15	7.53	4.19	8.04	0.15	4.52	10.81	4.09	0.02	0.03		1,260	1.71	229,500	40	1,710	7.3
Oct. 11-20 ----------	112,800	13	6.39	4.11	7.35	.13	4.20	10.06	3.95	.03	.05		1,180	1.60	180,500	41	1,850	7.4
Oct. 21-31 ----------	112,200	11	6.39	4.52	7.91	.11	4.03	10.45	4.79	.03	.06		1,250	1.70	190,700	42	1,720	7.4
Nov. 1-10 ----------	100,300	9.6	6.39	4.85	8.48	.14	4.00	11.37	4.57	.02	.07		1,320	1.80	180,500	43	1,850	7.3
Nov. 11-20 ---------	115,300	10	6.69	4.85	8.70	.13	4.29	10.99	5.08	.02	.06		1,310	1.78	205,200	43	1,800	7.3
Nov. 21-30 ---------	139,600	12	6.49	4.52	7.96	.14	4.20	10.39	4.57	.02	.07		1,240	1.69	235,900	42	1,700	7.5
Dec. 1-10 ----------	147,500	13	5.84	4.03	6.91	.09	4.15	9.35	3.44	.02	.07		1,100	1.50	221,200	41	1,560	7.5
Dec. 11-20 ---------	134,800	13	5.89	4.03	7.17	.38	4.28	8.93	4.17	.02	.06		1,070	1.46	196,800	41	1,590	7.4
Dec. 21-31 ---------	152,100	14	5.74	4.03	7.31	.36	4.24	8.54	4.32	.02	.06		1,080	1.47	223,600	42	1,600	7.4
Jan. 1-10, 1951 -----	111,700	13	5.59	3.87	7.22	.38	4.16	8.22	4.34	.02	.07		1,050	1.43	159,700	42	1,560	7.4
Jan. 11-20 ----------	89,770	14	6.24	4.44	8.78	.24	4.29	9.39	5.58	.02	.09		1,230	1.67	149,900	45	1,790	7.4
Jan. 21-31 ----------	124,900	14	6.29	4.44	8.44	.26	4.41	9.45	5.47	.02	.09		1,230	1.67	208,600	44	1,770	7.8

Feb. 1-10 ----------	102,800	14	5.79	4.03	7.57	.23	4.23	8.22	4.96	.02	.07		1,120	1.52	156,300	43	1,610	7.8
Feb. 11-20----------	144,600	14	5.74	3.87	7.44	.19	4.05	8.39	4.57	.02	.07		1,090	1.48	214,000	43	1,570	7.9
Feb. 21-28 ---------	118,900	12	5.09	3.54	6.74	.21	3.77	7.72	3.89	.02	.07		990	1.35	160,500	43	1,440	7.9
Mar. 1-10 ----------	146,200	13	4.84	3.45	6.83	.20	3.62	7.74	3.89	.02	.05		974	1.32	193,000	44	1,420	7.9
Mar. 11-20 ---------	137,900	11	5.39	3.45	6.83	.49	4.26	7.64	4.37	.02	.04		1,020	1.39	191,700	42	1,520	7.3
Mar. 21-27 ---------	93,860	10	5.14	3.45	7.00	.41	4.20	7.49	4.37	.02	.06		1,000	1.36	127,600	44	1,500	7.6
Apr. 1-10 ----------	161,500	14	5.14	3.37	6.31	.31	4.24	7.10	3.81	.03	.03		941	1.28	206,700	42	1,410	7.4
Apr. 11-13, 17-19---	101,200	14	4.74	3.04	6.04	.26	4.06	6.64	3.44	.03	.03		882	1.20	121,400	43	1,330	7.6
Apr. 21-30 ---------	204,600	14	4.39	2.88	5.17	.26	4.00	5.52	2.93	.03	.03		770	1.05	214,800	41	1,170	7.6
May 1-10 ----------	300,700	16	3.89	2.38	3.65	.14	3.83	4.04	1.95	.03	.04		602	.82	246,600	36	932	7.4
May 11-20 ----------	445,100	16	3.79	2.30	2.91	.15	3.74	3.52	1.66	.03	.05		536	.73	324,900	32	836	7.3
May 21-31 ----------	805,900	16	3.49	1.73	2.09	.13	3.41	2.91	.96	.03	.04		436	.59	475,500	28	671	7.3
June 1-10 ----------	1,059,000	15	3.04	1.32	1.35	.15	3.44	1.73	.71	.02	.03		348	.47	497,700	23	535	7.8
June 11-20----------	728,700	12	3.29	1.32	1.70	.12	3.38	2.21	.87	.02	.02		393	.53	386,200	26	583	7.8
June 21-30----------	1,013,000	13	3.09	1.23	1.39	.14	3.26	1.87	.65	.02	.02		355	.48	486,200	24	543	7.8
July 7-10 ----------	222,100	11	2.69	1.23	1.92		2.70	2.14	.96	.02	.02		350	.48	106,600	33	543	7.8
July 11-20 ----------	395,900	11	2.74	1.40	2.13	.15	2.72	2.46	1.30	.02	.01		394	.54	213,800	33	599	7.8
July 21-31 ----------	346,700	14	4.19	1.73	3.26	.17	3.31	4.23	1.83	.03	.01		584	.79	273,900	35	884	8.0
Aug. 1-3, 6-10------	298,100	17	6.79	2.80	4.48	.19	3.67	8.56	1.86	.02	.01		906	1.23	366,700	31	1,250	7.8
Aug. 11 a ----------	31,540	--	b13.36		--	--	3.70	16.34	2.14	--	--		--	--	--	--	1,710	--
Aug. 13-20 ---------	186,600	15	5.19	2.55	4.48	.18	3.46	6.75	1.97	.02	.03		771	1.05	195,900	36	1,110	7.8
Aug. 21-30 ---------	170,000	14	4.79	2.55	4.78	.16	3.51	6.22	2.65	.02	.03		761	1.03	175,100	39	1,140	7.9
Aug. 31 a----------	38,480	--	b8.80		--	--	5.05	10.56	5.22	--	--		--	--	--	--	1,840	--
Sept. 1-10 ----------	236,900	15	7.49	3.12	6.35	.17	3.70	10.33	2.93	.02	.04		1,100	1.50	355,400	37	1,520	7.8
Sept. 11-20 ---------	118,600	10	5.94	3.04	6.09	.14	3.92	7.79	3.33	.02	.04		979	1.33	157,700	40	1,400	7.4
Sept. 21-30 ---------	96,280	11	6.19	3.78	7.48	.17	4.00	8.97	4.54	.02	.07		1,130	1.54	148,300	42	1,600	7.5
Total or weighted average---	(c)	14	4.39	2.38	3.96	0.18	3.62	5.02	2.17	0.02	0.04		677	0.92	8,379,000	36	994	--

a Not included for computation of weighted averages.
b Hardness determination by Schwarzenbach method.
c For computation of the weighted averages the total discharge corresponding to 9,110,000 acre-feet was used. This represents 93 percent of the runoff for the year October 1950 to September 1951.

COLORADO RIVER MAIN STEM--Continued

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 below Hoover Dam.
DRAINAGE AREA.--167,800 square miles above Hoover Dam.
RECORDS AVAILABLE.--Chemical analyses: November 1939 to September 1951.
Water temperatures: October 1941 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,020 micromhos Mar. 5; minimum, 910 micromhos Jan. 23.
Percent sodium: Maximum, 41 Feb. 20-21, 23, 26-28; minimum, 34 Oct. 23-27, 30-31.
EXTREMES, 1939-51.--Specific conductance: Maximum, 1,250 micromhos Mar. 2, 1941; minimum, 824 micromhos Nov. 14, 1949.
Percent sodium (1941-1944, 1950-51): Maximum, 41 Feb. 20-21, 23, 26-28, 1951; minimum, 32 Jan. 21-22, 25-29, 31, June 12-17, 19-20, 1944.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 2-6, 9-10, 1950 -	222,500	13	4.24	2.30	3.58		2.65	5.48	1.95		0.04		650	0.88	195,800	35	970	7.4
Oct. 11-13, 16-20 ----	243,400	13	4.19	2.30	3.70		2.64	5.54	1.97		.04		658	.89	216,600	36	973	7.6
Oct. 23-27, 30-31 ----	206,300	14	4.29	2.38	3.46		2.62	5.52	1.95		.04		660	.90	185,700	34	973	7.4
Nov. 1-3, 6-10-------	244,200	13	4.19	2.30	3.66		2.67	5.50	1.95		.03		656	.89	217,300	36	976	7.3
Nov. 13-17, 20 ------	188,000	13	4.19	2.30	3.66		2.64	5.52	1.95		.04		656	.89	167,300	36	973	7.4
Nov. 21-22, 24, 27-30	199,700	13	4.19	2.14	3.85		2.62	5.50	2.03		.03		640	.87	173,700	38	968	7.6
Dec. 1, 4-8----------	174,100	12	4.34	2.14	3.80		2.69	5.52	2.03		.04		634	.86	149,700	37	963	7.7
Dec. 11-15, 18-20----	261,400	12	4.24	2.14	3.79		2.70	5.43	2.00		.04		631	.86	224,800	37	957	7.7
Dec. 21-22, 26-29----	199,300	12	4.34	2.14	3.74		2.67	5.52	2.00		.03		632	.86	171,400	37	949	7.7
Jan. 2-5, 8-10, 1951 -	255,700	14	4.24	2.14	3.65		2.65	5.43	1.92		.03		625	.85	217,300	36	939	7.7
Jan. 11-12, 15-19----	233,500	12	3.89	2.22	4.10		2.69	5.52	1.97		.03		656	.89	207,800	40	965	7.6
Jan. 22-26, 29-31 ----	237,600	13	3.79	2.22	3.94		2.67	5.33	1.92		.03		632	.86	204,300	40	931	7.7

Feb. 1-2, 5-9 -------	193,200	12	3.89	2.14	3.91	2.64	5.35	1.92		.03		635	.86	166,200	39	936	7.7
Feb. 12-16, 19-------	172,600	12	3.84	2.14	4.05	2.65	5.43	1.92		.03		643	.87	150,200	40	947	7.6
Feb. 20-21, 23, 26-28	210,000	12	3.79	2.22	4.24	2.72	5.50	2.00		.03		658	.89	186,900	41	971	7.7
Mar. 1-2, 5-9 -------	230,900	12	4.19	2.22	4.11	2.85	5.54	2.09		.04		676	.92	212,400	39	1,000	7.8
Mar. 12-16, 19-20 ---	210,200	12	4.14	2.22	4.04	2.82	5.52	2.03		.03		664	.90	189,200	39	972	7.8
Mar. 21-23, 26-30 ---	243,200	12	4.39	--	--	2.72	5.60	2.03		.03		676	.92	223,700	--	1,000	8.0
Apr. 2-6, 9-10 ------	206,700	12	4.39	--	--	2.75	5.50	2.06		.03		678	.92	190,200	--	997	7.5
Apr. 11-13, 16-20 ---	244,000	12	4.29	--	--	2.77	5.56	2.14		.03		690	.94	229,400	--	1,010	7.4
Apr. 23-27, 30 ------	163,000	13	4.39	--	--	2.88	5.58	2.12		.03		692	.94	153,200	--	1,010	7.7
May 1-5, 8-10 -------	255,300	13	4.09	2.47	4.33	3.02	5.70	2.14		.03		680	.92	234,900	40	1,010	7.3
May 11-12, 15-18 ----	188,600	14	4.09	2.38	4.14	2.80	5.64	2.14		.03		676	.92	173,500	39	997	8.1
May 21-25, 28-29, 31-	248,300	13	4.14	2.38	4.09	2.80	5.64	2.14		.03		674	.92	228,400	39	991	7.8
June 1, 4-8 ----------	156,900	14	4.19	2.38	3.93	2.75	5.64	2.09		.02		667	.91	142,800	37	988	7.8
June 11-15, 18-20----	202,100	14	4.04	2.38	4.10	2.82	5.58	2.09		.03		669	.91	183,900	39	985	7.7
June 21-22, 25-29----	176,900	13	4.19	2.38	3.94	2.75	5.64	2.09		.03		676	.92	162,700	37	982	7.7
July 2-3, 5, 9-10-----	134,500	14	4.09	2.71	3.77	2.85	5.60	2.09		.03		685	.93	125,100	36	985	7.9
July 11-13, 16-20 ----	226,500	13	4.24	2.55	3.91	2.79	5.64	2.14		.03		676	.92	208,400	37	991	7.8
July 23-27, 30 -------	175,300	13	4.24	2.55	3.90	2.84	5.70	2.12		.03		665	.90	157,800	36	988	7.7
Aug. 1, 3, 6-10 ------	212,000	13	4.29	2.47	3.85	2.84	5.66	2.09		.02		677	.92	195,000	36	991	7.9
Aug. 13-17, 20-------	202,100	14	4.29	2.30	3.94	2.75	5.66	2.09		.03		681	.93	188,000	37	980	7.6
Aug. 21-24, 27-31----	303,100	13	4.29	2.14	4.17	2.77	5.73	2.06		.04		682	.93	281,900	39	983	7.6
Sept. 4-7, 10 --------	171,400	13	4.24	2.38	3.84	2.74	5.62	2.06		.04		676	.92	157,700	37	980	7.6
Sept. 11-14, 17-20 ---	282,200	13	4.29	2.30	3.94	2.77	5.66	2.06		.04		680	.92	259,600	37	980	7.6
Sept. 21, 24-28 ------	181,900	14	4.29	2.38	3.90	2.74	5.73	2.06		.04		676	.92	167,300	37	978	7.6
Total or weighted average --	a7,657,000	13	4.19	2.30	3.91	2.74	5.56	2.03		0.03		663	0.90	6,900,000	38	977	--

a Represents 77 percent of runoff for water year October 1950 to September 1951.

DIVERSIONS AND RETURN FLOWS AT AND BELOW IMPERIAL DAM

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

LOCATION.--At gaging station on Yuma Main Canal below Colorado River siphon at Yuma, Yuma County, on Arizona side of river 3½ miles downstream from siphon-drop power plant.
DRAINAGE AREA.--242,900 square miles, including all closed basins within drainage boundary.
RECORDS AVAILABLE.--Chemical analyses: September 1926 to September 1928, October 1942 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,090 micromhos on several days during May to August; minimum, 921 micromhos Sept. 4.
Percent sodium: Maximum, 42 Aug. 2-3, 6-10; minimum, 36 Apr. 11-12, 16-20.
EXTREMES, 1943-51.--Specific conductance: Maximum, 1,150 micromhos on several days in May and June 1944 and June 1947; minimum, 828 micromhos Nov. 21, 1949.
Percent sodium: Maximum, 42 several periods in 1946, 1947 and 1951; minimum, 32 several periods in 1945, 1946, 1948 and 1949.
REMARKS.--Samples collected prior to February 1943 were from gaging station on the Colorado River at Yuma. Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 2-6, 9-10, 1950	8,570	14	4.09	2.14	4.04	0.15	2.70	5.58	2.26	0.01	0.01		684	0.93	7,970	39	1,010	7.6
Oct. 11-13, 16-20	10,490	14	4.09	2.14	4.13	.17	2.70	5.68	2.28	.01	.01		692	.94	9,860	39	1,000	7.6
Oct. 23-27, 30-31	8,710	12	4.09	2.22	4.22	.14	2.79	5.70	2.37	.01	.01		691	.94	8,190	40	1,010	7.8
Nov. 1-3, 6-10	9,210	13	4.19	2.14	4.26	.12	2.79	5.66	2.34	.01	.01		696	.95	8,750	40	1,020	7.6
Nov. 11, 13-16, 20	6,380	17	4.29	2.22	4.26	.10	2.77	5.77	2.37	.01	.02		701	.95	6,060	39	1,030	8.0
Nov. 21-22, 24, 27-30	6,770	15	4.24	2.22	4.13	.11	2.80	5.70	2.34	.01	.02		697	.95	6,430	39	1,030	7.8
Dec. 1, 4-8	4,300	13	4.29	2.22	4.22	.13	2.92	5.75	2.34	.01	.02		701	.95	4,080	39	1,030	8.1
Dec. 11-15, 18-20	6,340	13	4.39	2.22	4.22	.13	2.80	5.81	2.37	.01	.01		695	.95	6,020	39	1,040	8.1
Dec. 21-22, 25-29	4,500	13	4.29	2.30	4.22	.14	2.82	5.79	2.40	.02	.02		700	.95	4,280	39	1,030	8.1
Jan. 1-6, 9-10, 1951	5,500	13	4.34	2.30	4.26	.10	2.79	5.83	2.37	.02	.02		702	.95	5,220	39	1,040	8.1
Jan. 11-12, 15-19	3,910	14	4.39	2.30	4.17	.11	2.84	5.79	2.40	.02	.02		697	.95	3,710	38	1,040	8.1
Jan. 22-26, 29-31	7,130	13	4.29	2.38	4.30	.14	2.87	5.77	2.40	.02	.02		702	.95	6,770	39	1,040	8.1

Feb. 1-2, 5-9-------	8,270	13	4.39	2.14	4.26	.21	2.85	5.77	2.48	.01	.01		698	.95	7,860	39	1,040	8.1
Feb. 15-16, 19-21 --	5,490	14	4.59	2.22	4.35	.16	2.88	5.89	2.48	.01	.02		707	.96	5,270	38	1,050	7.9
Feb. 22-23, 26-28 --	5,780	15	--	2.22	4.30	.20	2.90	5.98	2.59	.01	.01		--	--	--	37	1,060	8.1
Mar. 1-2, 5-9 ------	7,420	13	4.34	2.38	4.30	.09	2.87	5.85	2.40	.02	.02		702	.95	7,050	39	1,060	8.1
Mar. 12-14, 16,19-20	6,490	11	4.39	2.22	4.44	.21	2.88	5.83	2.48	.02	.02		709	.96	6,230	39	1,070	8.0
Mar. 21-23, 26-30 --	8,200	8.5	4.39	2.22	4.52	.19	2.84	5.93	2.54	.02	.02		708	.96	7,870	40	1,070	8.0
Apr. 2-6, 9-10 -----	7,450	8.9	4.39	2.30	4.44	.13	2.79	5.95	2.26	.01	.03		708	.96	7,150	39	1,060	7.7
Apr. 11-12, 16-20 --	7,690	10	4.49	2.30	3.96	.12	2.82	5.89	2.26	.02	.03		704	.96	7,380	36	1,060	7.7
Apr. 23-27, 30 -----	5,950	14	4.39	2.47	4.48	.15	3.03	5.98	2.43	--	.02		714	.97	5,770	39	1,070	8.1
May 1-4, 7-10 ------	9,860	14	4.44	2.55	4.52	.14	2.88	5.98	2.51	.02	.02		726	.99	9,760	39	1,080	8.0
May 11, 14-18 ------	7,250	14	4.39	2.55	4.65	.13	2.95	6.02	2.54	.02	.02		728	.99	7,180	40	1,090	8.1
May 21-25, 28-29, 31	10,530	15	4.39	2.47	4.65	.14	2.90	6.00	2.51	.02	.02		735	1.00	10,530	40	1,080	8.1
June 1, 4-8 ---------	8,210	15	4.34	2.38	4.65	.08	2.88	6.00	2.68	.02	.01		719	.98	8,050	41	1,100	8.0
June 11-15, 18------	7,990	15	4.34	2.38	4.61	.07	2.93	6.02	2.48	.02	.01		717	.98	7,830	40	1,080	8.1
June 25-29 ---------	7,280	14	4.39	2.38	4.74	.10	2.92	6.08	2.54	.02	.02		730	.99	7,210	41	1,090	8.2
July 2-3, 5-6, 9-10 -	8,930	15	4.29	2.30	4.70	.08	2.90	6.00	2.68	.02	.01		721	.98	8,750	41	1,080	8.2
July 11-20 ---------	14,100	17	4.29	2.30	4.65	.11	2.82	5.91	2.68	.02	.01		714	.97	13,680	41	1,070	8.3
July 23-27, 30-31 ---	10,930	15	4.19	2.30	4.65	.09	2.82	6.02	2.54	.02	.01		718	.98	10,710	41	1,070	8.3
Aug. 2-3, 6-10------	10,850	15	4.19	2.30	4.74	.10	3.08	6.00	2.40	.02	.02		706	.96	10,420	42	1,070	8.3
Aug. 13-17, 20------	9,090	17	4.19	2.30	4.48	.09	2.41	5.95	2.68	.02	.01		703	.96	8,730	41	1,060	8.3
Aug. 21-22, 28-29, 31	5,320	12	4.14	2.22	4.39	.09	2.67	5.79	2.48	.02	.01		689	.94	5,000	40	1,050	8.3
Sept. 3-7, 10 -------	6,430	16	3.84	2.22	4.13	.16	2.65	5.29	2.26	.02	.03		650	.88	5,660	40	969	7.8
Sept. 11-14, 17-20 --	11,060	16	3.94	2.38	4.35	.16	2.65	5.75	2.37	.02	.02		689	.94	10,400	40	1,030	8.0
Sept. 21, 24-28 -----	8,940	18	4.09	2.47	4.48	.19	2.65	5.89	2.43	.02	.02		709	.96	8,580	40	1,050	8.1
Total or weighted average--	a 281,300	14	4.29	2.30	4.39	0.13	2.82	5.85	2.45	0.02	0.02		706	0.96	264,400	40	1,050	--

a Represents 73 percent of runoff for water year October 1950 to September 1951.

GUNNISON RIVER BASIN

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

LOCATION.--At road bridge 1 mile downstream from point of diversion of Redlands power canal, 1½ miles upstream from mouth and Grand Junction, Mesa County, and about half a mile downstream from gaging station.
DRAINAGE AREA.--8,020 square miles above gaging station.
RECORDS AVAILABLE.--Chemical analyses: October 1931 to September 1951.
Water temperatures: April 1949 to September 1951.
EXTREMES, 1950-1951.--Specific conductance: Maximum, 2,680 micromhos Nov. 5; minimum, 455 micromhos May 31.
Percent sodium: Maximum, 34 Feb. 1-10; minimum, 15 June 21-30.
EXTREMES, 1941-51.--Specific conductance: Maximum, 2,680 micromhos Nov. 5, 1950, minimum, 280 micromhos May 23, 1948.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	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, 1950 -----	14,000	19	11.83	8.22	7.96		3.77	23.11	0.73		0.16		1,800	2.45	34,300	28	2,250	--
Oct. 11-20 ---------	10,890	20	13.02	9.37	9.83		4.33	27.06	.85		.24		2,100	2.86	31,150	31	2,500	--
Oct. 21-31 ---------	11,740	19	12.77	9.21	9.91		4.69	25.82	.90		.14		2,040	2.77	32,520	31	2,520	--
Nov. 1-10 ---------	10,600	19	13.47	9.46	9.96		5.01	26.65	.85		.24		2,110	2.87	30,420	30	2,580	--
Nov. 11-20 ---------	15,030	20	10.68	7.48	7.26		4.54	19.88	.68		.23		1,620	2.20	33,070	29	2,060	--
Nov. 21-30 ---------	23,460	19	7.98	5.51	6.26		3.90	15.16	.51		.13		1,260	1.71	40,120	32	1,640	--
Dec. 1-10 ----------	20,920	19	8.13	5.84	6.22		3.85	15.64	.59		.16		1,290	1.75	36,610	31	1,720	--
Dec. 11-20 ---------	20,930	17	7.39	5.43	5.65		3.79	14.41	.51		.18		1,200	1.63	35,120	31	1,590	--
Dec. 21-31 ---------	18,230	19	8.08	5.84	6.48		3.98	15.86	.59		.18		1,310	1.78	32,450	32	1,730	--
Jan. 1-10, 1951 -----	15,610	19	7.49	5.26	5.70		3.74	14.37	.51		.16		1,190	1.62	25,290	31	1,590	--
Jan. 11-20 ---------	14,800	20	7.68	5.59	5.87		3.92	14.78	.56		.18		1,240	1.69	25,010	31	1,640	--
Jan. 21-31----------	16,700	18	6.99	5.26	5.74		3.59	13.70	.51		.21		1,150	1.56	26,050	32	1,510	--
Feb. 1-10 ----------	13,310	20	7.09	5.51	6.35		3.85	14.20	.54		.19		1,200	1.63	21,700	34	1,570	--
Feb. 11-19 ---------	17,470	17	6.79	5.43	6.04		3.64	13.87	.56		.19		1,170	1.59	27,780	33	1,540	--
Feb. 20-28 ---------	15,230	18	6.64	5.35	5.61		3.54	13.32	.51		.18		1,120	1.52	23,150	32	1,510	--
Mar. 1-10 ---------	16,630	18	6.24	5.10	5.31		3.41	12.68	.48		.14		1,060	1.44	23,950	32	1,450	--
Mar. 11-20 --------	17,370	16	5.69	4.36	4.44		3.23	10.85	.42		.13		926	1.26	21,890	31	1,280	--
Mar. 21-31---------	21,140	16	4.94	3.70	4.00		3.03	9.35	.39		.10		813	1.11	23,470	32	1,140	--

Apr. 1-10 ----------	17,030	16	5.04	3.54	4.09		2.93	9.58	.45		.09		824	1.12	19,070	32	1,150	--
Apr. 11-20 ---------	13,050	14	6.09	4.28	4.74		3.15	11.83	.59		.08		986	1.34	17,490	31	1,350	--
Apr. 21-30 ---------	32,150	15	3.89	2.22	2.30		2.62	5.58	.28		.05		533	.72	23,150	27	784	--
May 1-10 a --------	43,680	--	--	--	--		--	--	--		--		--	--	--	--	692	--
May 11-20 ---------	73,920	15	3.29	1.40	1.35		2.52	3.52	.14		.04		381	.52	38,440	22	579	--
May 21-22, 24, 26-28, 31 a ----------	107,300	--	--	--	--		--	--	--		--		--	--	--	--	539	--
June 1-10 ----------	97,710	17	3.39	1.56	1.48		2.28	4.00	.21		.05		409	.56	54,720	23	603	--
June 11-20 ---------	112,800	17	3.39	1.40	1.48		2.20	3.89	.17		.05		398	.54	60,910	24	592	--
June 21-30 ---------	112,800	16	2.99	1.73	.83		2.02	3.35	.16		.02		344	.47	53,020	15	527	--
July 1-10 ----------	53,260	15	3.99	2.22	1.91		2.39	5.58	.25		.04		517	.70	37,280	24	754	--
July 11-20 ---------	19,620	13	6.64	3.78	4.22		2.85	11.45	.39		.04		941	1.28	25,110	29	1,280	--
July 21-31 ---------	19,770	19	9.38	5.35	6.31		3.67	16.70	.56		.06		1,350	1.84	36,380	30	1,740	--
Aug. 1-10 ----------	24,020	21	8.33	4.52	5.17		3.54	13.99	.39		.08		1,160	1.58	37,950	29	1,510	--
Aug. 11-20 ---------	10,570	17	8.48	5.26	6.91		2.88	16.99	.62		.03		1,340	1.82	19,240	33	1,710	--
Aug. 21, 26-31 -----	10,970	16	9.38	5.43	6.83		3.20	17.76	.56		.09		1,400	1.90	20,840	32	1,770	7.6
Sept. 1-10 ---------	12,030	16	8.73	5.59	7.17		2.82	17.63	.65		.07		1,380	1.88	22,620	33	1,770	7.6
Sept. 11-20 ---------	10,390	16	11.13	6.99	8.96		3.24	23.11	.82		.08		1,770	2.41	25,040	33	2,170	7.7
Sept. 21-30 ---------	14,980	18	12.03	7.32	8.91		3.72	23.53	.73		.16		1,830	2.49	37,300	32	2,210	7.8
Total or weighted average -	(b)	17	5.69	3.54	3.74		2.92	9.70	0.37		0.09		832	1.13	1,052,000	29	1,120	--

a Not included for computation of weighted averages.

b For computation of the weighted averages the total discharge corresponding to 929,100 acre-feet was used. This represents 82 percent of the runoff for the water year October 1950 to September 1951.

GREEN RIVER BASIN

GREEN RIVER AT GREEN RIVER, UTAH

LOCATION.--At gaging station, 1 mile southeast of Green River, Emery County, 22 miles upstream from San Rafael River, and 117 miles upstream from mouth.
DRAINAGE AREA.--40,600 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1951.
Water temperatures: April 1949 to September 1951.
Sediment records: May 1930 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 1,370 micromhos Jan. 9; minimum, 364 micromhos June 30.
Percent sodium: Maximum, 40 Feb. 20-28; minimum, 21 June 1-10.
EXTREMES, 1941-51.--Specific conductance: Maximum, 2,420 micromhos Sept. 29, 1943; minimum, 321 micromhos May 30, 1948.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951.

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	51,850	11	3.79	3.12	4.22		3.64	6.33	1.13		0.02		704	0.96	49,780	38	1,020	--
Oct. 11-20	50,140	10	3.69	3.21	4.26		3.64	6.22	1.13		.01		693	.94	47,130	38	1,000	--
Oct. 21-31	51,250	9.7	3.69	3.37	4.57		3.70	6.70	1.18		.00		717	.98	50,220	39	1,040	--
Nov. 1-10	49,310	11	3.89	3.54	4.61		3.83	6.87	1.18		.01		741	1.01	49,800	38	1,070	--
Nov. 11-20	50,220	11	3.94	3.45	4.57		4.00	6.77	1.18		.01		741	1.01	50,720	38	1,060	--
Nov. 21-30	66,600	13	3.99	3.12	4.04		4.13	6.27	1.13		.03		713	.97	64,600	36	1,040	7.5
Dec. 1-10	59,330	13	3.69	3.04	3.96		3.83	6.12	1.13		.02		686	.93	55,180	37	987	7.6
Dec. 11-20	57,500	12	3.89	3.29	4.04		3.98	6.45	1.16		.03		714	.97	55,780	36	1,050	--
Dec. 21-31	54,070	13	3.99	3.12	4.00		3.97	6.37	1.16		.03		711	.97	52,450	36	1,050	--
Jan. 1-10, 1951	28,440	14	4.54	3.87	5.00		4.57	7.79	1.41		.03		857	1.17	33,270	37	1,230	--
Jan. 11-20	33,140	15	4.89	4.03	5.26		4.87	8.12	1.55		.02		913	1.24	41,090	37	1,290	--
Jan. 21-31	51,730	14	4.44	3.37	4.26		4.36	6.72	1.30		.02		765	1.04	53,800	35	1,120	--

Feb. 1-10	41,360	14	4.04	3.37	4.17		4.23	6.22	1.16		.03		732	1.00	41,360	36	1,050	--
Feb. 11-19	59,600	12	3.64	3.04	4.00		3.70	5.83	1.07		.03		676	.92	54,830	37	976	--
Feb. 20-28	66,290	11	3.29	2.88	4.04		3.38	5.66	1.07		.02		642	.87	57,670	40	943	--
Mar. 1-10	63,670	13	3.84	2.96	4.00		3.90	6.02	1.10		.03		688	.94	59,850	37	1,020	--
Mar. 11-20	65,570	13	3.89	2.96	3.78		3.97	5.77	1.07		.03		681	.93	60,980	36	994	--
Mar. 21-31	75,290	12	3.99	2.96	3.78		4.05	5.79	1.04		.05		684	.93	70,020	35	1,010	--
Apr. 1-10a	93,400	--	--	--	--		--	--	--		--		669	.91	64,990	--	993	--
Apr. 11-20	114,000	13	3.49	2.14	2.70		3.85	3.75	.68		.02		497	.68	77,520	32	761	--
Apr. 21-30 a	164,400	--	--	--	--		--	--	--		--		438	.60	98,640	--	681	--
May 1-10 a	168,200	--	--	--	--		--	--	--		--		390	.53	89,150	--	611	--
May 11-20	254,100	13	2.89	1.56	1.52		3.49	2.21	.37		.02		349	.47	119,400	25	546	--
May 21-31 a	459,800	--	--	--	--		--	--	--		--		306	.42	193,100	--	488	--
June 1-10	516,700	14	2.50	1.07	.96		2.98	1.37	.28		.01		285	.39	201,500	21	428	--
June 11-20	328,700	11	2.40	1.23	1.13		2.79	1.71	.28		.02		331	.45	147,900	24	480	--
June 21-30	463,700	11	2.40	1.07	1.00		2.88	1.33	.25		.01		287	.39	180,800	22	420	--
July 1-10	274,900	12	2.20	1.07	1.04		2.65	1.35	.28		.01		267	.36	98,960	24	403	--
July 11-20	182,600	12	2.10	1.23	1.22		2.59	1.60	.37		.01		294	.40	73,040	27	432	--
July 21-31	169,700	12	3.04	1.73	1.87		3.34	2.79	.48		.03		413	.56	95,030	28	622	--
Aug. 1-2, 5-10	129,500	12	3.59	1.81	2.61		3.15	4.25	.59		.03		521	.70	90,650	33	744	--
Aug. 11-20	117,100	12	3.19	1.48	2.17		3.54	2.98	.62		.03		441	.60	70,260	32	653	--
Aug. 21-31	94,550	12	4.04	1.81	3.13		3.41	4.81	.79		.02		587	.80	75,640	35	851	--
Sept. 1-10	61,980	11	3.69	2.30	3.17		3.64	4.83	.79		.03		563	.77	63,120	35	838	--
Sept. 11-20	53,730	9.2	3.39	2.38	3.48		3.26	4.95	.96		.03		571	.78	41,910	38	845	--
Sept. 21-30	41,970	8.6	3.54	2.71	3.70	0.09	3.20	5.58	1.02		.01		623	.85	35,670	37	914	--
Total or weighted average	(b)	12	3.04	1.89	2.22		3.29	3.27	0.59		0.02		449	0.61	2,786,000	31	662	--

a Not included for computation of weighted averages.
b For computation of the weighted averages the total discharge corresponding to 3,799,000 acre-feet was used. This represents 80 percent of the runoff for the water year October 1950 to September 1951.

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.--3,320 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 820 micromhos Aug. 20; minimum, 129 micromhos, May 30.
Percent sodium: Maximum, 44 Aug. 15-20; minimum, 19 May 21-31.
EXTREMES, 1945-51.--Specific conductance: Maximum, 1,420 micromhos Aug. 16, 1947; minimum, 108 micromhos June 9, 1948.
Percent sodium: Maximum, 52 July 11-16, 18, 20, 1947; minimum, 15 Apr. 21-30, 1949.
REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	6,830	13	2.00	0.73	1.04	0.17	2.36	1.48	0.15	0.02	0.02	0.0	237	0.32	2,200	26	377	7.5
Oct. 11-20	3,870	--	2.25	.75	1.52	--	--	--	--	--	--	--	268	.36	1,410	34	439	--
Oct. 21-31	3,220	--	2.50	.82	1.83	--	--	--	--	--	--	--	311	.42	1,360	36	498	--
Nov. 1-10	2,090	--	3.29	1.15	2.78	--	--	--	--	--	--	--	442	.60	1,260	39	640	--
Nov. 11-20	2,220	--	3.09	1.07	2.48	--	--	--	--	--	--	--	404	.55	1,220	37	603	--
Nov. 21-30	2,750	--	2.89	.99	2.17	--	--	--	--	--	--	--	369	.50	1,380	36	558	--
Dec. 1-10	3,000	--	2.99	1.15	2.26	--	--	--	--	--	--	--	385	.52	1,570	35	579	--
Dec. 11-20	3,070	--	2.69	.99	1.91	--	--	--	--	--	--	--	339	.46	1,420	34	511	--
Dec. 21-31	2,300	--	2.89	.99	2.22	--	--	--	--	--	--	--	380	.52	1,190	36	563	--
Jan. 1-10, 1951	2,220	17	2.99	.90	2.17	.11	2.98	2.87	.28	.02	.01	.1	398	.54	1,200	35	590	7.4
Jan. 11-20	2,460	--	2.89	1.15	2.65	--	--	--	--	--	--	--	368	.50	1,230	40	555	--
Jan. 21-31	3,050	--	2.69	1.15	2.09	--	--	--	--	--	--	--	330	.45	1,370	35	512	--
Feb. 1-10	3,170	--	2.79	1.15	2.13	--	--	--	--	--	--	--	353	.48	1,520	35	547	--
Feb. 11-20	4,260	--	2.40	.78	1.74	--	--	--	--	--	--	--	304	.41	1,760	35	481	--
Feb. 21-28	2,230	--	2.40	.82	2.09	--	--	--	--	--	--	--	339	.46	1,030	39	533	--
Mar. 1-10	2,750	--	2.59	.82	1.91	--	--	--	--	--	--	--	346	.47	1,290	36	541	--
Mar. 11-20	7,440	--	2.79	1.23	1.52	--	--	--	--	--	--	--	352	.48	3,560	27	538	--
Mar. 21-31	8,010	--	2.30	.82	1.13	--	--	--	--	--	--	--	274	.37	2,980	27	423	--

Apr. 1-10	5,950	19	2.35	.82	1.43	.07	2.34	2.23	.09	.01	.01	(a)	299	.41	2,420	31	451	7.7
Apr. 11-20	7,650	--	2.00	.68	1.09	--	--	--	--	--	--	--	238	.32	2,480	29	376	--
Apr. 21-30	14,070	--	1.60	.49	.74	--	--	--	--	--	--	--	178	.24	3,410	26	278	--
May 1-10	20,610	--	1.55	.42	.70	--	--	--	--	--	--	--	169	.23	4,740	26	260	--
May 11-20	26,690	--	1.25	.31	.52	--	--	--	--	--	--	--	136	.18	4,940	25	206	--
May 21-31	63,540	--	1.20	.26	.35	--	--	--	--	--	--	--	125	.17	10,800	19	185	--
June 1-10	38,790	--	--	--	.38	--	--	--	--	--	--	--	111	.15	5,860	--	155	--
June 11-20	31,430	--	.85	.26	.43	--	--	--	--	--	--	--	116	.16	4,960	28	162	--
June 21-30	17,800	--	1.10	.37	.70	--	--	--	--	--	--	--	155	.21	3,750	32	225	--
July 1-10	5,290	11	1.70	.56	1.26	.11	2.06	1.48	.13	.01	.02	(a)	228	.31	1,640	35	354	7.8
July 11-20	1,920	--	2.30	1.40	1.96	--	--	--	--	--	--	--	308	.42	804	35	476	--
July 21-31	2,610	--	2.10	.90	1.87	--	--	--	--	--	--	--	321	.44	1,140	38	502	--
Aug. 1-14	8,960	--	2.30	.78	1.48	--	--	--	--	--	--	--	292	.40	3,560	32	448	--
Aug. 15-20	563	--	3.09	1.07	3.22	--	--	--	--	--	--	--	471	.64	361	44	705	--
Aug. 21-25	2,630	--	2.99	1.07	2.13	--	--	--	--	--	--	--	383	.52	1,370	34	589	--
Aug. 26-31, Sept. 1-3	12,170	--	1.60	.66	.96	--	--	--	--	--	--	--	199	.27	3,290	30	313	--
Sept. 4-10	3,260	--	2.00	.71	1.57	--	--	--	--	--	--	--	256	.35	1,130	37	404	--
Sept. 11-20	1,540	--	2.45	.82	2.04	--	--	--	--	--	--	--	338	.46	708	38	532	--
Sept. 21-30	910	--	2.94	1.07	2.96	--	--	--	--	--	--	--	430	.58	532	42	667	--
Total or weighted average	331,400	--	1.70	0.54	0.87	--	--	--	--	--	--	--	193	0.26	86,840	28	291	--

(a) Less than 0.1 part per million of boron.

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 near Cameron.
DRAINAGE AREA.--26,500 square miles above gaging station.
RECORDS AVAILABLE.--Chemical analyses: April to September 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, New Mexico. Values reported for dissolved solids are sums of determined constituents. Discharge records for gaging station near Cameron for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, April to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 6-10, 1951 a ---	83	21	1.85	0.74	7.78	0.18	2.72	1.31	6.49	0.03	0.03	0.15	631	0.86	71	74	1,120	8.1
Apr. 19-25 a --------	248	21	1.60	.62	6.57	.20	2.63	1.25	5.08	.03	.04	.25	542	.74	183	73	962	8.1
May 1-10 a ----------	579	20	2.00	.79	9.48	.24	3.65	2.73	5.92	.03	.03	.38	750	1.02	591	76	1,270	7.8
May 15 ----------	48	--	1.40	.50	4.24		2.82	.75	2.51	.03	.03	--	345	.47	23	69	631	7.8
July 19-20 a ---------	113	--	1.10	.61	6.07		4.69	1.56	1.41	.11	.01	--	438	.60	67	78	738	8.2
July 27-29----------	1,990	23	.37	.36	5.52	.20	4.35	1.31	.79	.07	.03	.50	395	.54	1,070	86	588	8.5
July 30-31----------	1,810	21	2.59	.90	7.13	.23	3.10	5.10	2.40	.05	.02	--	683	.93	1,680	66	1,060	8.2
Aug. 1, 8-10, 30-----	7,690	25	2.69	.90	10.26	.16	5.24	4.35	4.48	.04	.02	.35	861	1.17	9,000	73	1,390	7.8
Aug. 2-3----------	1,560	20	13.57	5.02	6.52	.28	5.21	18.67	1.27	.02	.02	--	1,610	2.19	3,420	26	2,060	7.1
Aug. 29-31 ----------	13,530	18	1.25	.30	4.61	.18	3.53	1.56	1.27	.06	.03	--	389	.53	7,160	73	631	8.2
Sept. 1-4, 7-11 a ----	13,520	15	1.30	.45	4.09	.09	2.82	.98	2.00	.03	.04	.09	350	.48	6,440	69	592	7.8

a No flow at sampling point Oct. 1 to Apr. 5; no flow at gaging station Apr. 13; no flow during part of period May 1-10; no flow at gaging station May 23 to July 18; no flow Sept. 15-28.

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.
RECORDS AVAILABLE.--Chemical analyses: July 1949 to September 1951.
Water temperatures: October 1947 to September 1951.
Sediment records: October 1947 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 3,780 micromhos Aug. 24; minimum, 1,930 micromhos Apr. 30.
EXTREMES, 1949-51.--Specific conductance: Maximum, 3,950 micromhos Aug. 12,1950; minimum, 1,450 micromhos Feb. 8, 1950.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, water year October 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950	1,360	--	--	--	--	--	--	--	--		--		--	--	--	--	3,150	7.4
Oct. 11-20	1,510	23	17.17	10.03	12.28		4.24	23.94	11.28		0.02		2,450	3.33	5,030	31	3,200	7.5
Oct. 21-31	1,990	--	--	--	--	--	--	--	--		--		--	--	--	--	3,470	7.5
Nov. 1-10	2,150	--	--	--	--	--	--	--	--		--		--	--	--	--	3,320	7.5
Nov. 11-20	3,220	19	17.86	7.89	11.92		4.97	21.65	11.00		.05		2,330	3.17	10,210	32	3,150	7.6
Nov. 21-30	3,470	--	--	--	--	--	--	--	--		--		--	--	--	--	2,920	7.7
Dec. 1-10	3,360	--	--	--	--	--	--	--	--		--		--	--	--	--	2,880	--
Dec. 11-20	3,340	24	14.87	7.24	12.57		4.85	19.36	10.44		.03		2,150	2.92	9,750	36	2,900	7.7
Dec. 21-31	3,560	--	--	--	--	--	--	--	--		--		--	--	--	--	2,910	--
Jan. 1-10, 1951	3,580	--	--	--	--	--	--	--	--		--		--	--	--	--	2,840	--
Jan. 11-20	3,730	21	13.97	7.07	11.48		5.13	17.49	9.87		.03		2,000	2.72	10,150	35	2,750	7.7
Jan. 21-31	3,720	--	--	--	--	--	--	--	--		--		--	--	--	--	2,750	--
Feb. 1-10	3,210	--	--	--	--	--	--	--	--		--		--	--	--	--	2,740	--
Feb. 11-19	2,250	22	14.77	7.98	10.92		5.03	19.44	9.17		.03		2,080	2.83	6,370	32	2,990	7.7
Feb. 20-28	2,280	--	--	--	--	--	--	--	--		--		--	--	--	--	2,990	--
Mar. 1-10	3,120	--	--	--	--	--	--	--	--		--		--	--	--	--	2,810	--
Mar. 11-20	3,240	21	13.37	7.15	11.21		5.05	17.05	9.59		.04		1,950	2.65	6,590	35	2,760	7.9
Mar. 21-31	1,680	--	--	--	--	--	--	--	--		--		--	--	--	--	3,180	--

VIRGIN RIVER BASIN--Continued

VIRGIN RIVER AT LITTLEFIELD, ARIZ.--Continued

Chemical analyses, water year October 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	1,510	--	--	--	--	--	--	--	--		--		--	--	--	--	3,260	--
Apr. 11-20	1,690	24	17.66	6.09	14.85		4.82	23.32	10.44		0.02		2,430	3.30	5,580	38	3,220	7.8
Apr. 21-30	3,740	--	--	--	--	--	--	--	--		--		--	--	--	--	3,000	--
May 1-10	4,100	--	--	--	--	--	--	--	--		--		--	--	--	--	2,520	--
May 11-20	3,450	23	15.37	7.57	10.92		4.88	19.36	9.59		.03		2,090	2.84	9,800	32	2,830	7.8
May 21-31	2,210	--	--	--	--	--	--	--	--		--		--	--	--	--	3,040	--
June 1-10	1,290	--	--	--	--	--	--	--	--		--		--	--	--	--	3,280	--
June 11-20	1,200	24	17.66	10.28	11.39		4.10	24.36	10.86		.01		2,440	3.32	3,980	29	3,230	7.7
June 21-30	1,240	--	--	--	--	--	--	--	--		--		--	--	--	--	3,320	--
July 1-10	1,170	--	--	--	--	--	--	--	--		--		--	--	--	--	3,230	--
July 11-20	1,180	27	17.66	10.53	11.56		4.65	24.15	10.94		.01		2,460	3.35	3,950	29	3,260	7.5
July 21-31	3,520	--	--	--	--	--	--	--	--		--		--	--	--	--	3,270	--
Aug. 1-10	10,450	--	--	--	--	--	--	--	--		--		--	--	--	--	3,180	--
Aug. 11-20	1,270	24	17.66	10.53	10.64		4.36	23.73	10.72		.02		2,400	3.26	4,140	27	3,220	7.5
Aug. 21-31	4,970	--	--	--	--	--	--	--	--		--		--	--	--	--	3,260	--
Sept. 1-10	1,980	--	--	--	--	--	--	--	--		--		--	--	--	--	3,200	--
Sept. 11-20	1,310	24	17.47	10.53	10.93		4.80	23.53	10.58		.02		2,400	3.26	4,270	28	3,220	7.5
Sept. 21-30	2,880	--	--	--	--	--	--	--	--		--		--	--	--	--	3,080	--
Total or weighted average	99,930	--	--	--	--	--	--	--	--		--		--	--	--	--	3,020	--

GILA RIVER BASIN

GILA RIVER AT KELVIN, ARIZ.

LOCATION.--Just above mouth of Mineral Creek, 1,200 feet upstream from gaging station at Kelvin, Pinal County, 17 miles downstream from San Pedro River and 19½ miles upstream from Ashurst-Hayden Dam.
DRAINAGE AREA.--18,000 square miles, of which 5,140 square miles is below Coolidge Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,460 micromhos Jan. 16, 1951; minimum, 554 micromhos Aug. 27, 1951. Percent sodium: Maximum, 62 Aug. 8-10; minimum, 22 June 4-10, 11-20, 21-30.
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 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-10, 1950 ---	138	30	9.08	3.78	9.96	0.17	4.33	11.53	7.22	0.09	0.00	0.1	1,440	1.96	270	43	2,100	7.9
Dec. 11-20 --------	258	28	7.19	3.54	9.83	.19	4.18	8.87	7.39	.09	.00	.1	1,260	1.71	442	47	1,950	7.9
Dec. 21-31 --------	266	32	7.58	3.12	9.52	.16	4.20	9.60	6.43	.10	.03	.20	1,270	1.73	459	47	1,900	7.9
Jan. 1-10, 1951 ----	399	30	7.19	3.12	9.52	.15	4.33	8.47	7.28	.10	.03	.38	1,240	1.69	673	48	1,920	7.9
Jan. 11-20 --------	1,390	23	7.49	4.03	13.05	.26	4.49	7.66	12.35	.06	.04	.36	1,480	2.01	2,800	53	2,390	7.7
Jan. 21-31 --------	1,760	23	7.34	3.62	11.61	.22	4.42	7.52	10.89	.07	.04	.39	1,370	1.86	3,280	51	2,220	7.7
Feb. 1-10 --------	1,690	28	7.58	3.54	10.65	.18	4.33	7.25	10.01	.06	.04	.59	1,310	1.78	3,010	49	2,110	7.5
Feb. 11-20 --------	1,740	28	7.09	3.37	10.52	.17	4.39	6.47	9.87	.06	.02	.32	1,260	1.71	2,980	50	2,060	7.4
Feb. 21-28 --------	1,520	28	6.79	2.88	10.35	.24	4.29	5.93	9.59	.07	.03	.14	1,200	1.63	2,480	51	1,980	7.6
Mar. 1-10 --------	2,040	29	6.74	2.96	10.18	.19	4.28	5.66	9.73	.08	.03	.40	1,190	1.62	3,300	51	1,970	7.5
Mar. 11-20 --------	1,980	30	6.59	3.04	10.96	.15	4.31	5.56	10.44	.08	.03	.36	1,230	1.67	3,310	53	2,030	7.5
Mar. 21-31 --------	2,400	35	6.79	3.04	10.74	.18	4.21	6.56	9.87	.05	.03	.89	1,260	1.71	4,110	52	2,060	7.9
Apr. 1-10 ---------	2,400	35	7.58	3.29	10.70	.25	4.23	7.41	9.87	.05	.03	.35	1,320	1.80	4,310	49	2,110	7.9
Apr. 11-19 --------	1,280	28	5.89	2.88	12.09	.19	4.05	5.62	11.28	.05	.11	.89	1,270	1.73	2,210	57	2,120	7.9
Apr. 20 ----------	387	--	4.44	1.64	4.04		4.83	2.52	2.74	--	.03	--	567	.77	298	40	961	7.2
Apr. 21-30 --------	1,570	30	5.74	2.88	12.26	.26	3.82	5.33	11.85	.08	.04	.34	1,270	1.73	2,710	58	2,150	7.6
May 1-10 ---------	1,100	34	5.59	2.96	13.05	.28	3.67	5.68	12.27	.08	.03	.36	1,310	1.78	1,960	60	2,230	7.9
May 11-20 --------	512	34	5.29	3.21	13.29	.26	3.90	6.70	12.13	.08	.02	.43	1,390	1.89	968	58	2,280	7.9
May 21-31 --------	112	37	8.83	3.87	11.52	.26	4.08	10.31	9.73	.07	.02	.38	1,500	2.04	228	47	2,290	7.8

GILA RIVER BASIN--Continued

GILA RIVER AT KELVIN, ARIZ.--Continued

Chemical analyses, December 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	18	43	15.32	6.00	6.17	0.18	5.19	16.95	5.50	0.04	0.04	0.40	1,740	2.37	43	22	2,280	7.8
June 11-20	12	39	14.72	5.76	5.91	.21	5.26	15.41	5.64	.05	.05	.30	1,650	2.24	27	22	2,250	7.6
June 21-30	13	42	15.07	6.09	5.91	.17	4.97	16.80	5.36	.04	.03	.32	1,710	2.33	30	22	2,280	7.5
July 1-3, 8-15	33	41	13.57	5.43	6.44	.14	5.01	14.66	5.36	.06	.04	.32	1,580	2.15	71	25	2,150	7.6
July 4-7	449	43	5.34	2.30	5.26	.20	6.87	4.66	1.55	.05	.04	.30	796	1.08	486	40	1,180	7.8
July 16-20	1,170	29	9.73	2.06	4.09	.25	3.75	10.12	2.12	.03	.03	.18	1,030	1.40	1,640	25	1,410	7.3
July 21-23	22	32	8.08	2.30	5.91	.43	4.05	7.66	4.74	.06	.04	--	1,040	1.41	31	35	1,550	--
July 24-31	1,050	32	5.74	1.73	2.52	.28	7.26	1.79	1.16	.04	.10	.10	590	.80	843	25	925	7.4
Aug. 1-7	15,750	36	5.29	1.89	4.35	.26	7.46	.87	3.41	.04	.10	.12	670	.91	14,350	37	1,110	7.6
Aug. 8-10	944	46	5.54	2.63	14.13	.46	3.72	4.83	13.68	.07	.10	--	1,370	1.86	1,760	62	2,280	--
Aug. 11-20	4,700	28	6.84	2.47	7.83	.28	3.82	6.79	6.46	.05	.05	.22	1,060	1.44	6,780	45	1,660	7.5
Aug. 26-28	7,130	25	2.99	.90	1.92		3.52	1.29	.96	.03	.01	--	343	.47	3,330	33	559	--
Aug. 21-25, 29-31	2,990	28	5.39	1.64	5.57	.25	4.16	4.33	4.12	.05	.04	.15	776	1.06	3,160	43	1,230	7.6
Sept. 1-5	1,110	28	6.49	2.14	6.00	.15	3.87	5.91	5.08	.05	.06	.19	912	1.24	1,380	41	1,440	7.7
Sept. 6-12	3,510	21	2.69	.90	4.48	.20	3.02	1.81	3.44	.05	.03	.32	500	.68	2,390	54	853	7.7
Sept. 13-20	2,590	24	4.19	1.56	4.78	.16	3.34	3.68	3.75	.05	.02	.28	656	.89	2,310	45	1,080	7.8
Sept. 21-30	397	32	8.03	3.04	7.57	.17	4.54	7.49	6.49	.07	.02	.20	1,140	1.55	616	40	1,840	8.0
Total or weighted average	64,820	29	5.64	2.22	6.96	0.23	4.85	4.08	5.95	0.05	0.05	0.28	896	1.22	79,040	46	1,460	--

GILA RIVER BELOW GILLESPIE DAM, ARIZ.

LOCATION.--At gaging station on Gillespie Canal 200 feet downstream from Gillespie Dam, Maricopa County.
DRAINAGE AREA.--49,600 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951.
Water temperatures: December 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 9,580 micromhos Sept. 30; minimum, 420 micromhos Sept. 1.
Percent sodium: Maximum, 69 Aug. 6-10; minimum, 39 Sept. 1.
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. Samples from canal are believed to be representative of total flow passing Gillespie Dam including spill and amounts diverted into Gillespie and Enterprise canals. Records of separate and combined discharge for the river and canals for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-10, 1950	791	32	19.26	12.58	60.88	0.08	6.60	23.94	62.89	0.08	0.65	2.8	5,590	7.60	6,010	66	8,670	7.3
Dec. 11-20	890	30	19.06	12.83	60.44	.04	6.57	23.94	62.05	.13	.63	3.1	5,550	7.55	6,720	65	8,580	7.6
Dec. 21-31	974	30	18.56	12.50	59.57	.04	6.01	23.73	61.77	.13	.63	2.8	5,480	7.45	7,260	66	8,420	7.8
Jan. 1-10, 1951	1,020	32	18.96	13.98	61.31	.19	6.46	24.36	61.77	.13	.66	2.4	5,600	7.62	7,770	65	8,620	7.4
Jan. 11-20	1,120	28	17.76	13.24	57.83	.19	6.19	22.90	58.38	.12	.68	2.5	5,280	7.18	8,040	65	8,140	7.6
Jan. 21-30	1,280	29	18.26	13.49	58.70	.18	6.33	23.32	59.79	.12	.69	2.3	5,390	7.33	9,380	65	8,330	7.7
Jan. 31	734	16	7.78	3.70	16.87	--	3.57	7.41	17.77	--	.04	1.0	1,700	2.31	1,700	60	2,860	--
Feb. 1-4	1,160	20	9.88	7.07	29.74	.18	3.87	11.70	30.18	.06	.44	1.2	2,770	3.77	4,370	63	4,570	7.5
Feb. 5-10	995	28	17.56	12.50	56.09	.24	6.15	21.65	56.12	.11	.65	2.3	5,090	6.92	6,890	65	7,860	7.5
Feb. 11-20	1,350	34	18.31	12.91	56.53	.13	6.29	22.69	58.10	.13	.65	2.9	5,240	7.13	9,620	64	8,330	7.7
Feb. 21-28	1,010	32	18.21	12.83	56.96	.15	6.21	22.90	59.51	.13	.87	3.3	5,320	7.24	7,310	65	8,400	7.8
Mar. 1-10	1,200	34	17.91	12.83	57.83	.15	6.05	22.07	60.64	.13	.71	3.2	5,320	7.24	8,680	65	8,450	7.7
Mar. 11-20	1,120	33	18.41	12.66	57.83	.09	5.38	23.11	61.20	.13	.76	3.4	5,380	7.32	8,190	65	8,510	7.7
Mar. 21-27, 29-31	1,160	29	17.96	12.42	57.40	.13	5.98	22.48	59.79	.13	.65	3.0	5,290	7.19	8,350	65	8,330	7.7
Mar. 28	186	27	10.08	6.58	30.85		3.69	12.32	31.02	.06	.42	--	2,850	3.88	721	65	4,610	--
Apr. 1-10	1,040	30	19.16	12.83	60.01	.24	6.36	23.53	60.92	.12	.35	2.5	5,460	7.43	7,720	65	8,460	7.7
Apr. 11-20	1,050	32	18.86	12.83	60.01	.23	6.26	23.11	60.92	.12	.39	2.6	5,440	7.40	7,770	65	8,410	7.7
Apr. 21-30	988	37	18.76	12.83	59.57	.18	6.29	23.32	60.07	.12	.34	2.5	5,410	7.36	7,270	65	8,360	7.8

GILA RIVER BASIN--Continued

GILA RIVER BELOW GILLESPIE DAM, ARIZ.--Continued

Chemical analyses, December 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	912	33	19.26	12.83	59.14	0.24	6.10	23.53	61.20	0.12	0.35	2.5	5,450	7.41	6,760	65	8,460	7.6
May 11-20	853	37	18.86	12.83	60.44	.17	6.01	23.94	60.92	.14	.39	2.6	5,490	7.47	6,370	65	8,430	7.7
May 21-31	779	39	18.36	12.75	60.44	.18	5.56	23.73	60.64	.13	.37	2.5	5,440	7.40	5,760	66	8,360	7.7
June 1-10	591	27	17.96	13.40	59.57	.17	5.51	23.53	60.92	.12	.77	3.2	5,430	7.38	4,360	65	8,430	7.6
June 11-20	462	28	17.76	13.08	59.14	.21	5.41	23.32	60.64	.12	.68	2.7	5,390	7.33	3,390	66	8,370	7.6
June 21-30	357	23	17.47	12.91	60.01	.15	5.13	23.73	61.77	.12	.58	2.8	5,440	7.40	2,640	66	8,410	7.7
July 1-10	351	24	17.76	12.83	60.01	.19	5.15	24.15	61.48	.12	.71	2.9	5,460	7.43	2,610	66	8,500	7.7
July 11-20	432	33	17.27	12.83	60.88	.20	4.87	23.73	61.77	.12	.50	3.0	5,450	7.41	3,200	67	8,410	7.6
July 28-31	3,620	72	6.49	2.96	13.87	.25	a3.85	6.04	13.54	.06	.09	1.0	1,460	1.99	7,190	59	2,380	8.6
July 21-27, Aug. 2	474	59	15.47	10.69	50.01	.12	4.29	20.57	51.89	.11	.37	2.5	4,640	6.31	2,990	66	7,310	7.8
Aug. 1-3	821	95	6.49	3.78	19.00	.25	b4.13	8.39	16.92	.07	.23	--	1,860	2.53	2,080	64	2,980	8.5
Aug. 4-5	8,230	52	2.94	.90	3.70	.23	c3.10	1.39	3.10	.04	.01	--	487	.66	5,450	48	810	8.3
Aug. 6-10	7,270	37	3.09	1.07	9.74	.15	3.85	4.16	6.06	.05	.05	.75	877	1.19	8,670	69	1,450	7.9
Aug. 16-17	696	23	8.18	5.18	22.22	.23	3.31	8.74	22.99	.05	.13	--	2,110	2.87	2,000	62	3,540	7.7
Aug. 11-15, 18-26	2,410	31	18.76	12.58	56.09	.17	5.74	22.69	58.66	.09	.39	2.4	5,220	7.10	1,710	64	8,140	7.5
Aug. 27	1,160	30	5.04	2.14	7.74	.23	4.88	2.25	7.90	.03	.02	.75	881	1.20	1,390	51	1,550	7.2
Aug. 28-31	67,420	14	2.74	.76	3.35	.14	2.59	1.46	2.96	.03	.05	.32	417	.57	38,230	48	727	7.2
Sept. 1	9,200	20	2.05	.65	1.71		2.74	.81	.76	--	.10	--	262	.36	3,280	39	420	--
Sept. 2	5,040	23	2.10	.79	5.96	--	2.95	2.52	3.24	--	.10	--	543	.74	3,720	67	900	--
Sept. 3-4	2,010	25	8.33	4.77	22.87	.22	4.92	8.39	22.28	.07	.19	--	2,140	2.91	5,850	63	3,570	7.9
Sept. 5-10	2,950	34	20.36	14.88	61.31	.14	6.95	22.07	65.43	.09	.42	2.4	5,660	7.70	22,710	63	8,880	7.9
Sept. 11-20	3,440	39	20.36	15.21	62.62	.24	6.21	22.90	67.41	.11	.45	2.8	5,790	7.87	27,090	64	9,070	7.7
Sept. 21-30	1,990	36	20.06	16.12	65.66	.19	5.70	24.77	69.10	.12	.60	3.0	6,000	8.16	16,240	64	9,370	7.6
Total or weighted average	139,600	25	6.74	3.95	17.70	0.16	3.62	7.00	17.49	0.06	0.18	--	1,700	2.31	322,800	62	2,710	--

a Includes 0.60 equivalents per million of carbonate (CO_3).
b Includes 0.87 equivalents per million of carbonate (CO_3).
c Includes 0.23 equivalents per million of carbonate (CO_3).

SALT RIVER AT STEWART MOUNTAIN DAM, ARIZ.

LOCATION.--Just below dam, 3½ miles above gaging station below Stewart Mountain Dam, which is 6 miles upstream from Verde River, Maricopa County.
DRAINAGE AREA.--6,240 square miles, above gaging station.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951.
Water temperatures: December 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 2,490 micromhos Aug. 20; minimum, 1,110 micromhos Sept. 4-6.
Percent sodium: Maximum, 76 July 21-31, Aug. 11-20, Aug. 21-28; minimum, 65 Jan. 11-20, Jan. 21-31, Feb. 1-10.
REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Discharge records for gaging station below Stewart Mountain Dam for water year October 1950 to September 1951 given in Water-Supply Paper 1213. No appreciable inflow between sampling point and gaging station except during periods of heavy rains.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 9-20, 1950	8,230	11	2.64	1.40	8.52	0.13	2.74	1.00	8.74	0.02	0.05	0.24	736	1.00	8,230	67	1,350	7.6
Jan. 1-10, 1951	3,070	13	2.74	1.40	8.39	.18	2.85	1.02	8.74	.02	.03	.20	746	1.01	3,110	66	1,360	7.3
Jan. 11-20	204	14	2.94	1.48	8.65	.18	3.00	.94	9.03	.02	.03	.79	a754	1.03	209	65	1,410	7.3
Jan. 21-31	242	14	2.84	1.56	8.57	.20	2.98	1.02	9.03	.02	.03	.54	a756	1.03	249	65	1,420	7.2
Feb. 1-10	220	14	2.89	1.64	8.65	.18	2.97	1.23	9.03	.02	.03	.49	a768	1.04	230	65	1,430	7.3
Feb. 11-20	272	14	2.89	1.56	9.04	.17	3.00	1.15	9.73	.02	.05	.40	a799	1.09	296	66	1,490	7.8
Feb. 21-28	2,630	12	2.84	1.40	9.35	.13	2.95	1.08	9.87	.02	.05	.17	821	1.12	2,940	68	1,500	8.0
Mar. 1-10	6,480	12	2.79	1.40	9.39	.15	2.93	1.12	9.87	.02	.05	.30	824	1.12	7,260	68	1,510	7.7
Mar. 11-20	18,400	11	2.99	1.56	10.87	.15	3.02	1.21	11.42	.02	.05	.21	928	1.26	23,180	70	1,700	7.8
Mar. 21-31	22,390	12	3.09	1.64	12.26	.16	3.15	1.31	12.97	.02	.04	.20	1,030	1.40	31,360	71	1,880	7.9
Apr. 1-10	12,700	12	2.99	1.64	12.87	.17	3.20	1.33	13.11	.02	.03	.20	a1,040	1.41	17,980	73	1,910	7.9
Apr. 11-20	16,980	10	2.99	1.64	12.44	.18	3.18	1.31	12.83	.02	.03	.26	1,020	1.39	23,550	72	1,880	7.8
Apr. 21-30	8,020	10	2.99	1.64	12.35	.17	3.20	1.29	12.69	.02	.03	.20	989	1.35	10,790	72	1,850	7.8
May 1-10	5,030	14	3.04	1.73	12.39	.18	3.28	1.33	12.83	.02	.02	.28	1,020	1.39	6,980	71	1,860	7.9
May 11-20	5,760	14	3.04	1.73	12.22	.16	3.21	1.31	12.69	.02	.03	.20	a993	1.35	7,780	71	1,840	8.0
May 21-31	13,950	12	2.94	1.64	12.09	.18	3.18	1.29	12.69	.02	.02	.20	997	1.36	18,910	72	1,820	7.9

a Computed as sum of dissolved constituents.

GILA RIVER BASIN--Continued

SALT RIVER AT STEWART MOUNTAIN DAM, ARIZ.--Continued

Chemical analyses, December 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	21,440	12	2.94	1.64	12.05	0.17	3.16	1.31	12.55	0.02	0.03	0.28	1,000	1.36	29,160	72	1,820	8.0
June 11-20	23,690	11	2.94	1.64	12.26	.17	3.13	1.29	12.69	.02	.03	.20	1,000	1.36	32,220	72	1,840	7.7
June 21-30	28,800	11	2.99	1.73	12.48	.14	3.11	1.31	12.69	.02	.02	.19	1,010	1.37	39,560	72	1,860	7.9
July 1-10	26,730	14	2.94	1.73	12.78	.17	3.13	1.33	13.26	.02	.02	.19	a1,040	1.41	37,810	73	1,890	7.8
July 11-20	33,240	25	2.89	1.81	13.09	.18	3.15	1.37	13.40	.02	.02	.14	a1,060	1.44	47,920	73	1,920	7.9
July 21-31	26,340	--	2.40	1.89	13.96	.20	2.90	1.46	13.96	.03	.07	.30	1,130	1.54	40,480	76	1,980	8.2
Aug. 1-10	11,300	22	2.89	1.89	14.22	.18	3.03	1.35	14.52	.03	.03	.30	1,140	1.55	17,520	74	2,090	7.4
Aug. 11-20	28,280	20	3.04	2.06	16.52	.21	2.95	1.62	16.92	.03	.04	.32	a1,280	1.74	49,230	76	2,330	7.5
Aug. 21-28	20,480	21	2.99	2.14	16.61	.23	2.87	1.67	17.20	.03	.05	.35	1,300	1.77	36,210	76	2,340	7.5
Aug. 29-31, Sept. 1-10	613	18	1.95	1.07	7.31	.20	1.84	.92	7.61	.03	.04	.24	636	.86	530	69	1,160	7.7
Sept. 11-20	186	21	2.05	1.23	7.52	--	1.93	.94	7.76	--	.05	--	a631	.86	160	70	1,170	--
Sept. 21-30	172	21	2.20	1.32	8.44	.20	2.18	.96	8.69	.03	.08	.35	713	.97	167	69	1,290	7.6
Total or weighted average	345,800	18	2.89	1.73	12.91	0.18	3.06	1.35	13.31	0.02	0.03	0.23	1,050	1.43	494,000	73	1,910	--

a Computed as sum of dissolved constituents.

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.--6,160 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951.
Water temperatures: December 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 725 micromhos June 28; minimum, 251 micromhos Sept. 17.
Percent sodium: Maximum, 31 July 21-31; minimum, 14 Sept. 11-20.
REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, New Mexico. Values reported for dissolved solids concentrations are residue on evaporation. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1213.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1950---	2,910	22	2.20	3.21	1.74	0.08	4.70	1.67	0.87	0.02	0.02	0.25	402	0.55	1,590	24	642	8.0
Dec. 21-31 --------	8,640	23	2.40	3.12	1.65	.07	4.92	1.54	.79	.02	.02	.42	392	.53	4,610	23	648	8.0
Jan. 1-10, 1951 ----	4,120	22	2.15	3.21	1.70	.16	4.77	1.52	.76	.02	.01	.27	393	.53	2,200	24	638	8.0
Jan. 11-20 --------	4,080	22	2.15	3.12	1.65	.16	4.74	1.46	.76	.01	.00	.13	387	.53	2,150	23	622	8.1
Jan. 21-31 --------	4,340	22	2.15	3.04	1.61	.13	4.70	1.39	.71	.02	.00	.19	370	.50	2,180	23	615	8.1
Feb. 1-10 ---------	2,350	20	2.35	2.86	1.52	.14	4.67	1.39	.68	.02	.01	.15	365	.50	1,170	22	611	8.1
Feb. 11-20 --------	5,120	24	2.20	3.12	1.57	.15	4.70	1.50	.79	.02	.02	.27	400	.54	2,790	22	641	7.9
Feb. 21-28 --------	3,380	24	2.40	3.12	1.52	.17	4.83	1.52	.76	.02	.02	.44	398	.54	1,830	21	651	8.1
Mar. 1-10 ---------	5,580	24	2.40	2.88	1.48	.13	4.79	1.37	.71	.02	.01	.37	384	.52	2,910	21	629	8.0
Mar. 11-20 --------	8,700	24	2.50	3.04	1.39	.15	4.70	1.44	.76	.02	.02	.34	390	.53	4,610	20	630	8.0
Mar. 21-31 --------	4,660	26	2.40	2.88	1.43	.11	4.69	1.37	.71	.02	.01	.17	384	.52	2,430	21	624	7.9
Apr. 1-10 ---------	1,760	22	2.30	2.96	1.39	.18	4.61	1.48	.71	.02	.01	.17	383	.52	917	20	626	7.8
Apr. 11-20 --------	4,150	24	2.20	3.04	1.43	.11	4.59	1.52	.68	.02	.02	.52	379	.52	2,140	21	635	8.0
Apr. 21-30 --------	4,150	24	2.25	3.04	1.74	.13	4.67	1.62	.76	.02	.01	.08	397	.54	2,240	24	647	8.0
May 1-10 ---------	8,470	26	2.10	2.96	1.74	.09	4.47	1.58	.79	.02	.01	.25	381	.52	4,390	25	626	8.2
May 11-20 --------	6,710	23	2.10	2.47	1.39	.12	4.11	1.25	.62	.02	.02	.21	339	.46	3,090	23	551	8.2
May 21-31 --------	5,990	24	2.20	2.71	1.57	.08	4.38	1.46	.71	.02	.02	.22	367	.50	2,990	24	602	8.2

GILA RIVER BASIN--Continued

VERDE RIVER BELOW BARTLETT DAM, ARIZ.--Continued

Chemical analyses, December 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951-----	1,950	29	2.25	3.12	2.04	0.13	4.63	1.89	0.85	0.02	0.02	0.26	426	0.58	1,130	27	683	8.2
June 11-20 --------	1,680	33	2.20	3.21	2.09	.14	4.68	2.04	.93	.01	.02	.27	437	.59	998	27	700	8.0
June 21-30 --------	1,970	26	2.10	3.29	2.22	.15	4.63	2.12	.99	.02	.01	.32	449	.61	1,200	29	701	8.2
July 1-10----------	2,440	24	2.00	3.29	2.22	.14	4.42	2.21	1.04	.02	.01	.38	438	.60	1,450	29	710	8.2
July 11-20 --------	1,610	27	2.00	3.37	2.09	.15	4.39	2.23	1.07	.02	.01	.27	450	.61	985	27	718	8.3
July 21-31 ---------	1,720	29	1.75	3.12	2.30	.16	3.97	2.21	1.04	.03	.02	.18	416	.57	973	31	681	8.2
Aug. 1-10 ---------	1,610	33	1.95	2.96	2.09	.18	4.18	2.00	.85	.03	.02	.22	417	.57	913	29	658	8.1
Aug. 11-20 --------	2,500	33	2.15	2.96	1.87	.18	4.42	1.79	.82	.02	.02	.22	412	.56	1,400	26	649	8.2
Aug. 21-31 --------	2,760	24	2.20	2.47	1.74	.16	4.08	1.60	.73	.02	.03	.17	364	.50	1,370	26	601	8.0
Sept. 1-10 --------	9,870	20	1.50	.90	.61	.12	2.20	.52	.23	.03	.09	.08	191	.26	2,560	19	296	7.8
Sept. 11-20--------	33,000	22	1.60	.90	.43	.13	2.31	.44	.20	.02	.05	.09	190	.26	8,530	14	289	7.8
Sept. 21-30 -------	16,240	22	1.70	1.15	.52	.11	2.65	.56	.24	.02	.02	.09	218	.30	4,810	15	330	7.9
Total or weighted average-	162,700	23	2.00	2.22	1.22	0.13	3.79	1.17	0.56	0.02	0.03	0.21	318	0.43	70,560	22	513	--

OUTFLOW FROM LAKE PLEASANT, ARIZ.

LOCATION.--At water-stage recorder on Canal 1¼ miles downstream from Lake Pleasant Dam on Agua Fria River, 23 miles upstream from New River and 19 miles north of Marinette, Maricopa County.
DRAINAGE AREA.--1,460 square miles (above Lake Pleasant).
RECORDS AVAILABLE.--December 1950 to September 1951.
REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Records of discharge for Agua Fria River at Lake Pleasant Dam for water year December 1950 to September 1951 given in Water-Supply Paper 1213. (Samples for which no discharge is shown were collected at surface of lake at the dam during periods of no release). The only flow in canal during period was Aug. 24-27.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 8, 14, 21, 29, 1950	--	12	3.64	3.54	5.91	0.20	6.33	1.98	4.77	0.02	0.02	0.35	749	1.02	--	44	1,260	7.7
Jan. 5, 12, 19, 1951	--	11	4.04	3.62	5.96	.16	6.57	2.02	4.91	.02	.05	.32	776	1.06	--	43	1,310	7.5
Feb. 9, 16, 23	--	8.8	2.20	1.64	2.22	.13	2.25	2.06	1.83	.02	.10	.65	383	.52	--	36	633	7.2
Mar. 2, 9, 16, 23, 30	--	9.2	2.20	1.81	2.74	.15	2.67	2.04	2.17	.02	.03	.20	421	.57	--	40	702	7.3
Apr. 6, 10, 20, 27	--	9.3	2.89	2.14	3.26	.18	3.61	2.23	2.48	.02	.02	.20	492	.67	--	38	822	7.3
May 4, 11, 18, 25	--	8.5	3.19	2.63	3.52	.16	4.48	2.48	2.71	.02	.01	.33	553	.75	--	37	935	7.9
June 1, 8, 15, 29	--	7.4	3.49	2.88	4.26	.18	4.92	2.79	3.27	.02	.00	.28	632	.86	--	39	1,060	7.8
July 6, 13, 20, 27	--	13	3.49	3.21	4.61	.21	5.06	3.00	3.27	.04	.01	.42	691	.94	--	40	1,140	7.8
Aug. 3, 10, 11	--	13	2.05	.99	1.22	.12	2.93	.67	.71	.03	.01	.1	242	.33	--	28	389	7.4
Aug. 24-27	453	12	1.75	.74	.57	.09	2.44	.33	.39	.02	.01	.05	190	.26	117	18	301	7.3
Sept. 7, 14, 21, 28	--	29	1.55	.45	.43	.08	1.85	.42	.14	.03	.04	.1	176	.24	--	17	237	8.4
Total or weighted average	453	--	--	--	--	--	--	--	--	--	--	--	--	--	117	--	--	--

Part 10. THE GREAT BASIN

SEVIER LAKE BASIN

SEVIER RIVER NEAR LYNNDYL, UTAH

LOCATION.--At bridge on State Highway 125, 1½ miles upstream from gaging station, which is 3½ miles southwest of Lynndyl, Millard County.
DRAINAGE AREA.--6,270 square miles above gaging station.
RECORDS AVAILABLE.--Chemical analyses: March to September 1951.
Water temperatures: March to September 1951.
EXTREMES, March to September 1951.--Specific conductance: Maximum, 3,710 micromhos Sept. 24; minimum, 1,510 micromhos Apr. 18.
Percent sodium: Maximum, 60 Sept. 11-20; minimum, 48 Mar. 22-31.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1214.

Chemical analyses, March to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 22-31, 1951	914	20	5.24	7.89	12.13	0.23	5.31	7.70	12.69	0.00	0.04		1,490	2.03	1,860	48	2,420	7.9
Apr. 1-10	988	17	5.09	7.81	12.57	.28	5.11	7.74	12.83	.00	.03		1,500	2.04	2,020	49	2,440	7.8
Apr. 11-17, 19-20	1,720	21	4.89	7.89	12.87	.41	5.10	7.97	12.97	.01	.06		1,530	2.08	3,580	49	2,450	7.9
Apr. 18 a	349	--	--	--	--	--	--	--	--	--	--		--	--	--	--	1,510	--
Apr. 21-30	7,840	29	4.39	7.57	14.78	--	5.15	8.81	13.11	--	.16		1,600	2.18	17,090	55	2,560	7.8
May 1-10 a	10,450	--	--	--	--	--	--	--	--	--	--		--	--	--	--	2,610	--
May 11-20	10,010	29	4.49	7.81	16.05	--	5.29	9.20	13.82	--	.16		1,680	2.28	22,820	57	2,690	--
May 21-31 a	6,660	--	--	--	--	--	--	--	--	--	--		--	--	--	--	2,750	--
June 1-10	9,280	28	4.39	7.89	15.52	.26	5.05	9.18	13.68	.02	.26		1,670	2.27	21,070	55	2,680	7.6
June 11-20	6,300	27	4.19	7.89	15.61	.26	4.88	9.01	13.82	.02	.26		1,660	2.26	14,240	56	2,660	7.7
June 21-30	8,770	29	4.19	7.89	15.31	.26	4.79	9.14	13.96	.02	.26		1,670	2.27	19,910	55	2,680	7.9
July 1-10	12,020	26	4.14	8.14	16.39	.26	4.82	9.62	14.52	.02	.26		1,730	2.35	28,250	57	2,790	7.8
July 11-20	11,060	25	4.09	8.31	16.83	.31	4.82	9.81	15.17	.02	.26		1,780	2.42	26,770	57	2,840	7.8
July 21-31	3,790	25	4.04	8.55	16.96	.20	4.72	9.85	15.51	.02	.23		1,790	2.43	9,210	57	2,890	7.9
Aug. 1-10	3,220	27	4.19	8.72	17.78	.31	4.62	10.45	16.41	.01	.08		1,870	2.54	8,180	57	2,980	7.8
Aug. 11-20	5,770	26	3.79	8.80	18.35	.31	4.72	10.39	16.58	.01	.09		1,880	2.56	14,770	59	2,940	7.9
Aug. 21-31	6,020	27	4.04	8.39	18.70	.31	4.82	10.41	16.64	.01	.09		1,890	2.57	15,470	59	2,970	7.9

a Not included for computation of weighted averages.

Sept. 1-10 ----------	4,210	26	3.99	8.88	19.00	.31	4.85	10.60	17.20	.01	.09		1,930	2.62	11,030	59	3,030	7.8
Sept. 11-20 ----------	3,720	25	3.99	9.13	20.31	.36	5.01	10.74	17.91	.02	.08		2,000	2.72	10,120	60	3,120	7.9
Sept. 21-30 ----------	2,480	21	4.49	9.54	20.05	.31	5.28	10.81	18.61	.02	.09		2,040	2.77	6,870	58	3,210	7.9
Total or weighted average---	(b)	27	4.24	8.22	16.57	0.28	4.93	9.60	14.86	0.02	0.19		1,750	2.38	233,300	57	2,790	--

b For computation of the weighted averages the total discharge corresponding to 98,110 acre-feet was used. This represents 75 percent of the runoff for the water year October 1950 to September 1951.

Part 11. PACIFIC SLOPE BASINS IN CALIFORNIA

SAN JOAQUIN RIVER BASIN

SAN JOAQUIN RIVER MAIN STEM

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.
RECORDS AVAILABLE.--Chemical analyses: Single sample Dec. 2, 1950, daily samples March to September 1951.
Water temperatures: Single sample Dec. 2, 1950, daily samples March to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 851 micromhos Aug. 3; minimum, 81.8 micromhos May 30.
Percent sodium: Maximum, 50 July 11-20, Sept. 11-20; minimum, 35 May 23-31.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1215.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 2, 1950	21,420	13	0.50	0.35	0.64		0.84	0.21	0.42	--	0.03		a94	0.13	2,780	43	136	--
Mar. 1-10, 1951	174,600	19	.70	.53	0.91	0.09	1.03	.37	.79	0.02	.01		141	.19	33,170	41	228	7.4
Mar. 11-20	155,200	19	.80	.60	1.09	.10	1.15	.48	.99	.02	.01		159	.22	34,140	42	265	7.4
Mar. 21-30	138,400	17	.80	.67	.13	.11	1.10	.50	1.04	.01	.01		170	.23	31,830	42	285	7.1
Mar. 31, Apr. 1-10	65,870	21	1.40	1.15	2.41		1.64	.85	2.43	.01	.03		315	.43	28,240	49	528	7.3
Apr. 11-12	7,220	24	--	--	--	--	1.98	1.02	3.41	.01	.04		--	--	--	--	686	7.3
Apr. 13-20	47,920	20	1.00	.77	1.69		1.33	.48	1.64	.01	.02		214	.29	13,900	49	356	7.5
Apr. 21-22, 27-28	15,290	24	1.50	1.23	2.58		1.87	.75	2.65	.02	.03		336	.46	7,030	49	560	7.4
Apr. 23-26, 29-30	31,160	21	1.05	.79	1.70		1.39	.48	1.64	.01	.02		221	.30	9,350	48	374	7.4
May 1-10	113,700	18	.65	.45	.78	.07	.98	.21	.71	.01	.02		122	.17	19,330	40	197	7.4
May 11-20	77,380	20	.90	.66	1.26	.07	1.20	.42	1.24	.01	.02		177	.24	18,570	44	298	7.5
May 21-22	22,450	--	--	--	--	--	.98	.29	.99	--	--		--	--	--	--	239	7.6
May 23-31	187,600	13	.36	.25	.35	.05	.56	.11	.34	.01	.01		69	.09	16,880	35	101	7.1

a Sum of determined constituents.

June 1-3	45,680	14	--	--	--	--	.75	.20	.51	--	.01		--	--	--	--	156	6.8
June 4-5	14,420	20	--	--	--	--	1.18	.40	1.02	--	.02		--	--	--	--	269	7.4
June 6-15	52,540	23	1.10	.82	1.83	.12	1.44	.58	1.75	.01	.02		239	.33	17,340	47	406	7.1
June 16-20	38,220	14	--	--	--	--	.72	.23	.68	--	.01		--	--	--	--	175	7.1
June 21-23	19,740	15	--	--	--	--	.95	.31	1.02	--	.02		--	--	--	--	245	7.0
June 24-29	25,310	22	1.35	1.07	2.22	.09	1.61	.65	2.37	--	.03		a282	.38	9,620	47	496	7.1
June 30, July 1-10	25,310	29	2.10	1.56	3.65	.12	2.36	.94	4.00	.01	.03		446	.61	15,440	49	764	7.4
July 11-20	17,780	29	2.10	1.56	3.74	.10	2.52	.85	4.06	.01	.01		448	.61	10,850	50	777	7.5
July 21-31	13,130	33	2.05	1.56	3.48	.14	2.49	.60	4.26	.02	.01		451	.61	8,010	48	768	7.5
Aug. 1-10	11,350	33	2.30	1.56	3.52	.13	2.62	.77	4.20	.02	.01		477	.65	7,380	47	792	7.5
Aug. 11-20	14,790	34	2.15	1.48	3.57	.10	2.69	.87	3.84	.01	.02		451	.61	9,020	49	765	7.5
Aug. 21-31	20,560	34	2.05	1.48	3.48	.13	2.65	.83	3.64	.02	.02		437	.59	12,130	49	739	7.5
Sept. 1-10	19,960	33	1.95	1.40	3.30	.12	2.62	.85	3.30	.02	.03		410	.56	11,180	49	699	7.5
Sept. 11-20	18,450	35	2.00	1.40	3.50	.11	2.62	.87	3.41	.02	.03		426	.58	10,700	50	724	7.6
Sept. 21-30	23,160	34	1.90	1.40	3.22	.14	2.61	.85	3.19	.02	.04		406	.55	12,740	48	690	7.6
Total	b1,418,000	--	--	--	--	--	--	--	--	--	--		--	--	339,600	--	--	--

a Sum of determined constituents.
b Represents 30 percent of runoff for water year October 1950 to September 1951.

CALAVERAS RIVER BASIN

STOCKTON DIVERTING CANAL AT STOCKTON, CALIF.

LOCATION.--Just upstream from bridge on Sanguinetti Lane, at north edge of Stockton, San Joaquin County, in Campo de Los Franceses Grant and about 200 feet upstream from gaging station.

RECORDS AVAILABLE.--Chemical analyses: March to September 1951.
Water temperatures: March to September 1951.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1215. Many days in November, April to July, and entire months of October, August, and September reported no flow.

Chemical analyses, March to July 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951 ----	28,030	21	0.70	0.58	0.22	0.08	1.31	0.21	0.10	0.02	0.01		103	0.14	3,920	14	156	7.4
Mar. 11-17, 19-20 --	7,910	23	.80	.62	.24	.07	1.44	.25	.11	.02	.01		116	.16	1,270	14	176	7.4
Mar. 21-31 ---------	2,690	24	.95	.70	.27	.07	1.57	.31	.12	.02	.01		122	.17	457	14	186	7.6
Apr. 1-5, 7-9 ------	108	21	1.05	.81	.30	.11	1.72	.31	.16	.02	.00		133	.18	19	13	209	7.4
Apr. 30, May 1-2, 5-7	18	18	1.25	.90	.31	.12	1.93	.40	.23	.01	.02		151	.21	4	12	245	7.4
June 14-16, 18-19 ---	114	26	1.15	.75	.37	.06	1.95	.25	.13	.02	.01		146	.20	23	16	221	8.2
June 21, 23-24, 26, 28	48	23	1.15	.77	.37	.06	1.97	.27	.16	.02	.01		146	.20	10	16	224	8.2
July 13, 15, 23-24 --	88	18	1.20	.81	.39	.07	2.02	.27	.17	.02	.02		146	.20	18	16	234	8.2

MOKELUMNE RIVER BASIN

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: Single sample Dec. 1, 1950, daily samples March to September 1951.
Water temperatures: Single sample Dec. 1, 1950, daily samples March to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 74.1 micromhos Sept. 4; minimum, 33.1 micromhos Dec. 1.
Percent sodium: Maximum, 22 June 1-10; minimum, 14 Apr. 1-20.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, California. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1215.

Chemical analyses, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1, 1950 ------	4,720	8.3	--	--	--	--	0.31	0.09	0.06	--	0.01		--	--	--	--	33.1	--
Mar. 1-10, 1951 ---	27,610	14	0.30	0.19	0.13	0.13	.52	.13	.08	0.02	.01		51	0.07	1,930	17	64.6	7.4
Mar. 11-20--------	33,520	13	.31	.17	.12	.10	.49	.11	.08	.02	.01		51	.07	2,350	17	62.7	7.4
Mar. 21-31--------	35,840	13	.31	.20	.11	.09	.48	.10	.06	.02	.01		53	.07	2,510	16	63.3	7.0
Apr. 1-10---------	10,770	12	.31	.21	.10	.09	.48	.10	.06	.02	.01		53	.07	754	14	63.2	6.8
Apr. 11-20--------	16,070	12	.30	.19	.10	.09	.46	.08	.06	.02	.01		50	.06	964	14	59.3	6.8
Apr. 21-30--------	20,020	13	.30	.17	.11	.06	.48	.08	.06	.01	.01		43	.06	1,200	17	56.1	7.3
May 1-31----------	82,800	13	.28	.16	.10	.03	.43	.07	.05	.01	.01		40	.06	4,970	18	50.8	7.0
June 1-10----------	14,830	12	.25	.13	.13	.07	.41	.07	.05	.01	.01		40	.05	742	22	51.2	6.9
June 11-20--------	6,830	12	.27	.12	.12	.07	.41	.07	.05	.01	.00		41	.06	410	21	50.5	6.9
June 21-30--------	1,410	12	.30	.13	.12	.06	.43	.08	.06	.01	.01		44	.06	85	20	55.2	7.0
July 1-10----------	397	12	.31	.14	.13	.08	.44	.11	.06	.01	.01		45	.06	24	20	57.7	6.9
July 11-20--------	462	12	.32	.16	.13	.08	.38	.23	.06	.01	.01		47	.06	28	19	61.3	7.0
July 21-31--------	522	13	.27	.17	.09	.05	.39	.14	.07	.01	.01		47	.06	31	16	61.6	6.6
Aug. 1-10---------	474	13	.27	.17	.09	.05	.39	.15	.06	.01	.01		45	.06	28	16	57.7	6.8
Aug. 11-20--------	458	12	.28	.18	.09	.06	.33	.21	.07	.01	.01		47	.06	27	15	59.0	6.6
Aug. 21-31--------	526	11	.27	.17	.09	.04	.29	.23	.07	.01	.01		45	.06	32	16	59.8	6.6
Sept. 1-10--------	643	12	.29	.19	.09	.05	.29	.25	.06	.01	.01		49	.07	45	15	63.0	6.6
Sept. 11-20-------	4,420	11	.23	.16	.10	.04	.39	.11	.05	.01	.00		39	.05	221	19	49.9	6.8
Sept. 21-30-------	6,240	11	.23	.25	.11	.04	.38	.15	.05	.01	.00		40	.05	312	17	55.2	7.1
Total ----------	a 268,600	--	--	--	--	--	--	--	--	--	--		--	--	16,660	--	--	--

a Represents 30 percent of runoff for water year October 1950 to September 1951.

SACRAMENTO RIVER BASIN

SACRAMENTO RIVER MAIN STEM

SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.

LOCATION.--At gaging station at Yolo-Sutter County line, just upstream from Southern Pacific Railroad bridge at Knights Landing.
RECORDS AVAILABLE.--Chemical analyses: March to September 1951.
Water temperatures: March to September 1951.
EXTREMES, March to September 1951.--Specific conductance: Maximum, 383 micromhos May 27; minimum, 125 micromhos Mar. 12.
Percent sodium: Maximum, 37 May 11-31, June 11-20; minimum, 21 Mar. 21-31, Apr. 11-20.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1215.

Chemical analyses, March to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 2-10, 1951	353,700	24	0.70	0.53	0.38	0.09	1.26	0.25	0.17	0.02	0.01		108	0.15	53,060	23	157	7.6
Mar. 11-20	290,800	25	.70	.54	.39	.08	1.28	.25	.17	.02	.01		111	.15	43,620	23	158	7.6
Mar. 21-31	259,200	24	.70	.58	.36	.08	1.31	.25	.14	.02	.01		112	.15	38,880	21	163	7.4
Apr. 1, 6-10	96,750	24	.75	.64	0.42		1.41	.20	.18	.01	.01		118	.16	15,480	23	175	7.4
Apr. 2-5	72,120	24	.90	.82	.68		1.61	.46	.31	.02	.01		154	.20	14,420	28	238	7.4
Apr. 11-20	118,800	23	.80	.72	.43	.14	1.52	.31	.24	.02	.01		134	.18	21,380	21	204	7.5
Apr. 21-30	99,310	26	.75	.73	.70	.07	1.54	.40	.31	.01	.01		142	.19	18,870	31	219	7.7
May 1-10	185,200	25	.70	.71	.70	.05	1.44	.42	.31	.01	.01		138	.19	35,190	32	212	7.9
May 11-31	281,100	25	.90	.90	1.09	.06	1.85	.58	.48	.01	.01		177	.24	67,460	37	283	7.6
June 1-10	105,500	26	.75	.78	.87	.07	1.69	.46	.34	.01	.00		154	.21	22,160	35	241	7.2
June 11-20	114,500	26	.75	.78	.96	.08	1.67	.50	.39	.01	.01		161	.22	25,190	37	253	7.3
June 21-30	108,300	25	.75	.74	.87	.07	1.67	.44	.31	.01	.01		148	.20	21,660	36	231	7.4
July 1-10	115,000	26	.75	.75	.87	.05	1.67	.44	.34	.01	.01		149	.20	23,000	36	231	7.6
July 11-20	146,700	24	.70	.67	.83	.07	1.52	.40	.28	.01	.01		139	.19	27,870	36	214	7.6
July 21-31	192,400	16	.65	.65	.70	.05	1.43	.33	.26	.01	.01		130	.18	34,630	34	198	7.2
Aug. 1-10	174,800	16	.65	.64	.70	.07	1.46	.40	.25	.01	.01		128	.17	29,720	34	197	7.4
Aug. 11-20	169,600	16	.70	.67	.74	.06	1.52	.40	.27	.01	.01		136	.18	30,530	34	206	7.3
Aug. 21-31	179,700	16	.70	.74	.83	.06	1.67	.40	.31	.01	.01		146	.20	35,940	36	226	7.6

Sept. 1-10 ----------	169,600	17	.80	.82	.91	.06	1.85	.40	.34	.01	.01		156	.21	35,620	35	246	7.6
Sept. 11-20 ----------	144,000	17	.80	.82	.87	.07	1.88	.42	.34	.01	.01		157	.21	30,240	34	247	7.6
Sept. 21-30 ----------	122,800	15	.70	.72	.61	.07	1.59	.27	.24	.01	.01		134	.18	22,100	29	203	7.6
Total ----------	a3,500,000	--	--	--	--	--	--	--	--	--	--		--	--	647,000	--	--	--

a Represents 43 percent of runoff for water year October 1950 to September 1951.

FEATHER RIVER BASIN

FEATHER RIVER AT NICOLAUS, CALIF.

LOCATION.--At gaging station at Nicolaus, Sutter County, 0.4 mile downstream from highway bridge.
RECORDS AVAILABLE.--Chemical analyses: March to September 1951.
Water temperatures: March to September 1951.
EXTREMES, March to September 1951.--Specific conductance: Maximum, 189 micromhos Aug. 17; minimum, 65.0 micromhos Apr. 17.
Percent sodium: Maximum, 17 July 11-20; minimum, 8 June 21-30.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1215.

Chemical analyses, March to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951 ---	289,400	16	0.47	0.35	0.16	0.08	0.85	0.13	0.08	0.01	0.01		69	0.09	20,050	15	96.2	7.5
Mar. 11-20--------	277,700	17	.44	.34	.14	.07	.80	.11	.07	.01	.01		66	.09	25,000	14	91.1	7.5
Mar. 21-31--------	303,700	15	.43	.30	.14	.12	.77	.09	.04	.00	.01		62	.08	24,300	14	86.8	7.1
Apr. 1-10 --------	255,700	15	.42	.29	.11	.14	.75	.07	.05	.00	.01		61	.08	20,460	12	82.4	7.1
Apr. 11-20 --------	271,100	15	.39	.26	.11	.07	.70	.08	.02	.01	.01		50	.07	18,980	14	69.8	7.0
Apr. 21-30 --------	202,800	15	.39	.26	.12	.03	.67	.09	.04	.01	.00		53	.07	14,200	15	73.7	7.4
May 1-31 ---------	671,100	15	.40	.28	.13	.04	.69	.08	.05	.00	.01		56	.08	53,690	15	77.7	7.1
June 1-10 ---------	69,200	17	.50	.34	.17	.03	.92	.08	.07	.01	.00		72	.10	6,920	16	103	7.0
June 11-20 --------	33,240	19	.55	.39	.17	.04	1.02	.10	.08	.01	.01		78	.11	3,660	15	114	7.0
June 21-30 --------	23,810	19	.60	.44	.10	.05	1.08	.10	.08	.01	.01		86	.12	2,860	8	125	7.0
July 1-10----------	13,000	20	.70	.57	.20	.05	1.25	.14	.09	.01	.01		95	.13	1,690	13	144	7.1
July 11-20 --------	8,370	20	.75	.60	.29	.05	1.39	.16	.15	.01	.01		107	.15	1,260	17	162	7.2
July 21-31 ---------	7,620	19	.75	.58	.26	.05	1.33	.15	.11	.01	.01		102	.14	1,070	16	153	7.2

FEATHER RIVER BASIN--Continued

FEATHER RIVER AT NICOLAUS, CALIF.--Continued

Chemical analyses, March to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951 ----	4,930	20	0.80	0.66	0.30	0.05	1.49	0.17	0.12	0.01	0.01		111	0.15	740	16	170	7.2
Aug. 11-20 --------	5,210	20	.80	.68	.29	.04	1.49	.19	.12	.01	.01		110	.15	782	16	172	7.3
Aug. 21-31 --------	9,570	19	.75	.60	.24	.05	1.38	.18	.10	.01	.01		102	.14	1,340	15	156	7.3
Sept. 1-10 --------	20,830	19	.65	.55	.23	.06	1.28	.14	.08	.01	.00		93	.13	2,710	16	142	7.5
Sept. 11-20--------	30,230	16	.65	.52	.23	.06	1.28	.11	.06	.01	.01		84	.11	3,330	16	133	7.3
Sept. 21-30 -------	37,470	16	.65	.51	.23	.06	1.28	.11	.07	.01	.01		84	.11	4,120	16	132	7.1
Total ----------	a2,535,000	--	--	--	--	--	--	--	--	--	--		--	--	213,200	--	--	--

a Represents 29 percent of runoff for water year October 1950 to September 1951.

AMERICAN RIVER BASIN

AMERICAN RIVER AT FAIR OAKS, CALIF.

LOCATION.--From Mar. 2 to Apr. 27 samples were collected at gaging station at Sacramento at H Street Bridge, just east of Sacramento, Sacramento County, 6.5 miles upstream from mouth. From May 3 to Sept. 30 samples were collected at gaging station at Fair Oaks, Sacramento County, 10 miles downstream from South Fork.

DRAINAGE AREA.--1,921 square miles.

RECORDS AVAILABLE.--Chemical analyses: January to December 1906, March to September 1951.
Water temperatures: March to September 1951.

EXTREMES, March to September, 1951.--Specific conductance: Maximum, 112 micromhos Aug. 28; minimum, 39.0 micromhos Apr. 11-12.
Percent sodium: Maximum, 19 Apr. 21-27, June 11-20, July 11-20; minimum, 10 Mar. 21-31.

REMARKS.--Discharge data for Mar. 2 to Apr. 27 are for the Sacramento gaging station. Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Discharge records for gaging stations at Sacramento and at Fair Oaks, for water year October 1950 to September 1951, given in Water-Supply Paper 1215.

Chemical analyses, March to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Per-cent so-dium	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)		Parts per mil-lion	Tons per acre-foot	Total tons			
Mar. 2-10, 1951	141,700	16	0.37	0.29	0.13	0.05	0.67	0.11	0.08	0.02	0.00		58	0.08	11,340	16	79.6	7.4
Mar. 11-20	131,000	16	.34	.25	.13	.05	.66	.10	.07	.02	.00		54	.07	9,170	16	72.3	7.4
Mar. 21-31	139,900	13	.31	.18	.06	--	.54	.06	.05	.00	.01		46	.06	8,390	10	59.5	7.1
Apr. 1-10	127,700	12	.29	.16	.09	--	.48	.05	.05	.00	.01		44	.06	7,660	15	53.8	7.2
Apr. 11-20	162,300	12	.24	.17	.06	.07	.36	--	.03	.01	.01		35	.05	8,120	11	43.9	6.9
Apr. 21-27	83,410	12	.26	.17	0.10		.44	.05	.04	.01	.00		39	.05	4,170	19	49.4	7.3
May 3-10	131,000	13	.27	.21	.09	.09	.48	.06	.04	.02	.01		45	.06	7,860	14	54.7	6.9
May 11-31	305,700	12	.22	.15	.08	.04	.38	.04	.04	.01	.01		31	.04	12,230	16	41.7	7.0
June 1-10	63,290	12	.28	.13	.10	.06	.43	.05	.05	.00	.00		40	.05	3,160	18	49.6	6.8
June 11-20	53,180	11	.28	.12	.11	.05	.44	.06	.06	.01	.00		41	.06	3,190	19	52.2	6.8
June 21-30	32,850	12	.04	.15	.11	.07	.51	.06	.08	.01	.00		46	.06	1,970	15	61.6	7.0
July 1-10	18,040	15	.48	.18	.15	.06	.64	.08	.07	.01	.00		56	.08	1,440	17	74.8	7.2
July 11-20	11,270	16	.50	.21	.18	.07	.70	.09	.10	.01	.01		63	.09	1,010	19	89.0	7.2
July 21-31	9,030	15	.47	.27	.14	.06	.75	.08	.12	.01	.01		65	.09	813	15	93.8	6.8
Aug. 1-10	6,290	15	.55	.27	.14	.06	.82	.09	.12	.01	.01		68	.09	566	14	101	6.9
Aug. 11-20	5,710	14	.55	.28	.14	.06	.82	.09	.14	.01	.01		68	.09	514	14	102	6.9
Aug. 21-31	6,080	14	.55	.27	.15	.06	.80	.09	.16	.01	.01		69	.09	547	14	103	6.9
Sept. 1-10	5,610	13	.55	.28	.14	.06	.80	.10	.14	.01	.01		67	.09	505	14	102	6.9
Sept. 11-20	4,970	12	.50	.29	.17	.05	.82	.10	.14	.01	.01		69	.09	447	17	104	7.1
Sept. 21-30	5,590	12	.50	.28	.17	.06	.82	.10	.14	.01	.01		68	.09	503	17	102	7.3
Total	a 1,445,000	--	--	--	--	--	--	--	--	--	--		--	--	83,600	--	--	--

a Represents approximately 31 percent of runoff for water year October 1950 to September 1951.

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

UPPER COLUMBIA RIVER BASIN

COLUMBIA RIVER MAIN STEM

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 1951.
Water temperatures: November 1950 to September 1951.
EXTREMES, 1950-51.--Specific conductance: Maximum, 164 micromhos May 10; minimum, 136 micromhos May 29-30, June 6, 8.
Percent sodium: Maximum, 9 Feb. 21-28; minimum, 4 Dec. 1-10, Aug. 11 to Sept. 30.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1216.

Chemical analyses, November 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 25-30, 1950----	752,700	5.4	1.00	0.40	--	--	1.23	0.27	0.02	--	0.00		86	0.12	90,320	8	144	7.5
Dec. 1-10 ----------	1,191,000	7.2	1.10	.40	0.07	0.04	1.25	.27	--	0.01	.01		90	.12	142,900	4	150	7.5
Dec. 11-20 ---------	1,179,000	6.9	1.05	.39	.07	.05	1.28	.27	--	.01	.01		91	.12	141,500	5	151	7.5
Dec. 21-31 ---------	1,922,000	7.2	1.10	.42	.08	.06	1.28	.27	--	.02	.01		92	.13	249,900	5	153	7.5
Jan. 1-10, 1951 -----	1,665,000	7.0	1.05	.45	.09	.06	1.26	.29	.03	.00	.01		90	.12	199,800	5	152	7.3
Jan. 11-20 ---------	1,509,000	6.9	1.05	.43	.10	.10	1.31	.27	.03	.00	.02		91	.12	181,100	6	153	7.4
Jan. 21-31 ---------	1,539,000	7.1	1.00	.43	.10	.09	1.26	.29	.03	.00	.01		90	.12	184,700	6	149	7.4
Feb. 1-10 ---------	1,248,000	7.5	1.05	.43	.10	.10	1.28	.29	.03	.00	.01		91	.12	149,800	6	151	7.4
Feb. 11-20 ---------	2,037,000	7.5	1.05	.42	.10	.10	1.28	.29	.03	.00	.00		92	.13	264,800	6	154	7.4
Feb. 21-28 ---------	1,538,000	7.8	1.00	.43	0.14		1.25	.29	.02	.00	.01		91	.12	184,600	9	150	7.4
Mar. 1-10 ---------	1,544,000	9.1	1.00	.44	.10	.15	1.25	.33	.02	.00	.02		93	.13	203,600	6	155	7.4
Mar. 11-20 --------	1,545,000	8.9	1.05	.44	.08	.14	1.26	.33	.03	.00	.02		95	.13	200,900	5	157	7.8
Mar. 21-31 ---------	1,460,000	11	1.05	.40	.12	.03	1.23	.31	.03	.01	.02		96	.13	189,800	8	156	7.6
Apr. 1-10 ----------	1,421,000	10	1.05	.38	.13	.02	1.26	.31	.03	.01	.01		94	.13	184,700	8	155	7.4
Apr. 11-20 ---------	2,368,000	10	1.10	.39	.12	.05	1.28	.33	.03	.01	.01		96	.13	307,800	7	159	7.4
Apr. 21-30 ---------	2,825,000	11	1.10	.40	.14	.05	1.30	.31	.04	.01	.01		98	.13	367,200	8	158	7.6

May 1-10 ----------	3,649,000	12	1.15	.41	.13	.06	1.33	.31	.03	.01	.01		99	.13	474,400	7	162	7.4
May 11-20 ---------	6,141,000	11	1.10	.39	.13	.05	1.28	.29	.03	.01	.01		96	.13	798,300	8	154	7.3
May 21-31 ---------	7,534,000	9.5	1.00	.34	.09	.04	1.20	.23	.02	.01	.01		85	.12	904,100	6	141	7.3
June 1-10 ----------	6,246,000	9.4	1.05	.36	.09	.04	1.20	.23	.02	.01	.01		84	.11	687,100	6	140	7.2
June 11-20 ---------	5,761,000	8.2	1.05	.38	.10	.05	1.26	.23	.02	.01	.01		85	.12	691,300	6	147	7.4
June 21-30 ---------	6,226,000	8.2	1.05	.36	.09	.04	1.26	.25	.02	.01	.01		85	.12	747,100	6	144	7.3
July 1-10 ----------	5,825,000	8.3	1.00	.44	.08	.10	1.25	.23	.03	.01	.01		86	.12	699,000	5	140	7.3
July 11-17 ---------	3,986,000	8.2	1.00	.40	.08	--	1.28	.25	.03	.01	.01		87	.12	478,300	6	142	7.2
Aug. 7-10 a --------	1,510,000	6.1	b1.36		--	--	1.25	.23	.02	--	--		--	--	--	--	139	7.2
Aug. 11-20 ---------	2,201,000	6.2	1.00	.39	.06	.08	1.25	.23	.02	.00	.01		85	.12	264,100	4	140	7.5
Aug. 21-31 --------	1,990,000	6.4	1.00	.40	.06	.07	1.28	.23	.02	.00	.01		84	.11	218,900	4	140	7.3
Sept. 1-10 ---------	1,597,000	5.8	1.00	.40	.06	.07	1.28	.25	.02	.00	.01		83	.11	175,700	4	140	7.6
Sept. 11-20 ---------	1,335,000	6.8	1.00	.39	.06	.07	1.25	.25	.02	.00	.01		83	.11	146,800	4	140	7.5
Sept. 21-30 ---------	1,182,000	5.5	1.00	.39	.06	.07	1.23	.25	.02	.01	.01		84	.11	130,000	4	140	7.6
Total or weighted average--	(c)	8.6	1.05	0.40	0.10	0.06	1.26	0.27	0.03	0.01	0.01		89	0.12	9,659,000	6	147	--

a Not included for computation of weighted averages.
b Hardness determination by Schwarzenbach method.
c For computation of the weighted averages the total discharge corresponding to 79,440,000 acre-feet was used. This represents 82 percent of the runoff for the water year October 1950 to September 1951.

Part 13. SNAKE RIVER BASIN

SNAKE RIVER MAIN STEM

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 River.
RECORDS AVAILABLE.--Chemical analyses: March to September 1951.
Water temperatures: March to September 1951.
EXTREMES, March to September 1951.--Specific conductance: Maximum, 564 micromhos Aug. 21; minimum, 434 micromhos Apr. 14.
Percent sodium: Maximum, 29 July 21-31; minimum, 17 Apr. 1-10.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1217.

Chemical analyses, March to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 27-31, 1951 --	183,500	30	2.50	1.40	1.13	0.25	3.36	0.96	0.65	0.03	0.07		299	0.41	75,240	21	475	7.9
Apr. 1-10 ---------	355,000	29	2.59	1.40	.87	.24	3.31	.96	.65	.03	.07		299	.41	145,600	17	478	8.1
Apr. 11-20 --------	298,900	30	2.30	1.40	1.09	.17	3.20	.92	.62	.04	.04		283	.38	113,600	22	448	7.8
Apr. 21-30 --------	199,200	34	2.20	1.56	1.26	.16	3.21	1.02	.68	.03	.05		296	.40	79,680	24	468	7.8
May 1-10 ---------	332,800	29	2.25	1.48	1.13	.16	3.18	.98	.62	.04	.04		288	.39	129,800	23	461	7.9
May 11-20 --------	368,500	23	2.30	1.32	1.17	.15	3.29	.94	.62	.04	.04		293	.40	147,400	24	465	7.7
May 21-31 --------	406,400	25	2.30	1.32	1.09	.15	3.28	.94	.56	.04	.03		288	.39	158,500	22	460	8.0
June 1-10 ---------	293,800	27	2.35	1.40	1.17	.18	3.34	.98	.62	.04	.05		296	.40	117,500	23	475	7.8
June 11-20 --------	172,400	32	2.25	1.56	1.39	.22	3.44	1.12	.71	.04	.05		321	.44	75,860	26	504	8.0
June 21-30 --------	214,400	31	2.30	1.56	1.43	.16	3.47	1.12	.73	.04	.05		322	.44	94,340	26	511	8.1
July 1-10 ---------	162,800	33	2.25	1.64	1.35	.14	3.44	1.08	.68	.03	.05		314	.43	70,000	25	499	7.6
July 11-20 --------	159,500	36	2.20	1.64	1.52	.13	3.49	1.17	.73	.03	.05		328	.45	71,780	28	520	7.6
July 21-31 --------	179,300	37	2.15	1.64	1.57	.13	3.54	1.19	.76	.03	.06		333	.45	80,680	29	525	7.8
Aug. 1-10 --------	178,600	37	2.30	1.73	1.52	.14	3.56	1.21	.79	.03	.07		335	.46	82,160	27	527	7.9
Aug. 11-20 --------	182,500	38	2.30	1.73	1.52	.12	3.56	1.19	.73	.03	.06		336	.46	83,950	27	521	7.7
Aug. 21-31 --------	193,700	37	2.35	1.73	1.52	.12	3.56	1.23	.73	.03	.06		336	.46	89,100	27	527	7.8

Sept. 1-10 --------	178,300	36	2.35	1.73	1.57	.13	3.64	1.25	.76	.03	.07		341	.46	82,020	27	534	7.9
Sept. 11-20 -------	187,900	35	2.40	1.81	1.57	.14	3.70	1.27	.79	.03	.05		345	.47	88,310	27	539	8.0
Sept. 21-30 --------	198,300	35	2.40	1.73	1.57	.14	3.70	1.29	.73	.03	.05		346	.47	93,200	27	540	8.0
Total ----------	a4,446,000	--	--	--	--	--	--	--	--	--	--		--	--	1,879,000	--	--	--

a Represents 47 percent of runoff for water year October 1950 to September 1951.

BOISE RIVER BASIN

BOISE RIVER AT NOTUS, IDAHO

LOCATION.--At steel county highway bridge, 360 yards downstream from gaging station, which is a quarter of a mile southeast of Notus, Canyon County, and 7 miles northwest of Caldwell.

RECORDS AVAILABLE.--Chemical analyses: January 1939 to January 1940, November 1950 to September 1951.
Water temperatures: November 1950 to September 1951.
Sediment records: January 1939 to June 1940.

EXTREMES, 1950-51.--Specific conductance: Maximum, 765 micromhos Feb. 1; minimum, 93.8 micromhos Apr. 20.
Percent sodium: Maximum, 53 Aug. 11-20; minimum, 25 Apr. 11-20.

EXTREMES, 1939-40, 1950-51.--Specific conductance: Maximum, 1,390 micromhos Aug. 21-31, 1939; minimum, 93.8 micromhos Apr. 20, 1951.
Percent sodium: Maximum, 64 Sept. 1-10, 1939; minimum, 25 Apr. 11-20, 1951.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake Ctiy, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1217.

Chemical analyses, November 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 21-30, 1950 ----	12,990	39	2.45	1.15	3.47		4.33	2.02	0.65	--	0.07		436	0.59	7,660	49	654	7.2
Dec. 1-10 ----------	16,440	31	2.25	.99	2.87	0.16	3.83	1.71	.56	0.03	.08		378	.51	8,380	46	579	7.5
Dec. 11-20 ----------	15,580	31	2.35	.99	2.70	.15	3.82	1.69	.54	.03	.07		374	.51	7,950	44	574	7.4
Dec. 21-31 ----------	15,220	32	2.30	.99	2.87	.13	3.87	1.85	.56	.02	.07		386	.52	7,910	46	598	7.5
Jan. 1-10, 1951 ------	13,100	32	2.45	1.07	2.96	.14	4.08	1.83	.62	.02	.05		406	.55	7,200	45	622	7.5
Jan. 11-20----------	13,120	35	2.20	1.07	2.78	.19	3.80	1.73	.62	.03	.09		385	.52	6,820	45	591	7.4
Jan. 21-31----------	15,060	36	2.40	1.07	2.87	.19	3.93	1.73	.59	.03	.09		395	.54	8,130	44	598	7.6

BOISE RIVER BASIN--Continued

BOISE RIVER AT NOTUS, IDAHO--Continued

Chemical analyses, November 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-5, 1951	8,250	37	3.04	1.07	2.83	0.26	4.74	1.75	0.59	0.02	0.07		434	0.59	4,870	39	665	7.6
Feb. 6-10	18,450	28	1.45	.65	1.43	.18	2.31	.94	.31	.02	.08		255	.35	6,460	39	359	--
Feb. 11-19	25,210	28	1.55	.72	1.65	.13	2.54	1.04	.34	.02	.09		251	.34	8,570	41	384	7.4
Feb. 20-28	22,950	27	1.40	.61	1.65	.09	2.44	1.02	.34	.03	.08		239	.33	7,570	44	373	7.5
Mar. 1-10	27,490	26	1.30	.54	1.52	.09	2.21	.92	.28	.03	.08		215	.29	7,970	44	335	7.5
Mar. 11-20	51,990	23	1.00	.44	.96	.07	1.61	.60	.20	.03	.06		156	.21	10,920	39	243	7.6
Mar. 21-31, Apr. 1-2	97,330	21	.85	.32	.70	.17	1.34	.46	.15	.02	.08		139	.19	18,490	34	198	7.3
Apr. 3-10	81,520	18	.75	.25	.48	.17	1.08	.31	.10	.02	.07		113	.15	12,230	29	151	7.3
Apr. 11-20	95,540	16	.60	.29	.33	.09	.95	.23	.06	.01	.03		94	.13	12,420	25	119	7.2
Apr. 21-30	114,900	19	.65	.24	.43	.06	.98	.20	.06	.03	.04		91	.12	13,790	31	124	7.2
May 1-10	98,200	18	.70	.23	.43	.07	1.05	.21	.07	.03	.04		91	.12	11,780	30	133	7.2
May 11-20	117,000	18	.65	.23	.48	.07	1.02	.23	.08	.03	.05		94	.13	15,210	34	137	7.2
May 21-31	125,100	15	.60	.19	.42	.08	.93	.20	.06	.02	.03		89	.12	15,010	32	125	7.2
June 1-10	83,090	17	.70	.26	.61	.09	1.20	.31	.11	.02	.03		115	.16	13,290	37	162	7.2
June 11-20	52,560	18	.75	.29	.70	.09	1.29	.33	.12	.03	.03		121	.16	8,410	38	175	7.4
June 21-30	23,410	18	.95	.37	.96	.10	1.62	.48	.17	.03	.04		152	.21	4,920	40	229	7.4
July 1-10	15,780	22	1.20	.49	1.39	.14	2.13	.69	.24	.03	.07		198	.27	4,260	43	303	7.6
July 11-20	3,590	31	1.90	.90	3.00	.09	3.51	1.64	.62	.03	.07		364	.50	1,800	51	556	7.4
July 21-31	4,060	32	1.90	.90	2.87	.09	3.57	1.50	.51	.03	.05		350	.48	1,950	50	536	7.5
Aug. 1-10	4,800	32	1.95	.90	2.87	.08	3.65	1.52	.54	.03	.05		358	.49	2,350	49	545	7.6
Aug. 11-20	2,500	34	2.20	1.07	3.78	.10	4.24	2.06	.79	.02	.05		438	.60	1,500	53	671	7.9
Aug. 21-31	5,800	36	2.15	.99	3.30	.09	4.03	1.83	.68	.02	.07		410	.56	3,250	51	624	7.8
Sept. 1-10	5,000	39	2.30	1.15	3.52	.18	4.26	2.00	.71	.03	.05		439	.60	3,000	49	652	7.8
Sept. 11-20	5,750	39	2.25	1.15	3.44	.19	4.20	1.94	.65	.03	.06		423	.58	3,340	49	635	8.0
Sept. 21-30	6,510	37	2.15	1.07	3.17	.16	4.06	1.79	.56	.03	.08		402	.55	3,580	48	605	7.8
Total or weighted average	a1,198,000	21	0.95	0.39	0.91	0.10	1.59	0.54	0.17	0.02	0.05		154	0.21	251,000	39	226	--

a Represents 93 percent of runoff for water year October 1950 to September 1951.

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

COLUMBIA RIVER MAIN STEM

COLUMBIA RIVER AT MARYHILL FERRY NEAR RUFUS, OREG.

LOCATION.--At Maryhill Ferry about 2½ miles downstream from Rufus, Sherman County, 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 1951.
Water temperatures: December 1950 to September 1951.

EXTREMES, 1950-51.--Specific conductance: Maximum, 225 micromhos Sept. 21, 23; minimum, 124 micromhos May 26.
Percent sodium: Maximum, 20 Feb. 1, 4-5, 7, 9-10; minimum, 12 June 21-30.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Discharge records for gaging station near The Dalles for water year October 1950 to September 1951 given in Water-Supply Paper 1218. 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, December 1950 to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-10, 1950	2,658,000	16	1.10	0.53	0.39	0.07	1.47	0.37	0.20	0.02	0.02		a 127	0.17	451,900	19	198	7.5
Dec. 11-20	2,594,000	16	1.05	.53	.39	.07	1.51	.37	.14	.02	.02		a 125	.17	441,000	19	199	7.7
Dec. 21-31	3,499,000	15	1.10	.50	.33	.06	1.46	.35	.12	.02	.01		119	.16	559,800	17	185	7.6
Jan. 1-10, 1951	3,427,000	15	1.10	.52	.31	.10	1.43	.33	.10	.01	.01		115	.16	548,300	16	181	7.4
Jan. 11-20	2,820,000	16	1.10	.57	.37	.12	1.56	.40	.13	.01	.02		126	.17	479,400	17	195	7.6
Jan. 21-31	3,265,000	17	1.10	.58	.39	.11	1.57	.37	.14	.02	.02		130	.18	587,700	18	201	7.8
Feb. 1, 4-5, 7, 9-10	1,720,000	17	1.10	.59	.43	.06	1.62	.40	.15	.02	.02		140	.19	326,800	20	213	7.7
Feb. 11-15, 18-19, 22	3,953,000	19	1.00	.57	.30	.10	1.43	.37	.11	.01	.02		125	.17	672,000	15	181	7.4
Mar. 21-31	3,870,000	20	1.05	.63	.27	.10	1.44	.42	.13	.01	.03		131	.18	696,600	13	195	7.4
Apr. 1-10	4,044,000	20	.95	.54	.27	.09	1.34	.35	.11	.01	.01		126	.17	687,500	15	179	7.4
Apr. 11-20	5,292,000	20	.85	.47	.27	.09	1.23	.29	.08	.01	.02		103	.14	740,900	16	150	7.4
Apr. 21-30	5,724,000	15	.85	.39	.23	.05	1.21	.25	.05	.02	.02		94	.13	744,100	15	146	7.2

a Sum of determined constituents.

COLUMBIA RIVER MAIN STEM--Continued

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

Chemical analyses, December 1950 to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	6,127,000	17	0.85	0.40	0.24	0.06	1.18	0.25	0.06	0.02	0.02		97	0.13	796,500	16	148	7.3
May 11-20	10,060,000	14	.80	.36	.20	.09	1.08	.23	.06	.02	.02		87	.12	1,207,000	14	136	7.2
May 21-31	12,610,000	11	.75	.36	.23	.10	1.07	.23	.10	.02	.01		89	.12	1,513,000	16	137	6.9
June 1-10	9,715,000	11	.85	.38	.20	.08	1.15	.23	.08	.01	.01		90	.12	1,166,000	13	143	7.1
June 11-20	8,741,000	10	.85	.37	.19	.07	1.15	.21	.06	.01	.01		88	.12	1,049,000	13	138	7.2
June 21-30	8,820,000	8.7	.90	.37	.19	.07	1.20	.23	.06	.01	.01		89	.12	1,058,000	12	142	7.0
July 1-10	7,674,000	8.1	1.00	.43	.23	.04	1.34	.25	.06	.01	.01		97	.13	997,600	14	160	7.2
July 11-20	6,948,000	8.2	1.05	.48	.27	.07	1.44	.31	.12	.01	.01		106	.14	972,700	14	180	7.6
July 21-31	6,579,000	11	1.10	.49	.25	.12	1.51	.33	.08	.02	.01		109	.15	986,800	13	176	7.4
Aug. 1-10	4,685,000	11	1.10	.46	.24	.09	1.44	.29	.14	.01	.01		107	.15	702,800	13	174	7.6
Aug. 11-20	3,461,000	11	1.10	.50	.29	.09	1.47	.33	.10	.01	.02		113	.15	519,200	15	185	7.6
Aug. 21-31	2,884,000	11	1.15	.55	.36	.12	1.61	.40	.11	.01	.01		122	.17	490,300	16	200	7.7
Sept. 1-10	2,481,000	11	1.15	.55	.37	.13	1.64	.42	.12	.02	.01		127	.17	421,800	17	208	7.7
Sept. 11-20	2,124,000	12	1.20	.59	.43	.12	1.70	.46	.14	.02	.01		137	.19	403,600	19	221	7.6
Sept. 21-30	1,920,000	14	1.20	.60	.42	.13	1.74	.46	.15	.02	.01		138	.19	364,800	18	218	8.0
Total or weighted average	b137,700,000	13	0.95	0.45	0.26	0.08	1.31	0.29	0.09	0.02	0.02		105	0.14	19,590,000	15	164	--

b Represents 84 percent of runoff for water year October 1950 to September 1951.

WILLAMETTE RIVER BASIN

WILLAMETTE RIVER AT SALEM, OREG.

LOCATION.--At bridge on Oregon Highway 22, Polk-Marion County line, 300 feet downstream from gaging station at Salem.
DRAINAGE AREA.--7,280 square miles.
RECORDS AVAILABLE.--Chemical analyses: August to December 1910, August 1911 to August 1912, February to September 1951. Water temperatures: February to September 1951.
EXTREMES, February to September 1951.--Specific conductance: Maximum, 77.4 micromhos Aug. 17; minimum, 40.9 micromhos Feb. 8. Percent sodium: Maximum, 28 May 21-31; minimum, 20 Apr. 11-20.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Salt Lake City, Utah. Records of discharge for water year October 1950 to September 1951 given in Water-Supply Paper 1218.

Chemical analyses, February to September 1951

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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. 1-10, 1951 ---	1,438,000	15	0.23	0.16	0.15	0.06	0.44	0.06	0.09	0.00	0.01		50	0.07	100,700	26	54.7	7.2
Feb. 11-20 --------	1,262,000	16	.23	.16	.14	.06	.44	.05	.06	.00	.01		48	.07	89,740	24	51.1	7.1
Feb. 21-28 --------	466,300	18	.25	.17	.14	.06	.49	.04	.06	.01	.01		53	.07	32,640	23	57.3	7.0
Mar. 1-10 --------	613,100	17	.24	.17	.13	.05	.46	.05	.08	.01	.01		56	.06	49,050	22	57.0	7.1
Mar. 11-20 -------	1,011,000	16	.20	.15	.13	.05	.43	.05	.06	.01	.01		53	.07	70,770	24	51.3	6.9
Mar. 21-31 --------	766,600	17	.21	.15	.13	.06	.44	.04	.06	.01	.01		49	.07	53,660	24	52.3	7.0
Apr. 1-10 ---------	575,600	16	.23	.17	.13	.08	.46	.04	.06	.03	.01		48	.07	40,290	21	50.2	6.7
Apr. 11-20 --------	554,400	16	.26	.17	.13	.09	.48	.04	.05	.02	.00		49	.07	38,810	20	53.5	6.8
Apr. 21-30 --------	378,200	16	.22	.13	.12	.09	.44	.04	.05	.01	.00		46	.06	22,690	21	49.2	6.8
May 1-10 ---------	455,800	17	.22	.16	.14	.06	.43	.05	.06	.03	.01		48	.07	31,910	24	49.2	6.7
May 11-20 --------	509,200	17	.22	.14	.15	.07	.43	.04	.06	.03	.01		48	.07	35,640	26	49.5	6.6
May 21-31 --------	383,200	18	.22	.16	.17	.05	.48	.05	.06	.03	.01		49	.07	26,620	28	52.9	6.7

WILLAMETTE RIVER BASIN--Continued

WILLAMETTE RIVER AT SALEM, OREG.--Continued

Chemical analyses, February to September 1951--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	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, 1951	223,500	19	0.25	0.16	0.17	0.07	0.49	0.05	0.06	0.03	0.01		54	0.07	15,640	26	58.7	6.7
June 11-20	186,000	20	.27	.16	.14	.05	.51	.06	.07	.01	.01		63	.09	16,740	22	64.7	6.8
June 21-30	146,100	20	.28	.17	.13	.05	.52	.05	.07	.01	.01		64	.09	13,150	21	66.4	6.7
July 1-10	128,000	20	.29	.16	.13	.05	.56	.04	.06	.01	.01		60	.08	10,240	21	64.9	6.9
July 11-20	107,800	22	.33	.17	.17	.05	.59	.05	.08	.01	.01		65	.09	9,700	23	70.3	6.8
July 21-31	102,000	20	.31	.18	.17	.04	.61	.05	.08	.01	.01		65	.09	9,180	24	72.1	6.9
Aug. 1-10	84,580	19	.30	.20	.20	.05	.62	.05	.09	.01	.01		62	.08	6,770	26	74.4	7.0
Aug. 11-17	60,890	18	.31	.20	.22	.07	.59	.06	.09	.01	.01		64	.09	5,480	27	74.2	7.1
Aug. 24-31	72,600	18	.30	.20	.21	.08	.61	.05	.10	.01	.01		64	.09	6,530	27	73.2	7.0
Sept. 1-3, 5, 11-15	81,520	18	.30	.22	.19	.10	.61	.07	.10	.02	.01		64	.09	7,340	23	71.9	6.9
Sept. 16-20, 24-29	92,430	18	.33	.22	.20	.08	.66	.07	.12	.01	.01		65	.09	8,320	24	73.4	7.0
Total	a9,719,000	--	--	--	--	--	--	--	--	--	--		--	--	701,800	--	--	--

a Represents 41 percent of runoff for water year October 1950 to September 1951.

INDEX

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