Quality of Surface Waters for Irrigation Western United States 1954

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

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PREFACE

This report was prepared by the Geological Survey in cooperation with other State and Federal Agencies by personnel of the Water Resources Division under the direction of:

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QUALITY OF SURFACE WATERS FOR IRRIGATION, WESTERN UNITED STATES, 1954

INTRODUCTION

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

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

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

It was contemplated that the network stations would be located at stream-flow gaging stations and that the program of collecting and analyzing the samples and reporting the findings would be the responsibility of the Geological Survey. The scope of the chemical analyses would provide for the calculation of the salt burden

Irrigation-Quality Network Stations in Western United States

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

No.	Geological Survey Part no.	Stream	Location	Date established
1	5	Souris River	near Westhope, N. Dak	
2	6	Missouri River	near Williston, N. Dak	Dec. 5, 1950
3		Missouri River	at Pierre, S. Dak	Oct. 3, 1950
4		Missouri River	at Nebraska City, Nebr	Jan. 4, 1951
5		Yellowstone River	at Billings, Mont	Dec. 15, 1950
6		Yellowstone River	near Sidney, Mont	Jan. 3, 1951
		Wind River	below Boysen Dam, Wyo	Nov. 24, 1954
7		Bighorn River[a]	at Thermopolis, Wyo	Jan. 1, 1951
8		Bighorn River	at Bighorn, Mont	Oct. 2, 1950
9		Tongue River	at Miles City, Mont	Jan. 4, 1951
10		Powder River	near Locate, Mont	Jan. 4, 1951
11		Grand River[b]	near Wakpala, S. Dak	Jan. 17, 1951
12		Moreau River	at Promise, S. Dak	
13		Cheyenne River[c]	near Eagle Butte, S. Dak	Jan. 17, 1951
14		White River	near Oacoma, S. Dak	
15		James River	near Huron, S. Dak	
16		N. Platte River	below Alcova Dam, Wyo	
17		N. Platte River	below Guernsey Reservoir, Wyo	Dec. 7, 1950
18		Platte River	at Brady, Nebr	Feb. 28, 1951
18a		Supply Canal (Tri-County Diversion).	near Maxwell, Nebr	Mar. 1, 1951
19		South Platte River	at Julesburg, Colo	Oct. 1, 1945
20		Republican River	above Medicine Creek at Cambridge, Nebr.	Dec. 22, 1950
21		Republican River	near Hardy, Nebr	
22		Smoky Hill River	near Langley, Kans	
23		Saline River	near Wilson (or Russell), Kans.	
			at Tescott, Kans	Apr. 3, 1950
24	7	Arkansas River	below John Martin Reservoir, Colo.	Jan. 10, 1951
25		Arkansas River	at Arkansas City, Kans	Oct. 8, 1951
26		Arkansas River	at Ralston, Okla	Jan. 1, 1950
27		Arkansas River	at Van Buren, Ark	Oct. 1, 1945
28		Cimarron River	at Mannford, Okla	Oct. 1, 1949
			at Perkins, Okla	Oct. 1, 1952
29		Canadian River[d]	near Tascosa, Tex	June 2, 1948
30		Canadian River	near Whitefield, Okla	Sept. 1, 1946
31		Red River	at Denison Dam, near Denison, Tex.	May 1, 1944
32		Washita River	near Tabler, Okla	Sept. 10, 1946
33		Sabine River	near Ruliff, Tex	Oct. 1, 1947
34		Neches River	at Evadale, Tex	Oct. 1, 1947
35	8	Trinity River	at Romayor, Tex	Sept. 1, 1945
36		San Jacinto River[e]	near Huffman, Tex	Sept. 1, 1945
37		Brazos River	at Richmond, Tex	Sept. 1, 1945
38		Colorado River	at Robert Lee, Tex	Oct. 1, 1947
39		Colorado River	at Austin, Tex	Oct. 1, 1947
40		Colorado River	at Wharton, Tex	Apr. 11, 1944
41		Guadalupe River	at Victoria, Tex	Sept. 1, 1945
42		Nueces River	near Mathis, Tex	Oct. 1, 1947
43		Rio Grande	above Culebra Cr. nr. Lobatos, Colo.	Oct. 11, 1946
44		Rio Grande	at Otowi Bridge nr. San Ildefonso, N. Mex.	Oct. 23, 1947
45		Rio Grande	at San Marcial, N. Mex	July 1, 1948
46		Rio Grande	below Elephant Butte Outlet, N. Mex.	1933
47		Rio Grande[f]	near El Paso, Tex	1930
48		Rio Grande[f]	below Old Fort Quitman, Tex	1930
49		Rio Grande[f]	at Upper Presidio, Tex	1935
50		Rio Grande[f]	at Langtry, Tex	1945
51		Rio Grande[f]	at Eagle Pass, Tex	1938
52		Rio Grande[f]	at Roma, Tex	1944
53		Pecos River	below Alamorgordo Dam, N. Mex.	June 26, 1937
54		Pecos River	near Artesia, N. Mex	July 1, 1937

Irrigation-Quality Network Stations in Western United States— Continued

No.	Geological Survey Part no.	Stream	Location	Date established
55	8	Pecos River	near Orla, Tex	July 1, 1937
56		Pecos River[f]	near Comstock, Tex	1935
57	9	Colorado River	near Glenwood Springs, Colo	Oct. 1941
58		Colorado River	near Cisco, Utah	Oct. 1928
59		Colorado River	at Lees Ferry, Ariz	Oct. 1, 1947
60		Colorado River	near Grand Canyon, Ariz.	Oct. 1939
61		Colorado River	below Hoover Dam, Ariz. -Nev.	Oct. 1939
62		Colorado River	below Parker Dam, Calif.	
63		Colorado River (Yuma Main Canal).	below Colorado River Siphon at Yuma, Ariz.	Oct. 1942
64		Gunnison River	near Grand Junction, Colo.	Oct. 1931
65		Green River	near Linwood, Utah	
66		Green River	at Green River, Utah	Oct. 1928
67		San Juan River	near Blanco, N. Mex.	Oct. 1, 1945
68		San Juan River	near Bluff, Utah	Oct. 1929
69		Little Colorado River	at Cameron, Ariz.	Jan. 17, 1951
70		Gila River	at Kelvin, Ariz.	Dec. 1, 1950
71		Gila River	below Gillespie Dam, Ariz.	Dec. 1, 1950
72		Salt River	at Stewart Mountain Dam, Ariz.	Dec. 9, 1950
73		Verde River	below Barlett Dam, Ariz.	Dec. 9, 1950
74		Agua Fria River	below Lake Pleasant Dam, Ariz.	Dec. 1, 1950
75	10	Bear River	near Collinston, Utah	
76		Sevier River	near Marysville, Utah	
77		Sevier River	near Lynndyl, Utah	Mar. 22, 1951
78		Humboldt River	at Palisade, Nev	
79		Humboldt River	near Rye Patch, Nev	Dec. 10, 1951
80	11	San Joaquin River	below Friant Dam, Calif	
81		San Joaquin River	near Mendota, Calif	
82		San Joaquin River	near Vernalis, Calif	Mar. 1, 1951
83		San Joaquin River	at Antioch, Calif.	
84		Calaveras River (Stockton Diverting Canal).	at Stockton, Calif.	Mar. 1, 1951
84a		San Joaquin River	near Biola, Calif.	Nov. 1952
85		Mokelumne River	at Woodbridge, Calif.	Mar. 1, 1951
86		Sacramento River	near Red Bluff, Calif.	
87		Sacramento River	at Knights Landing, Calif	Feb. 26, 1951
88		Feather River	at Nicolaus, Calif.	Feb. 26, 1951
89		American River	at Fair Oaks, Calif.	May 1, 1951
90	12	Columbia River	at International Boundary	Nov. 15, 1951
91		Columbia River	at Grand Coulee Dam, Wash	Nov. 25, 1950
92		Kootenai River	at Porthill, Idaho	
93		Pend Oreille River	near Metaline Falls, Wash.	
94		Yakima River	at Kiona, Wash.	Dec. 30, 1952
95	13	Snake River	near Heise, Idaho	Jan. 8, 1953
96		Snake River	near Minidoka, Idaho	
97		Snake River	at King Hill, Idaho	Mar. 27, 1951
98		Snake River	at Weiser, Idaho	
99		Snake River	near Clarkston, Wash.	Nov. 14, 1951
100		Boise River	near Arrowrock, Idaho	
101		Boise River	at Notus, Idaho	Nov. 21, 1950
102	14	Columbia River	at Maryhill, Ferry nr. Rufus, Oreg.	Dec. 1, 1950
103		Deschutes River[g]	at Moody nr. Biggs, Oreg.	Dec. 1952
104		Willamette River	at Salem, Oreg.	Feb. 1, 1951
105		Rogue River	at Grants Pass, Oreg.	Jan. 5, 1953
106	5	Sheyenne River	near Warwick, N. Dak.	Jan. 8, 1951
		Stations added by Subcommittee, October 2, 1952		
107	6	North Platte River	at Lewellen, Nebr.	
108		Platte River	near Louisville, Nebr.	
109	9	Virgin River	at Little field, Ariz.	July 1949

[a] Dropped from list Jan. 24, 1954. Replaced by station Wind River below Boysen Dam.
[b] Discontinued Nov. 20, 1953.

[c]Discontinued Nov. 20, 1953
[d]Discontinued Sept. 30, 1953.
[e]Discontinued Mar. 5, 1954.
[f]Operated by International Boundary and Water Commission.
[g]Discontinued Feb. 15, 1954.

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

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

1. All recommended stations should be located on streams west of the main stem of the Mississippi River.
2. All proposed stations should relate primarily to irrigation although multiple-purpose needs which include irrigation may be considered.
3. All stations should be located at or near stream-flow gaging stations. The most nearly up-to-date list of gaging stations currently operated by the U. S. Geological Survey (which comprises all but a small percentage of all gaging stations) will be found in the most recently published Geological Survey water-supply papers for the areas involved.
4. Consideration should be given to the location of irrigation development areas that are now affecting or are likely to affect the chemical quality of the river water.
5. Only those stations should be proposed that are likely to reflect important changes in chemical quality over a period of years. Stations operated for relatively short periods (5 years or less), as would be required for intensive studies of specific projects, should not in general be included.

Plate 1 is a plot of the recommended list of 109 network stations on streams in Western United States. The 82 stations in operation in 1954 are identified by a solid circle. The period of record, in years, is also shown at each of these stations. In a few instances the period of record differs from that obtained from the date established by the Subcommittee, as earlier records were included also. Proposed stations are identified by an open circle.

During the 1954 water year one network station was activated on the Wind River below Boysen Dam, Wyoming replacing the Bighorn River station at Thermopolis, Wyoming which was discontinued in January 1954. Both partial records are included in this report for comparative purposes. Five network stations were discontinued during the water year. They are the Grand River near Wakpala, S. Dak., Cheyenne River near Eagle Butte, S. Dak., Canadian River near Tascosa, Tex., San Jacinto River near Huffman, Tex. and the Deschutes River at Moody near Biggs, Oreg. As in 1952 and 1953 the record for Rio Grande Tiffany

Channel at San Marcial, is included; also the record for the Conveyance Channel for the Rio Grande at San Marcial is included this year; although these stations are not a part of the network list. The record at this station represents sampling of an artificial channel which bypasses the regular gaging station. During low flow the Tiffany Channel carries drainage water differing decidedly in quality from that in the main channel.

ACKNOWLEDGMENTS

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

During 1954, 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 also operated the Pecos River station near Comstock. 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 23 and 24 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 1953 and 1954. Analyses for seven Rio Grande main stem stations and for the Pecos River near Comstock, Tex., were obtained from the U. S. Salinity Laboratory, Riverside, Calif.

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

COLLECTION OF SAMPLES

In accordance with the recommendation of the Subcommittee, where practicable, one sample was collected each day throughout

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

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

EXAMINATION OF SAMPLES

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

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

It was further recommended by the Subcommittee that during the second and third years the following series of 11 determinations

(schedule 2) would be made on all composite samples: Calcium, magnesium, sodium, bicarbonate, carbonate, sulfate, chloride, nitrate, boron, dissolved solids, and specific conductance. Hardness, noncarbonate hardness, percent sodium, total tons and tons per acre-foot would be calculated as in schedule 1.

For the 1954 data there were notable exceptions to the recommended schedules as outlined above. At some stations, where more complete data were needed for other uses, the number of constituents determined was increased. Conversely, some stations that had been in operation for several years prior to this project, during which time at least the minimum determinations in schedule 1 were completed, were immediately placed on a reduced analytical schedule.

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

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

REPORTING OF DATA

In order to release the data in the form most widely used in the evaluation of irrigation waters, the results of analyses in this compilation are given in equivalents per million, rather than the conventional unit part per million. Some agencies that actively participate in irrigation water-quality investigations prefer to express results in milligrams per liter (mg/l) and milliequivalents per liter (meq/l). However, for all practical purposes where concentrations of dissolved solids are less than about 7,000 parts per million, no correction for density of the water is necessary and the units reported in each method are considered to be synonymous.

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

EXPLANATION OF TABLES

The tables of analyses beginning on page 24 include a brief descriptive heading summarizing the more pertinent features at each station as follows:

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

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

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

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

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

Discharge records were obtained from the responsible Geological Survey Surface Water Branch offices except for the seven stations operated by the International Boundary and Water Commission. Discharge data are shown in acre-feet, calculated from the mean daily discharge in cubic feet per second by multiplying by the factor 1.983.

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

$$\frac{Na \times 100}{Na + K + Ca + Mg}$$

, where all constituents are reported in equivalents per million.

At the recommendation of the Subcommittee, sodium-adsorption-ratio (SAR) is published for all network stations beginning October 1952. The term is defined and described under "Sodium hazard" on page 20.

DISCUSSION OF RESULTS

Discharge data and dissolved-solids loads for stations operated in 1954 are summarized in the following table.

HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

Red River of the North basin.— Runoff in the upper Sheyenne River basin was higher in 1954 than for the 1951, 52, and 53 water years, being triple the runoff for 1953. The greatest runoff during 1954 was in June and July.

Percentage composition of the water in 1954 differed little from the previous three years, but the weighted average dissolved solids decreased by nearly 100 ppm from 1953, probably as the result of increased runoff.

MISSOURI RIVER BASIN

Missouri River-main stem.—Flow in the Missouri River during 1954 was regulated by Ft. Peck, Garrison, and Ft. Randall Reservoirs. Storage in Garrison Reservoir began in November 1953. Water is stored in the reservoirs for navigation, flood control, and power generation. Some water is released for power generation

Summary of water discharge, and tonnages of dissolved solids

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Red River of the North basin		
Sheyenne River near Warwick, N. Dak.	48,280	0.62
Missouri River main stem		
Missouri River near Williston, N. Dak.	[a]16,570,000	[a].59
Missouri River at Pierre, S. Dak.	17,080,000	.61
Missouri River at Nebraska City, Nebr.	22,900,000	.60
Yellowstone River basin		
Yellowstone River at Billings, Mont.	4,575,000	.25
Yellowstone River near Sidney, Mont.	6,759,000	.61
Wind River below Boysen Dam, Wyo.	810,400	[a].69
Bighorn River at Thermopolis, Wyo.	.....	.....
Bighorn River at Bighorn, Mont.	1,958,000	[a]1.01
Tongue River at Miles City, Mont.	153,600	.73
Powder River near Locate, Mont.	163,500	1.75
Platte River basin		
North Platte River below Guernsey Reservoir, Wyo.	692,500	[a].59
Platte River at Brady, Nebr.	193,100	.59
Supply Canal (Tri-County Diversion) near Maxwell, Nebr.	1,029,000	.71
South Platte River at Julesburg, Colo.	101,000	2.03
Kansas River basin		
Republican River above Medicine Creek at Cambridge, Nebr.	63,480	[a].49
Arkansas River basin		
Arkansas River below John Martin Reservoir, Colo.	116,400	2.11
Arkansas River at Arkansas City, Kans.	331,000	1.75
Arkansas River at Ralston, Okla.	559,100	2.27
Cimarron River at Perkins, Okla.	220,900	5.52
Arkansas River at Van Buren, Ark.	6,134,990	1.21
Canadian River near Whitefield, Okla.	2,151,000	2.04
Red River basin		
Red River at Denison Dam near Denison, Tex.	2,859,360	1.23
Sabine River basin		
Sabine River near Ruliff, Tex.	2,966,000	.16
Neches River basin		
Neches River at Evadale, Tex.	1,531,000	.17
Trinity River basin		
Trinity River at Romayor, Tex.	1,227,000	.47
San Jacinto River basin		
San Jacinto River near Huffman, Tex.	.....	.....
Brazos River basin		
Brazos River at Richmond, Tex.	1,974,000	.62
Colorado River basin		
Colorado River at Austin, Tex.	684,400	.32
Colorado River at Wharton, Tex.	637,400	.33
Guadalupe River basin		
Guadalupe River at Victoria, Tex.	397,000	.41
Nueces River basin		
Nueces River near Mathis, Tex.	336,300	.37
Rio Grande basin		
Rio Grande above Culebra Creek near Lobatos, Colo.	71,570	.34
Rio Grande at Otowi Bridge near San Ildefonso, N. Mex.	450,600	.32
Rio Grande Tiffany Channel near San Marcial, N. Mex.	[a]33,200	.....
Rio Grande at San Marcial, N. Mex.	[a]103,900	1.06
Rio Grande Conveyance Channel at San Marcial, N. Mex.	[a]82,320	[a]1.24
Rio Grande below Elephant Butte Outlet, N. Mex.	245,400	.....
Rio Grande near El Paso, Tex.	.....	.....
Rio Grande below Old Fort Quitman, Tex.	.....	.....
Rio Grande at Upper Presidio, Tex.	.....	.....
Rio Grande at Langtry, Tex.	.....	.....
Rio Grande at Eagle Pass, Tex.	.....	.....
Rio Grande at Roma, Tex.	.....	.....
Pecos River below Alamogordo Dam, N. Mex.	66,500	2.98
Pecos River near Artesia, N. Mex.	74,180	4.77

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

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Rio Grande basin—Continued		
Pecos River below Red Bluff Dam near Orla, Tex.	63,970	9.25
Pecos River near Comstock, Tex.	.....	.....
Colorado River main stem		
Colorado River near Glenwood Springs, Colo.	883,400	.55
Colorado River near Cisco, Utah.	[a]1,772,000	[a]1.39
Colorado River at Lees Ferry, Ariz.	6,101,000	1.05
Colorado River near Grand Canyon, Ariz.	6,229,000	1.16
Colorado River below Hoover, Dam, Ariz, -Nev.	10,680,000	.92
Diversions and Return Flows at and below Imperial Dam		
Yuma Main Canal Below Colorado River siphon at Yuma, Ariz.	338,200	.99
Gunnison River basin		
Gunnison River near Grand Junction, Colo.	[a]637,300	[a]1.69
Green River basin		
Green River at Green River, Utah.	[a]2,473,000	[a].68
San Juan River basin		
San Juan River near Blanco, N. Mex.	514,200	.29
San Juan River near Bluff, Utah.	[a]948,400	[a].80
Little Colorado River basin		
Little Colorado River at Cameron, Ariz.	.....	.....
Virgin River basin		
Virgin River at Little field, Ariz.	[a]124,700	[a]2.54
Gila River basin		
Gila River at Kelvin, Ariz.	186,200	.69
Gila River below Gillespie Dam, Ariz.	43,630	3.90
Salt River at Stewart Mountain Dam, Ariz.	506,000	.72
Verde River below Bartlet Dam, Ariz.	295,300	.38
Aqua Fria River below Lake Pleasant Dam, Ariz.	[a]27,640	[a].34
Sevier Lake basin		
Sevier River near Lynndyl, Utah.	132,000	2.35
Humboldt River basin		
Humboldt River near Rye Patch, Nev.	[a]100,400	[a]1.01
San Joaquin River basin		
San Joaquin River near Biola, Calif.	249,300	.06
San Joaquin River near Vernalis, Calif.	1,717,000	.32
Mokelumne River at Woodbridge, Calif.	[a]266,000	[a].05
Sacramento River basin		
Sacramento River at Knights Landing, Calif.	8,275,000	.16
Feather River at Nicolaus, Calif.	5,343,000	[a].09
American River at Fair Oaks, Calif.	2,068,000	.06
Columbia River main stem		
Columbia River at International Boundary	[a]86,390,000	[a].12
Columbia River at Grand Coulee, Dam, Wash.	98,040,000	.12
Yakima River basin		
Yakima River at Kiona, Wash.	3,091,000	.18
Snake River main stem		
Snake River near Heise, Idaho.	4,994,000	.29
Snake River at King Hill, Idaho.	[a]6,563,000	[a].45
Snake River near Clarkston, Wash.	[a]35,130,000	.22
Boise River basin		
Boise River at Notus, Idaho.	799,000	.30
Deschutes River basin		
Deschutes River at Moody near Biggs, Oreg.	.....	.....
Columbia River main stem		
Columbia River at Maryhill Ferry near Rufus, Oreg.	151,400,000	.14
Willamette River basin		
Willamette River at Salem, Oreg.	21,300,000	.07
Rogue River Basin		
Rogue River at Grants Pass, Oreg.	3,354,000	.10

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

all of the time; high flows are impounded for flood control and to provide water for regulating the flow of the stream for navigation from early spring until late fall.

In 1954 the flow at Williston, Wyo., was 12 percent above average (26 year average), at Pierre near average (25 year average), and at Nebraska City, Nebr., 11 percent below average (24 year average). Flow in the upper Missouri basin was about 10 to 20 percent below average. Discharge above 100,000 cfs occurred at Nebraska City June 21 and 22, as a result of storms in the central reach of the river.

Spring runoff in the Missouri River was stored in Ft. Peck Reservoir until after the spring runoff from the Yellowstone River basin had passed Williston. In the late summer, when flow in the Yellowstone was low, the impounded water in Ft. Peck Reservoir was released in order to maintain flows downstream. Water in the Missouri River above Ft. Peck and water in the Yellowstone River are on the average similar in quality; however, the water in the upper Missouri River is impounded and is therefore of a more constant quality when released from storage. Large fluctuations in water quality at Williston are due principally to fluctuations in the quality of the water in the Yellowstone River and to changes in the proportion of upper Missouri River water to Yellowstone River water.

Although Garrison Reservoir began to impound water in November 1953, the effect on the quality of the water in the river was small because only about 3 percent of the flow at Garrison for the year was actually impounded. About 12 percent of the flow at Ft. Randall was impounded and added to the water already in storage.

The quality of the water is similar at the three sampling stations along the river. A comparison of the weighted average values for dissolved solids and specific conductance shows a slight increase in mineralization between Williston and Pierre, S. Dak., and a decrease between Pierre and Nebraska City. This same phenomenon also occurred in 1953. The increase in mineralization probably is due to the influence of tributary streams in in the Dakotas; the decrease probably is due to dilution by the Niobrara, Platte, and possibly the Big Sioux Rivers. The quality of the water has remained essentially the same as it was in 1953 at the Williston station, but was slightly improved at Pierre and at Nebraska City.

Of the dissolved solids load at Nebraska City during 1954 about 30 percent was contributed by the Yellowstone River basin, about 40 percent by the Upper Missouri basin, about 6 percent by the

drainage are between Williston and Pierre, and about 24 percent by the drainage area between Pierre and Nebraska City. The dissolved solids load at Nebraska City was 23 percent lower than for the 1953 water year.

Yellowstone River basin.—Runoff in the basin during 1954 was about the same as in 1953 and it was lower than in 1951 and 1952 which were years of above normal discharge, and also lower than the average for the 1934–54 period of discharge record.

Of the total dissolved solids load of the Yellowstone River at Sidney, 28 percent was contributed by the Yellowstone River basin above Billings, 48 percent by the Bighorn River basin, 3 percent by the Tongue River basin, and 7 percent by the Powder River basin. Fourteen percent of the dissolved solids load at Sidney is contributed by the minor tributaries and the Yellowstone Valley between Billings and Sidney.

There are diversions for about 1,250,000 acres of irrigated land in the Yellowstone basin above Sidney, Montana. Of this total acreage about 30 percent is in the Yellowstone River basin above Billings, Mont., 35 percent in the Bighorn basin, 10 percent in the Tongue and Powder basins, and the remaining 25 percent in the Yellowstone Valley and in minor basins between Billings and Sidney. Water used for irrigation in the Yellowstone Valley and in the minor basins between Billings and Sidney probably accounts for some of the loss of water between Billings and Sidney and for much of the salt load (14 percent) that is not measured above Sidney.

Major reservoirs in operation in the basin are Buffalo Bill Reservoir in the Shoshone River basin and Bull Lake, Pilot Butte, and Boysen Reservoirs in the Wind River basin. About 83,000 acre feet of water was impounded in Boysen, the largest reservoir in the basin, while more water (about 53,000 acre feet) was released from Bull Lake and Buffalo Bill than was impounded during the year. The reservoirs tend to make the water quality downstream more uniform with respect to time. Data for 1954 for the Wind River below Boysen Dam, Wyo., indicate that with a few exceptions daily specific conductance ranged from about 650 to 900 micromhos; further downstream daily specific conductance of the Bighorn River at Bighorn ranged from about 625 to 1,400 micromhos.

The quality of the water in the basin was very similar to that for the 1953 water year. However, because runoff in the Tongue and Powder River basins was much lower in 1954, the quality of water in these streams was poorer than in 1953; weighted average

dissolved solids concentrations were about 100 ppm greater in 1954 than in 1953.

Platte River basin.—Runoff in the basin upstream from Brady, Nebr., was less than one-half of the long-time average. Flow in the North Platte and South Platte Rivers is affected by trans-basin diversions, reservoirs (Seminoe, Pathfinder, Alcova, Guernsey, and McConaughy on the North Platte; Elevenmile Canyon and Cheesman on the South Platte), power developments, ground-water withdrawals, and diversions for and return flow from irrigation developments.

Water in the Platte River is utilized to such an extent that flow is reduced to nearly zero in certain reaches during parts of the year. For example, near Grand Island, Nebraska the river is dry for most of the summer. Correlation of chemical quality data at different stations along the stream is very difficult because water flowing past upstream stations sometimes does not reach the downstream stations; the water flowing past downstream stations is frequently composed of relatively local recharge. The mineral load carried by the Supply Canal near Maxwell, Nebr. is about five times that carried by the Platte River at Brady, Nebr. Much of the flow in the river at Brady is ground-water inflow and inflow from several small creeks draining the area to the north.

Kansas River basin.—The Saline River at Tescott, Kansas, station was discontinued September 30, 1953. Runoff at the Republican River above Medicine Creek at Cambridge, Nebraska was about one-half of the 1951, 1952 and 1953 water years. However, the quality of the water remained essentially the same in 1954 as it was in 1953, primarily because of regulation by Trenton dam (Swanson Lake) and Enders Reservoir.

Major reservoirs above the station, Republican River above Medicine Creek at Cambridge, include Bonny Reservoir, on the South Fork Republican river, Enders Reservoir on Frenchman Creek and Swanson Lake on the main stem.

LOWER MISSISSIPPI RIVER BASIN

Arkansas River basin.—An overall picture of the water quality record for the 1954 water year would be one of greatly deficient runoff and the consequent increases in the dissolved chemical loads. One deviation from this would be the highly regulated station below John Martin Reservoir, Colo., where the runoff release was 73 percent of the deficient previous year and was only 40 percent of the average for 16 years of record. In spite of the decreased flow the weighted water quality at the John Martin Reservoir was improved

over the previous year. This is because 45 percent of the runoff occurred in August when the chemical concentrations were the lowest of the water year. At Arkansas City, Kans. the average river discharge was 27 percent less than the 33-year average; and at Ralston, Okla. the average river discharge was 17 percent less than the 29-year average for that station. These decreases in flow were accompanied by increases in concentrations of all constituents as well as the percent sodium and the sodium-adsorption-ratio.

The Cimarron River at Perkins, Okla. records show an increase in discharge from 169,000 acre-feet in 1953 to 220,900 acre-feet and an expected decrease in the dissolved mineral load from 6.50 tons per acre-foot in 1953 to 5.52 tons per acre-foot. The discharge of 220,900 acre-feet is about 27 percent of the average for 15 years of record at this station. Runoff for the Arkansas River at Van Buren was 6.1 million acre-feet as compared to 9.4 million acre-feet in 1953 and was 27 percent of the average discharge for 27 years of record. All mineral constituents increased in concentration slightly over the 1953 water year except sodium and chloride which increased 62 percent over the previous year. This is due to proportionally larger flow from the Cimarron River during the year.

Discharge for the Canadian River near Whitefield was 2.2 million acre-feet which is slightly less than the 2.4 million acre-feet for the 1953 water year. This decrease in discharge was accompanied by a 70 percent increase in the average weighted dissolved solids in parts per million. All of the network stations in the basin had a lower dissolved chemical load in tons in 1954 than in 1953 except for the Cimarron station which had a slight increase in chemical load.

WESTERN GULF OF MEXICO STATION

The Red River at Denison Dam near Denison, Tex. had a discharge slightly higher than 1953 but still 24 percent below the average for the 31 years of discharge record for the station. The weighted average dissolved solids concentration and the unit load for the 1954 water year were 908 parts per million and 1.23 tons per acre-foot and were slightly lower than the 1953 year.

Runoff from the Sabine River to the Nueces River was generally less in 1954 than 1953, and dissolved solids concentrations were higher.

Rio Grande basin.—The discharge of the Rio Grande above Culebra Creek near Lobatos, Colorado, during the 1954 water year was 53 percent of the previous year's discharge and 14.5 percent of the yearly average for the fifty-five years of record at this station. The weighted average analysis at this station shows that the chemical composition of the water was also lower than for the 1953 water year. This direct variation between the discharge and the weighted chemical analysis is probably due to variations in subirrigation practices in the San Luis Valley of Southern Colorado.

The International Boundary and Water Commission reported the flow of the Rio Grande from El Paso, Tex. to Langtry, Tex. was much below normal. From the Del Rio station to the Laredo station the yearly volume of flow was greatly above normal due to one of the greatest floods of record which originated on the Pecos River and Devils River watersheds.

The annual tonnage of salts carried by the river was much below normal from El Paso to Langtry, Tex. Tonnages from Langtry to Falcon Reservoir above Roma were only slightly below normal. Below Falcon Reservoir tonnages were about half of normal because of the large volume of water in storage at the end of the year.

COLORADO RIVER BASIN

The quality of surface water supplies for irrigation in New Mexico and Arizona generally was poorer than in the 1952 and 1953 water years.

Generally, most of the changes in water quality at network stations were due to fluctuations in stream runoff and irrigation practices. Runoff for most of the stations in the basin was less than for the previous year.

Colorado River main stem.—An increase in the concentration of dissolved solids was noted for the Colorado River Basin generally. This change may be attributed to a decrease in runoff as compared to the previous year. With a decrease of about 45 percent in flow the dissolved solids increased approximately 38 percent over last year at the Glenwood Springs, Colorado River station. This pronounced difference in concentration upstream was modified considerably at the station below Hoover Dam, possibly because of the mixing effect of the reservoir.

Gunnison River basin.—An unusually good comparison is possible for the Gunnison River station at Grand Junction, Colorado. With 96

percent and 98 percent of the flow for 1953–54 represented by analyses it was noted that a decrease of about 50 percent in flow was accompanied by an increase of approximately 40 percent in dissolved solids and only 7 percent sodium.

Green River basin.—A decrease from last year of about 25 percent in flow had only slight effect (less than one-half of 1 percent) on the concentration of dissolved solids.

San Juan basin.—A slight increase in total flow for the year was accompanied by a slight increase in dissolved solids and percent sodium over the previous year. This may be due to solution of precipitated salts from last year's extreme low flow in an arid climate.

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

Virgin River basin.—This station downstream from an area of intense irrigation had an increase in flow of about 35 percent over the 1953 water year. This may account for the decrease of approximately 17 percent in specific conductance and total solids.

Gila River basin.— The annual runoff in most of the Gila and Salt River watersheds in southern Arizona was much higher than for the previous water year. Most of this increase in runoff came from heavy rains during March, July, August, and September. This runoff was higher than average; and decreased the weighted average analysis computed for the stations Gila River at Kelvin, Arizona and Gila River below Gillespie Dam, Arizona. The yearly weighted average analysis of the water released from Stewart Mountain Dam does not show a decrease in chemical constituents because the heavy runoff was stored in reservoirs higher in the watershed.

THE GREAT BASIN

Sevier Lake basin.— Runoff in the heavily irrigated Sevier River Basin was considerably less than for the 1953 water year. An increase of about 15 percent in dissolved solids and 8 percent in percent sodium was noted. The 1954 records revealed an increase in dissolved solids and percent sodium with approximately a 30 percent increase in flow.

Humboldt River basin.—An increase in dissolved solids, specific conductance, and percent sodium over last year may have resulted from a decrease in runoff of approximately 28 percent.

PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

Columbia River main stem.—Although runoff of the Columbia River at International Boundary was about 25 percent higher in the water year 1954 than in 1953, the average salt concentration in tons per acre-foot remained the same as the previous year. Downstream at Grand Coulee Dam, Wash., the quality of river water changed very little from the preceding year.

Yakima River basin.—Slight reductions in average SAR, and salt concentration occurred in the Yakima River at the Kiona, Wash. gaging station, 25 miles upstream from mouth. Increased flow past this station over that of 1953 resulted in an increased dissolved solids load of almost 25 percent.

SNAKE RIVER BASIN

Snake River Basin main stem.—Runoff in the Snake River Basin above Clarkston, Washington was about 8.5 percent below the 1953 water year. However, flow past the Heise station was about 7.5 percent greater than last year with little or no difference in mineral concentration. The decrease of about 8.5 percent in flow accounted for only 1 percent increase in dissolved solids and specific conductance at the King Hill station. The specific conductance and dissolved solids content at the Clarkston station decreased about 4.5 percent with the decrease in flow. This apparently abnormal condition may have been due to the inflow of the slightly mineralized water of Clearwater Creek which had a mean discharge of 2,000 cubic feet per second greater than in 1953.

Boise River basin.—Runoff in this basin was about 22 percent below the 1953 water year. The yearly weighted average dissolved solids concentration of the Boise River at Notus, Idaho was 0.30 ton per acre foot. The average percent sodium was the same as the 1953 water year.

PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN

Deschutes River basin.— Operation of the Deschutes River sampling station at Moody near Biggs, Oreg. begun in December 1952 was discontinued February 1954 because of construction of The Dalles dam on the Columbia River.

Columbia River main stem.—Some slight change in properties of Columbia River water near Rufus, Oreg., was observed in 1954 because of increased flow. Average salt concentration decreased from 0.16 to 0.14 tons per acre-foot and SAR value from 0.5 to 0.3 compared with 1953.

Willamette River basin.—Salinity and alkali hazards in the Willamette River water remained very low in 1954. At Salem, Oregon the river water had a weighted average specific conductance of 54.2 micromhos and a SAR value of 0.4; about average for the period of record.

Rogue River basin.—Rogue River water sampled at Grants Pass, Oregon showed no significant change from data reported in 1953. Salinity and alkali hazards were low and weighted average specific conductance was 92.7 micromhos.

CRITERIA OF WATER QUALITY

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

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

Thorne and Thorne (1951) in developing a system for classifying Utah waters designated categories by a series of two numbers: 1A, 1B, 1C, 1E, to increasing concentrations of dissolved solids and the letters to increasing proportions of sodium in the water or to different sodium percentages. In the number classification, Class 1 water in which specific conductance ranges from 0 to 750 micromhos, can be used safely on all soils. Class 5 waters, those having specific conductance greater than 5,000 micromhos, are generally unsuitable and should be used for irrigation only under special situations.

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

A. Salinity hazard.

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

B. Sodium hazard.

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

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

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

Waters are divided into four classes with respect to sodium hazard, the dividing points being at SAR values of 10, 18, and 26. They range from low-sodium water that can be used for irrigation on almost all soils to very high-sodium water which is generally unsatisfactory for irrigation.

C. Boron hazard.

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

D. Bicarbonate ion hazard.

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

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

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

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RED RIVER OF THE NORTH BASIN

SHEYENNE RIVER NEAR WARWICK, N. DAK.

LOCATION.--At gaging station at highway bridge, 3.3 miles south of Warwick, Benson County.
DRAINAGE AREA.--2,100 square miles, approximately.
Chemical analyses: January 1951 to September 1954.
RECORDS AVAILABLE.--Water temperatures: January 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,220 micromhos Aug. 26, 27; minimum daily, 343 micromhos Mar. 2.
Percent sodium: Maximum, 58 July 26 to Aug. 7, Aug. 28 to Sept. 30; minimum, 20 Oct. 1-31.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 1,220 micromhos Aug. 26-27, 1954; minimum daily, 244 micromhos Mar. 29, 1951.
Percent sodium: Maximum, 58 July 26 to Aug. 7, Aug. 28 to Sept. 30, 1954; minimum, 16 Oct. 1-31, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953	95	--	4.38		1.09	--	4.39	1.00	--	--	--	--	305	0.41	39	20	0.7	498	8.0
Nov. 1-30	169	--	4.58		2.48	--	5.54	1.39	--	--	--	--	406	.55	93	35	1.6	640	8.1
Dec. 1-28	188	19	3.04	2.28	3.70	0.22	7.01	1.73	0.34	0.03	0.03	0.26	513	.70	132	40	2.3	802	8.0
Dec. 29-Jan 16, 1954	143	--	5.72		2.87	--	6.75	1.81	--	--	--	--	491	.67	96	33	1.7	769	8.1
Jan. 17-26	63	--	5.42		2.30	--	6.06	1.52	--	--	--	--	451	.61	38	30	1.4	701	7.8
Jan. 27-Feb. 21	272	--	6.14		2.30	--	6.65	1.56	--	--	--	--	484	.66	180	27	1.3	755	7.8
Feb. 22-28	1,700	--	4.04		3.13	--	5.06	1.94	--	--	--	--	446	.61	1,040	44	2.2	688	7.6
Mar. 1-4	1,140	--	2.04		1.61	--	2.51	1.06	--	--	--	--	232	.32	365	44	1.6	373	7.3
Mar. 5-31	3,720	15	1.65	1.17	2.65	.20	3.65	1.71	.23	.01	.04	.15	344	.47	1,750	47	2.2	530	7.8
Apr. 1-30	3,820	--	2.90		2.17	--	3.44	1.46	--	--	--	--	309	.42	1,600	43	1.8	491	7.8
May 1-23	1,410	--	4.30		2.87	--	5.00	1.96	--	--	--	--	440	.60	846	40	2.0	676	8.1
May 24-June 8	1,220	16	2.74	2.40	3.65	.20	a6.20	2.25	.45	.04	.03	.19	524	.71	866	41	2.3	812	8.2
June 9-13	3,340	--	4.26		3.39	--	5.11	2.21	.37	--	--	--	460	.63	2,100	44	2.3	705	7.4
June 14-17	3,660	--	3.50		2.83	--	4.15	2.00	.24	--	--	--	395	.54	1,980	44	2.1	596	7.4
June 18-20	4,710	--	3.16		3.00	--	4.08	2.02	.18	--	--	--	389	.53	2,500	48	2.4	590	7.3
June 21-23	3,000	--	3.34		3.04	--	4.51	1.83	.17	--	--	--	407	.55	1,650	47	2.4	602	7.7

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

RED RIVER OF THE NORTH BASIN--Continued

SHEYENNE RIVER NEAR WARWICK, N. DAK.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 24-July 1, 1954	4,410	--	3.68		4.00	--	5.44	2.10	0.24	--	--	--	481	0.65	2,870	51	2.9	715	7.5
July 2-3	1,730	--	4.64		6.04	--	7.10	3.35	.48	--	--	--	659	.90	1,560	55	4.0	985	7.8
July 4-7	2,800	--	3.28		3.96	--	5.05	1.94	.28	--	--	--	440	.60	1,680	54	3.1	674	7.7
July 8-12	1,820	--	3.70		4.57	--	5.95	2.02	.28	--	--	--	492	.67	1,220	55	3.4	756	7.5
July 13-18	1,760	--	4.08		5.57	--	7.06	2.35	.37	--	--	--	590	.80	1,410	57	3.9	882	7.8
July 19-25	1,200	--	3.76		4.83	--	6.29	1.98	.34	--	--	--	512	.70	840	56	3.5	785	7.8
July 26-Aug. 7	1,300	--	3.96		5.44	--	7.16	1.89	.34	--	--	--	552	.75	975	58	3.9	845	7.7
Aug. 8-25	1,820	--	4.12		5.74	--	7.88	1.77	.37	--	--	--	581	.79	1,440	57	4.0	883	8.0
Aug. 26-27	161	--	7.08		5.87	--	7.24	1.98	3.95	--	--	--	753	1.02	164	45	3.1	1,220	7.5
Aug. 28-Sept. 30	2,630	20	2.00	2.52	6.65	0.28	8.93	2.06	.48	0.03	0.01	0.46	660	.90	2,370	58	4.4	994	8.0
Total or weighted average[b]	48,280	--	3.68		3.74	--	5.24	1.98	0.28	--	--	--	453	0.62	29,800	50	2.8	690	--

b Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1953 to September 1954.

MISSOURI RIVER MAIN STEM

MISSOURI RIVER NEAR WILLISTON, N. DAK.

LOCATION.--At gaging station at Lewis and Clark Highway bridge, 5 miles southwest of Williston, Williams County, and 25 miles downstream from Yellowstone River, and at mile 1,650.2.
DRAINAGE AREA.--164,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: May 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 908 micromhos Feb. 3, 5; minimum daily, 342 micromhos June 28.
Percent sodium: Maximum, 40 May 22, June 2-27; minimum, 32 May 23 to June 1.
EXTREMES, 1950-54.--Specific conductance: Maximum daily, 908 micromhos Feb. 3, 5, 1954; minimum daily, 320 micromhos June 24, 1951.
Percent sodium: Maximum, 41 May 26 to June 9, 1953; minimum, 31 Jan. 30, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953	2,040,000	--	4.52		2.57	--	3.08	3.85	--	--	--	--	456	0.62	1,265,000	36	1.7	678	7.4
Nov. 1-21	911,600	--	5.02		2.78	--	3.26	4.29	--	--	--	--	493	.67	610,800	36	1.8	733	7.7
Nov. 22-Dec. 13	691,800	14	3.29	2.01	3.04	0.10	3.47	4.68	0.31	0.04	0.01	0.15	529	.72	498,100	36	1.9	787	7.9
Jan. 1-13, 1954	274,700	--	5.60		3.09	--	3.59	4.85	--	--	--	--	552	.75	206,000	36	1.8	818	7.9
Jan. 14-31	298,500	--	5.60		3.00	--	3.62	4.62	--	--	--	--	544	.74	220,900	35	1.8	804	7.7
Feb. 1-9	235,000	--	6.04		3.26	--	3.80	5.20	--	--	--	--	587	.80	188,000	35	1.9	867	8.0
Feb. 10-Mar. 3	684,500	--	4.58		2.65	--	3.03	4.04	--	--	--	--	458	.62	424,400	37	1.7	697	7.9
Apr. 10-30	987,800	11	2.50	1.52	2.70	.14	2.88	3.73	.23	.02	.03	.18	429	.58	572,900	39	1.9	656	7.9
May 1-12	359,400	--	4.88		3.17	--	3.29	4.54	--	--	--	--	515	.70	251,600	39	2.0	779	8.1
May 13-16	130,100	--	3.18		1.65	--	2.26	2.42	--	--	--	--	306	.42	54,640	34	1.3	484	7.9
May 17-21	238,400	--	3.66		2.00	--	2.57	2.87	--	--	--	--	358	.49	116,800	35	1.5	558	7.5
May 22	54,740	--	4.76		3.13	--	3.28	4.29	--	--	--	--	496	.67	36,680	40	2.0	760	7.9

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MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER NEAR WILLISTON, N. DAK.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 23-June 1, 1954	687,700	--	2.92		1.39	--	2.29	1.94	--	--	--	--	291	0.40	275,100	32	1.2	426	7.8
June 2-27	1,257,000	15	2.00	1.16	2.17	0.09	2.41	2.79	0.20	0.02	0.02	0.11	355	.48	603,400	40	1.7	528	7.7
June 28-July 11	978,800	--	2.54		1.39	--	2.00	1.83	--	--	--	--	251	.34	332,800	35	1.2	394	7.1
July 12	59,900	--	4.16		2.26	--	2.92	3.39	--	--	--	--	416	.57	34,140	35	1.6	619	7.9
July 13-31	1,093,000	--	3.28		1.83	--	2.34	2.66	--	--	--	--	327	.44	480,900	36	1.4	505	7.6
Aug. 1-31	2,139,000	--	4.32		2.39	--	2.90	3.66	--	--	--	--	427	.58	1,241,000	36	1.6	645	7.6
Sept. 1-30	1,912,000	14	2.59	1.99	2.48	.11	3.08	3.87	.27	.04	.01	.14	455	.62	1,185,000	35	1.6	680	7.8
Total or weighted average a	15,030,000	--	4.18		2.44	--	2.87	3.54	--	--	--	--	421	0.57	8,598,000	37	1.7	633	--
Total or weighted average b	16,570,000	--	4.30		2.52	--	2.93	3.66	--	--	--	--	433	0.59	9,744,000	37	1.7	650	--

a Represents 91 percent of runoff for water year October 1953 to September 1954.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

MISSOURI RIVER AT PIERRE, S. DAK.

LOCATION.--At bridge on U. S. Highway 14 at Pierre, Hughes County, 0.3 mile upstream from gaging station and 1.5 miles upstream from Bad River.
DRAINAGE AREA.--243,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,040 micromhos Jan. 23; minimum daily, 440 micromhos Aug. 6.
Percent sodium: Maximum, 44 May 26 to June 4; minimum, 36 Oct. 1-31.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 1,040 micromhos Jan. 23, 1954; minimum daily, 394 micromhos July 3, 1951.
Percent sodium: Maximum, 45 May 1-3, 1953; minimum, 27 Jan. 24-27, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953	2,036,000	--	4.54		2.52	--	3.03	3.85	--	--	--	--	449	0.61	1,242,000	36	1.7	678	7.8
Nov. 1-30	1,470,000	11	2.99	1.81	2.91	0.09	3.21	4.27	0.27	0.04	0.02	0.14	499	.68	999,600	37	1.9	736	7.9
Dec. 1-31	605,000	--	5.78		3.48	--	3.82	5.16	--	--	--	--	588	.80	484,000	38	2.0	861	8.0
Jan. 1-Feb. 2,1954	565,500	--	6.76		4.09	--	4.42	6.04	--	--	--	--	684	.93	525,900	38	2.2	997	8.0
Feb. 3-Mar. 2	655,500	--	5.26		3.13	--	3.51	4.66	--	--	--	--	532	.72	472,000	37	1.9	798	7.7
Mar. 3-Apr. 5	1,235,000	13	2.84	1.72	2.96	.12	3.13	4.16	.27	.02	.02	.15	479	.65	802,800	39	2.0	726	7.9
Apr. 6-8	88,260	--	5.18		3.57	--	3.36	5.16	--	--	--	--	562	.76	67,080	41	2.2	841	7.8
Apr. 9-12	208,900	--	4.90		3.39	--	3.20	4.89	--	--	--	--	534	.73	152,500	41	2.2	805	7.6
Apr. 13-30	980,600	--	4.16		3.04	--	3.02	4.06	--	--	--	--	454	.62	608,000	42	2.1	708	7.7
May 1-25	1,253,000	13	2.35	1.43	2.78	.13	2.82	3.60	.23	.03	.02	.15	424	.58	726,700	42	2.0	649	8.0
May 26-30	263,600	--	4.98		3.91	--	3.23	5.48	--	--	--	--	581	.79	208,200	44	2.5	857	7.8
May 31-June 4	271,700	--	4.44		3.61	--	3.28	4.60	.28	--	--	--	521	.71	192,900	44	2.4	766	7.8
June 5-13	505,200	--	4.00		3.00	--	2.90	4.02	.23	--	--	--	452	.61	308,200	42	2.1	680	7.6
June 14-July 9	844,600	--	3.36		2.57	--	2.61	3.16	.20	--	--	--	384	.52	439,200	43	2.0	579	7.5
July 10-20	579,200	--	3.28		2.57	--	2.56	3.14	.21	--	--	--	378	.51	295,400	43	2.0	575	7.4
July 21-28	556,400	--	3.06		2.17	--	2.49	2.66	.18	--	--	--	339	.46	255,900	41	1.8	517	7.6

MISSOURI RIVER MAIN STEM--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 29-Aug. 17, 1954	1,548,000	--	2.90		1.87	--	2.33	2.35	0.16	--	--	--	307	0.42	650,200	39	1.6	469	7.8
Aug. 18-24	546,200	--	3.64		2.17	--	2.65	3.08	.20	--	--	--	373	.51	278,600	37	1.6	566	7.8
Aug. 25-31	540,300	--	4.04		2.39	--	2.79	3.50	--	--	--	--	402	.55	297,200	37	1.7	618	7.7
Sept. 1-30	2,329,000	15	2.69	1.63	2.74	0.12	3.02	3.75	.24	0.04	0.02	0.14	458	.62	1,444,000	38	1.9	668	7.8
Total or weighted average a	17,080,000	--	4.26		2.78	--	3.00	3.83	--	--	--	--	450	0.61	10,450,000	37	1.9	675	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

MISSOURI RIVER AT NEBRASKA CITY, NEBR.

LOCATION.--At gaging station at Waubonsie Highway bridge at Nebraska City, Otoe County.
DRAINAGE AREA.--414,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1954.
Water temperatures: May 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 895 micromhos Jan. 22; minimum daily, 422 micromhos June 24.
Percent sodium: Maximum, 42 Aug. 1-10; minimum, 23 June 26-28.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 936 micromhos Jan. 6, 1953; minimum daily, 361 micromhos Mar. 29, 1951.
Percent sodium: Maximum, 43 June 20-25, 1953; minimum, 18 Mar. 27-29, 1951.
REMARKS.--Values reported for dissolved solids are residue on evaporation. 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 1953 to September 1954 given in WSP 1340.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953	2,147,000	--	4.56		2.65	--	3.08	3.79	--	--	--	--	470	0.64	1,374,000	37	1.7	697	7.9
Nov. 1-30	1,466,000	--	4.56		2.44	--	3.16	3.37	--	--	--	--	451	.61	894,300	35	1.6	675	7.8
Dec. 1-23	990,100	18	3.14	1.52	2.48	0.13	3.24	3.44	0.56	0.03	0.05	0.12	467	.64	633,700	34	1.6	687	7.7
Dec. 24-Jan. 13, 1954	557,300	--	5.20		2.74	--	3.70	3.48	--	--	--	--	507	.69	384,500	35	1.7	760	7.7
Jan. 14-Feb. 9	639,500	--	5.48		3.09	--	3.79	3.91	--	--	--	--	548	.75	479,600	36	1.9	818	7.8
Feb. 10-28	1,054,000	--	4.34		2.09	--	3.11	2.83	--	--	--	--	414	.56	590,200	33	1.4	629	8.0
Mar. 1-31	2,087,000	19	3.39	1.69	2.48	.16	3.39	3.71	.51	.03	.07	.12	484	.66	1,377,000	32	1.6	727	7.8
Apr. 1-30	2,102,000	--	5.04		2.52	--	3.43	3.71	--	--	--	--	485	.66	1,387,000	33	1.6	731	7.8
May 1-2	161,100	--	4.58		2.91	--	3.10	3.79	--	--	--	--	483	.66	106,300	39	1.9	737	7.9
May 3-6	367,900	--	4.44		2.48	--	3.11	3.35	--	--	--	--	449	.61	224,400	36	1.7	684	7.6
May 7-June 1	1,854,000	--	4.64		2.78	--	3.18	3.83	--	--	--	--	480	.65	1,205,000	37	1.8	731	7.9
June 2-5	368,900	--	4.26		2.17	--	3.20	2.85	--	--	--	--	402	.55	202,900	34	1.5	631	7.5
June 6-19	1,148,000	--	4.16		2.30	--	2.95	3.08	--	--	--	--	416	.57	654,400	36	1.6	638	7.8
June 20-22	559,300	14	2.79	1.19	1.78	.17	2.98	2.56	.25	.03	.08	.10	375	.51	285,200	30	1.3	575	8.2
June 23-25	479,400	--	3.18		1.00	--	2.43	1.69	--	--	--	--	273	.37	177,400	24	.8	426	7.7
June 26-28	346,500	--	3.44		1.00	--	2.49	1.77	--	--	--	--	289	.39	135,100	23	.8	445	7.7

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT NEBRASKA CITY, NEBR.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 29-July 1, 1954	262,600	--	4.52		1.48	--	3.06	2.64	--	--	--	--	382	0.52	136,600	25	1.0	588	7.9
July 2-31	2,070,000	--	4.82		3.00	--	3.15	4.25	--	--	--	--	498	.68	1,408,000	38	1.9	752	7.7
Aug. 1-10	735,900	--	4.04		2.91	--	2.88	3.62	--	--	--	--	440	.60	441,500	42	2.1	681	7.4
Aug. 11-21	742,400	--	3.72		2.48	--	2.85	3.04	--	--	--	--	389	.53	393,500	40	1.8	610	7.4
Aug. 22-25	337,600	--	3.40		1.87	--	2.74	2.23	--	--	--	--	323	.44	148,500	35	1.4	521	7.4
Aug. 26-Sept. 14	1,331,000	14	2.35	1.13	1.96	0.14	2.69	2.52	0.42	0.03	0.01	0.13	347	.47	625,600	35	1.5	536	7.4
Sept. 15-30	1,092,000	--	3.80		2.09	--	2.79	2.73	--	--	--	--	363	.49	535,100	35	1.5	576	7.4
Total or weighted average a	22,900,000	--	4.46		2.44	--	3.11	3.37	--	--	--	--	443	0.60	13,800,000	35	1.6	672	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER BASIN

YELLOWSTONE RIVER AT BILLINGS, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 87, 1 mile northeast of Billings, Yellowstone County, and 12 miles upstream from Pryor Creek.
DRAINAGE AREA.--11,870 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 964 micromhos Jan. 20; minimum daily, 129 micromhos May 22.
Percent sodium: Maximum, 32 Oct. 1-21, July 22 to Sept. 3; minimum, 21 May 11-23.
EXTREMES, 1950-54.--Specific conductance: Maximum daily, 1,210 micromhos Feb. 2, 1951; minimum daily, 129 micromhos May 22, 1954.
Percent sodium: Maximum, 37 Dec. 1, 1950; minimum, 16 May 20, 1951.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-21, 1953...	106,700	--	3.72		1.74	--	2.88	2.35	--	--	--	--	337	0.46	49,080	32	1.3	526	7.4
Oct. 22-31.....	62,980	--	3.92		1.78	--	3.05	2.46	--	--	--	--	352	.48	30,230	31	1.3	547	7.8
Nov. 1-30.....	185,900	--	3.64		1.57	--	2.82	2.23	--	--	--	--	322	.44	81,800	30	1.2	504	7.8
Dec. 1-31.....	170,100	18	2.35	1.37	1.52	0.09	2.87	2.08	0.25	0.03	0.04	0.26	324	.44	74,840	29	1.1	507	7.7
Jan. 1-17, 1954 ...	70,650	--	3.90		1.61	--	2.92	2.33	--	--	--	--	339	.46	32,500	29	1.2	532	7.9
Jan. 18-21.....	11,210	--	6.32		2.57	--	4.18	4.31	--	--	--	--	549	.75	8,410	29	1.4	820	7.7
Jan. 22-31.....	38,880	--	4.06		1.52	--	3.06	2.27	--	--	--	--	353	.48	18,660	27	1.1	541	7.7
Feb. 1-28.....	149,000	--	3.54		1.39	--	2.64	2.06	--	--	--	--	316	.43	64,070	28	1.0	482	7.9
Mar. 1-31	138,500	16	2.25	1.41	1.57	.10	2.74	2.23	.27	.03	.03	.29	325	.44	60,940	29	1.2	506	8.0
Apr. 1-15.....	89,180	--	3.58		1.57	--	2.82	2.19	--	--	--	--	324	.44	39,240	30	1.2	497	7.7
Apr. 16-May 10 ...	199,800	--	2.72		1.09	--	2.29	1.39	--	--	--	--	242	.33	65,930	29	.9	382	7.8
May 11-16	160,700	--	1.62		.43	--	1.46	.50	--	--	--	--	139	.19	30,530	21	.5	208	7.6
May 17-20	151,700	--	1.22		.33	--	1.13	.35	--	--	--	--	105	.14	21,240	21	.4	164	7.4

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER AT BILLINGS, MONT.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 21-23, 1954 ..	183,700	--	1.04		0.27	--	0.98	0.31	--	--	--	--	101	0.14	25,720	21	0.4	136	7.4
May 24-27	165,600	13	0.70	0.42	.36	0.05	1.02	.37	0.07	0.02	0.02	0.06	104	.14	23,180	24	.5	147	7.4
May 28-June 16....	508,000	--	1.36		.57	--	1.29	.48	--	--	--	--	127	.17	86,360	30	.7	195	7.0
June 17-22.....	194,000	--	1.22		.48	--	1.18	.42	--	--	--	--	115	.16	31,040	31	.6	175	7.2
June 23-29.....	456,600	--	1.10		.32	--	1.08	.25	--	--	--	--	101	.14	63,900	23	.4	147	6.9
June 30-July 9.....	428,600	--	1.12		.43	--	1.07	.35	--	--	--	--	106	.14	60,000	28	.6	162	7.1
July 10-21	399,900	--	1.24		.52	--	1.21	.44	--	--	--	--	119	.16	63,980	30	.7	182	7.0
July 22-26	109,100	--	1.56		.74	--	1.47	.67	--	--	--	--	151	.21	22,910	32	.8	233	7.4
July 27-31	81,940	--	1.84		.87	--	1.70	.83	--	--	--	--	181	.25	20,490	32	.9	271	7.7
Aug. 1-17.....	207,000	--	2.12		1.00	--	1.92	1.06	--	--	--	--	206	.28	57,960	32	1.0	314	7.6
Aug. 18-Sept. 3 ...	131,000	--	2.64		1.26	--	2.26	1.54	--	--	--	--	233	.32	41,920	32	1.1	369	7.7
Sept. 4-30.....	174,400	16	1.90	1.30	1.48	.08	2.64	1.98	.23	.03	.02	.21	294	.40	69,760	31	1.2	462	7.7
Total or weighted average a	4,575,000	--	2.02		0.83	--	1.72	0.98	--	--	--	--	184	0.25	1,145,000	29	0.8	283	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Highway 23, 2 miles south of Sidney, Richland County, 4½ miles downstream from gaging station, 2 miles downstream from Fox Creek, and 30 miles upstream from mouth.
DRAINAGE AREA.--69,450 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1954.
Water temperatures: January 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,810 micromhos Jan. 2; minimum daily, 277 micromhos June 29.
Percent sodium: Maximum, 46 Oct. 22-31; minimum, 28 May 24-31.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 277 micromhos June 29, 1954.
Percent sodium: Maximum, 48 May 1-30, 1953; minimum, 26 June 11-13, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless otherwise noted. Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. No appreciable inflow between gaging station and sampling station. Discharge records for gaging station near Sidney for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B) ppm	Dissolved solids: Parts per million	Tons per acre-foot	Total tons	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-21, 1953	183,000	--	6.00		4.39	--	3.51	6.45	--	--	--	--	672	0.91	166,500	42	2.5	974	7.8
Oct. 22-31	155,900	--	5.86		4.91	--	3.65	6.77	--	--	--	--	693	.94	146,500	46	2.9	1,000	7.6
Nov. 1-30	401,300	--	6.18		3.83	--	3.70	5.93	--	--	--	--	639	.87	349,100	38	2.2	918	8.0
Dec. 1-Jan. 1, 1954	353,300	15	4.24	2.50	4.04	0.12	4.03	6.31	0.42	0.03	0.03	0.23	691	.94	332,100	37	2.2	983	7.8
Jan. 2-3	19,830	--	12.98		8.13	--	7.59	12.55	--	--	--	--	a1,370	1.86	36,880	39	3.2	1,790	7.9
Jan. 4-19	126,900	--	6.94		4.00	--	4.11	6.31	--	--	--	--	696	.95	120,600	37	2.2	1,000	8.0
Jan. 20-Feb. 3	79,340	--	8.34		4.96	--	4.77	7.97	--	--	--	--	856	1.16	92,030	37	2.4	1,200	8.0
Feb. 4-28	355,000	--	5.72		3.30	--	3.31	5.31	--	--	--	--	584	.79	280,500	37	2.0	851	7.8
Mar. 1-11	94,810	--	6.40		3.65	--	3.49	6.10	--	--	--	--	648	.88	83,430	36	2.0	936	8.0
Mar. 12-22	128,900	11	3.69	2.59	3.74	.11	3.46	6.10	.48	.03	.04	.22	651	.89	114,700	37	2.1	937	8.0
Mar. 23-Apr. 4	201,200	--	6.82		4.30	--	3.59	7.18	--	--	--	--	726	.99	199,200	39	2.3	1,040	7.9
Apr. 5-6	71,920	--	5.64		3.87	--	3.23	5.89	--	--	--	--	602	.82	58,970	41	2.3	890	7.9
Apr. 7-16	126,700	--	6.32		4.48	--	3.54	6.83	--	--	--	--	706	.96	121,600	41	2.5	1,020	7.8
Apr. 17-May 12	379,200	--	5.42		3.35	--	3.23	5.41	--	--	--	--	564	.77	292,000	38	2.0	838	7.7

a Sum of determined constituents.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 13-15, 1954...	71,210	--	4.40		2.65	--	2.87	4.00	--	--	--	--	453	0.62	44,150	38	1.8	687	7.8
May 16-23	346,500	--	2.80		1.39	--	2.03	2.06	--	--	--	--	278	.38	131,700	33	1.2	422	7.5
May 24-31	452,800	--	2.46		.96	--	1.97	1.35	--	--	--	--	228	.31	140,400	28	.9	338	7.7
June 1-7.....	245,200	--	2.86		1.91	--	2.10	2.48	--	--	--	--	320	.44	107,900	40	1.6	473	7.6
June 8	29,950	--	3.26		2.17	--	2.39	2.81	--	--	--	--	374	.51	15,270	40	1.7	541	8.0
June 9-26.....	637,700	18	1.75	0.85	1.52	0.09	1.97	2.04	0.17	0.02	0.02	0.14	277	.38	242,300	36	1.3	419	7.9
June 27-July 1.....	359,000	--	1.55	.63	.96	--	1.84	1.19	.10	--	--	--	206	.28	100,500	31	.9	312	7.8
July 2-21	912,000	--	1.50	.68	1.17	--	1.77	1.52	.13	--	--	--	217	.30	273,600	35	1.1	338	7.4
July 22-27	175,100	--	1.85	.91	1.65	--	2.11	2.23	.18	--	--	--	294	.40	70,040	37	1.4	447	7.4
July 28-Aug. 7.....	192,800	--	2.15	1.21	2.30	--	2.43	3.14	.24	--	--	--	372	.51	98,330	41	1.8	562	7.9
Aug. 8-20	231,000	--	2.84	1.52	3.09	--	2.97	4.29	.27	--	--	--	485	.66	152,500	41	2.1	724	7.7
Aug. 21-31.....	126,600	--	4.74		3.30	--	3.03	4.83	--	--	--	--	524	.71	89,890	41	2.2	773	7.8
Sept. 1-6	43,970	--	4.74		3.78	--	2.97	5.37	--	--	--	--	550	.75	32,980	44	2.5	817	7.9
Sept. 7-30	257,600	14	2.94	2.18	4.17	.12	3.28	5.79	.34	.03	.03	.21	598	.81	208,700	44	2.6	877	7.6
Total or weighted average [b]	6,759,000	--	4.24		2.61	--	2.74	3.89	--	--	--	--	445	0.61	4,102,000	38	1.8	654	--

b Represents 100 percent of runoff for water year October 1953 to September 1954.

WIND RIVER BELOW BOYSEN DAM, WYO.

LOCATION.--At tailrace of power plant at Boysen Dam, 0.6 mile upstream from gaging station and 12.4 miles north of Shoshoni, Fremont County.
DRAINAGE AREA.--7,741 square miles.
RECORDS AVAILABLE.--Chemical analyses: November 1953 to September 1954.
Water temperatures: December 1953 to September 1954.
EXTREMES, November 1953 to September 1954.--Specific conductance: Maximum daily, 1,380 micromhos June 18; minimum daily, 647 micromhos Aug. 18.
Percent sodium: Maximum, 51 June 18-19; minimum, 41 June 20 to Sept. 27.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, November 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Nov. 24-30, 1953 ..	15,710	--	4.46		3.30	--	2.72	4.79	--	--	--	--	495	0.67	10,530	43	2.2	752	7.5
Dec. 1-31	70,100	9.5	3.04	1.46	3.35	0.08	2.74	4.85	0.37	0.02	0.01	0.10	520	.71	49,770	42	2.2	765	7.8
Jan. 1-21, 1954	43,850	--	4.74		3.57	--	2.85	5.08	--	--	--	--	538	.73	32,010	43	2.3	804	8.0
Jan. 22-Feb. 28....	29,450	--	4.88		3.70	--	--	--	--	--	--	--	554	.75	22,090	43	2.4	822	--
Mar. 1-31	21,890	8.7	3.24	1.76	3.87	.08	3.00	5.52	.45	.03	.01	.12	583	.79	17,290	43	2.4	847	8.1
Apr. 1-30.....	61,060	--	4.96		3.70	--	--	--	--	--	--	--	558	.76	46,410	43	2.3	837	--
May 1-31	110,300	--	5.04		3.74	--	--	--	--	--	--	--	566	.77	84,930	43	2.4	842	--
June 1-17.....	52,700	9.9	3.09	1.63	3.44	.09	2.84	4.79	.45	.02	.01	.08	524	.71	37,420	42	2.2	789	7.9
June 18-19.....	6,110	--	6.06		6.39	--	2.87	7.81	1.86	--	--	--	830	1.13	6,900	51	3.7	1,210	7.3
June 20-July 19....	80,090	--	4.50		3.17	--	2.77	4.60	--	--	--	--	497	.68	54,460	41	2.1	741	7.4

YELLOWSTONE RIVER BASIN--Continued

WIND RIVER BELOW BOYSEN DAM, WYO.--Continued

Chemical analyses, November 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 20-Aug. 25, 1954	112,100	--	4.14		2.87	--	2.59	4.18	--	--	--	--	444	0.60	67,260	41	2.0	678	7.4
Aug. 26-Sept. 27	77,140	11	2.64	1.36	2.87	0.07	2.52	4.12	0.31	0.02	0.01	0.09	445	.61	47,060	41	2.0	664	7.8
Sept. 28	2,380	--	4.72		4.00	--	2.75	5.16	.76	--	--	--	548	.75	1,790	46	2.6	840	7.5
Sept. 29-30	4,740	--	4.20		3.09	--	2.62	4.35	--	--	--	--	460	.63	2,990	42	2.1	702	7.7
Total or weighted average[a]	687,600	--	4.58		3.35	--	b2.77	b4.79	--	--	--	--	514	0.70	480,900	42	2.2	768	--
Total or weighted average[c]	810,400	--	4.60		3.35	--	2.77	4.79	--	--	--	--	511	0.69	563,600	42	2.2	765	--

a Represents 85 percent of runoff for water year October 1953 to September 1954.
b Includes estimates where data are missing.
c Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1953 to September 1954.

BIGHORN RIVER AT THERMOPOLIS, WYO.

LOCATION.--At Broadway Street Bridge at Thermopolis, Hot Springs County, just downstream from Thermopolis Creek and about a quarter of a mile upstream from gaging station, which is upstream from principal hot springs inflow.
DRAINAGE AREA.--8,080 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April 1947 to January 1954 (discontinued).
Water temperatures: April 1947 to January 1954.
Sediment records: March 1946 to September 1952.
EXTREMES, 1947-49, 1951-54.--Specific conductance: Maximum daily, 1,270 micromhos Apr. 26, 1947; minimum daily, 245 micromhos June 10, 1948.
Percent sodium: Maximum, 47 Aug. 1 to Sept. 30, 1948; minimum, 13 May 21-30, 1947.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for period October 1953 to January 1954 given in WSP 1279.

Chemical analyses, October 1953 to January 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953	74,420		4.56		3.09		2.75	4.62					485	0.66	49,120	40	2.0	736	7.6
Nov. 1-30	72,710		4.76		3.13		2.87	4.68					508	.69	50,170	40	2.0	763	7.8
Dec. 1-31	73,710	9.0	3.24	1.66	3.13	0.08	2.92	4.89	0.39	0.03	0.01	0.09	521	.71	52,330	39	2.0	775	7.7
Jan. 1-21, 1954	--		4.98		3.26		2.97	4.91					539	.73	--	40	2.1	794	7.8

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At bridge on U. S. Highways 10 and 12, 1 mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 3½ miles downstream from gaging station near Custer.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1954.
Water temperatures: April 1949 to September 1951, August 1952 to September 1954.
Sediment records: July 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,390 micromhos Mar. 5, 6; minimum daily, 624 micromhos May 23.
Percent sodium: Maximum, 46 Aug. 15-31; minimum, 35 May 22-25.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 1,390 micromhos Mar. 5-6, 1954; minimum daily, 384 micromhos June 20, 1951.
Percent sodium: Maximum, 49 May 23-28, 1952; minimum, 30 June 13-20, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis 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. Discharge records for gaging station near Custer for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-20, 1953	88,260	--	7.98		5.96	--	3.70	9.74	--	--	--	--	915	1.24	109,400	43	3.0	1,270	7.9
Oct. 21-Nov. 19	188,600	--	7.52		5.17	--	3.79	8.29	--	--	--	--	819	1.11	209,300	41	2.7	1,150	7.9
Nov. 20-Dec. 19	171,500	13	4.99	2.83	4.96	0.11	4.03	8.12	0.48	0.03	0.04	0.19	832	1.13	193,800	38	2.5	1,150	7.9
Dec. 20-Jan. 16, 1954	148,900	--	7.10		4.35	--	3.69	7.35	--	--	--	--	740	1.01	150,400	38	2.3	1,050	8.1
Jan. 23-Feb. 28	145,400	--	7.84		4.61	--	3.83	8.12	--	--	--	--	816	1.11	161,400	37	2.3	1,130	8.1
Mar. 1-31	116,200	13	5.24	3.56	5.39	.12	4.24	9.43	.56	.03	.04	.21	932	1.27	147,600	38	2.6	1,260	8.0
Apr. 1-30	140,600	--	7.66		5.17	--	3.82	8.70	--	--	--	--	843	1.15	161,700	40	2.6	1,170	7.9
May 1-12	86,400	--	6.26		4.39	--	3.39	7.04	--	--	--	--	697	.95	82,080	41	2.5	1,000	7.8
May 13-21	72,380	--	5.16		2.96	--	2.87	5.16	--	--	--	--	535	.73	52,840	36	1.8	783	7.9
May 22-25	42,310	12	2.79	1.45	2.30	.07	2.49	3.85	.23	.02	.05	.09	430	.58	24,540	35	1.6	641	7.8
May 26-31	49,670	--	5.12		3.17	--	2.85	5.20	--	--	--	--	539	.73	36,260	38	2.0	793	7.9

June 1-26, 1954 ...	192,900	--	5.70	3.70	--	3.13	6.00	--	--	--	--	622	.85	164,000	39	2.2	888	7.6
June 27-28	14,080	--	5.56	3.48	--	3.03	5.79	--	--	--	--	601	.82	11,550	38	2.1	860	7.6
June 29-30	23,310	--	6.36	4.09	--	3.41	6.77	--	--	--	--	702	.95	22,140	39	2.3	980	7.5
July 1-4	33,420	--	5.46	3.48	--	3.05	5.73	--	--	--	--	592	.81	27,070	39	2.1	856	7.6
July 5-11	66,590	--	4.08	2.70	--	2.38	4.25	--	--	--	--	453	.62	41,290	40	1.9	663	7.5
July 12-19	55,850	--	4.38	3.09	--	2.51	4.66	--	--	--	--	495	.67	37,420	41	2.1	725	7.5
July 20-27	50,300	--	5.52	4.13	--	3.13	6.31	--	--	--	--	644	.88	44,260	43	2.5	921	7.8
July 28-Aug. 14 ...	76,580	--	6.62	5.26	--	3.36	8.18	--	--	--	--	784	1.07	81,940	44	2.9	1,100	7.8
Aug. 15-31	61,750	--	6.98	5.83	--	3.28	9.06	--	--	--	--	858	1.17	72,250	46	3.1	1,190	7.7
Sept. 1-30	120,400	13	4.24 | 3.02	5.87	.11	3.49	9.22	.51	.03	.03	.20	871	1.18	142,100	44	3.1	1,210	7.8
Total or weighted average[a]	1,945,000	--	6.80	4.57	--	3.49	7.47	--	--	--	--	745	1.01	1,973,000	40	2.5	1,050	--
Total or weighted average[b]	1,958,000	--	6.80	4.57	--	3.49	7.47	--	--	--	--	745	1.01	1,986,000	40	2.5	1,050	--

a Represents 99 percent of runoff for water year October 1953 to September 1954.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER BASIN--Continued

TONGUE RIVER AT MILES CITY, MONT.

LOCATION.--At gaging station, 4 miles south of Miles City, Custer County, and 8 miles upstream from mouth.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1954.
Water temperatures: April 1949 to September 1954.
Sediment records: June 1946 to September 1951.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 2,260 micromhos July 29; minimum daily, 384 micromhos Aug. 18.
Percent sodium: Maximum, 65 Aug. 5-6; minimum, 24 Nov. 1 to Dec. 7.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 2,280 micromhos July 24, 1953; minimum daily, 288 micromhos June 21, 1953.
Percent sodium: Maximum, 65 May 10-11, 1953, Aug. 5-6, 1954; minimum, 19 June 8-11, 1951, June 1-15, 1952, June 2-3, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless otherwise noted. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-6, 1953	107	--	8.92		9.13	--	7.87	9.85	--	--	--	--	a1,080	1.47	157	51	4.3	1,570	7.9
Oct. 7-8.....	430	--	6.62		3.61	--	4.90	5.31	--	--	--	--	611	.83	357	35	2.0	928	7.8
Oct. 9-21.....	4,020	--	5.76		2.30	--	4.10	3.87	--	--	--	--	473	.64	2,570	29	1.4	735	7.5
Oct. 22-24.....	6,510	--	2.04		3.65	--	3.00	2.71	--	--	--	--	360	.49	3,190	64	3.6	565	7.4
Oct. 25-31.....	4,480	--	5.58		2.13	--	3.92	3.71	--	--	--	--	450	.61	2,730	28	1.3	703	8.0
Nov. 1-30	22,500	--	6.70		2.09	--	4.34	4.37	--	--	--	--	523	.71	16,690	24	1.1	788	7.8
Dec. 1-7	4,640	--	7.34		2.26	--	4.62	4.95	--	--	--	--	577	.78	3,620	24	1.2	854	7.9
Dec. 8-31	7,590	11	4.39	4.81	3.26	0.13	5.87	6.72	0.17	0.02	0.02	0.15	753	1.02	7,740	26	1.5	1,080	8.2
Jan. 1-24, 1954 ...	8,340	--	9.28		3.22	--	5.92	6.41	--	--	--	--	757	1.03	8,590	26	1.5	1,090	8.0
Jan. 25-Feb. 14...	9,720	--	8.28		2.87	--	5.42	5.58	--	--	--	--	688	.94	9,140	26	1.4	982	8.0
Feb. 15-23	5,040	--	6.76		2.35	--	4.47	4.46	--	--	--	--	547	.74	3,730	26	1.3	819	8.0
Feb. 24-Mar. 8 ...	5,410	9.4	3.39	3.77	2.83	.12	4.79	5.10	.14	.02	.02	.12	610	.83	4,490	28	1.5	900	8.0
Mar. 9	655	--	7.12		2.52	--	4.67	4.89	--	--	--	--	600	.82	537	26	1.3	866	8.0
Mar. 10-12	1,750	--	6.70		2.30	--	4.39	4.56	--	--	--	--	546	.74	1,300	26	1.3	814	8.1
Mar. 13-28	7,480	--	7.36		2.83	--	4.80	5.48	--	--	--	--	614	.84	6,280	28	1.5	916	7.9

a Sum of determined constituents.

Mar.29-Apr.17,1954	7,950	--	7.60		3.22	--	4.93	5.93	--	--	--	--	659	.90	7,160	30	1.7	976	7.9
Apr. 18-May 13	11,860	--	7.20		2.61	--	b4.51	5.31	--	--	--	--	593	.81	9,610	27	1.4	886	8.3
May 14-26	5,780	--	5.48		1.96	--	3.90	3.46	--	--	--	--	440	.60	3,470	26	1.2	688	8.1
May 27-June 7	15,160	17	1.80	1.48	1.43	.08	2.85	1.77	.04	.03	.04	.08	290	.39	5,910	30	1.1	452	8.0
June 8-18	6,880	--	2.05	1.57	1.65	--	3.02	2.27	.06	--	--	--	320	.44	3,030	31	1.2	505	7.6
June 19-26	2,090	--	2.59	2.39	2.61	--	3.98	3.56	.10	--	--	--	463	.63	1,320	34	1.7	705	7.8
June 27-July 10	3,060	--	2.84	2.68	3.09	--	4.31	4.27	.13	--	--	--	527	.72	2,200	36	1.9	799	7.7
July 11-16	347	--	3.44	3.40	5.35	--	5.64	6.52	.16	--	--	--	742	1.01	350	44	2.9	1,100	7.8
July 17-18	179	--	3.04	2.72	7.17	--	5.59	7.18	.17	--	--	--	812	1.10	197	55	4.2	1,190	7.7
July 19-25	252	--	3.19	2.97	9.31	--	6.34	9.16	.17	--	--	--	988	1.34	338	60	5.3	1,420	7.9
July 26-Aug. 4	189	--	4.34	4.88	13.26	--	8.59	13.84	.28	--	--	--	a 1,430	1.94	367	59	6.2	1,990	8.1
Aug. 5-6	144	--	2.15	1.33	6.57	--	4.98	5.06	.06	--	--	--	638	.87	125	65	5.0	960	7.7
Aug. 7-15	608	--	3.24	2.70	7.31	--	5.79	7.45	.14	--	--	--	847	1.15	699	55	4.3	1,220	7.7
Aug. 16-17	3,910	--	2.69	1.43	4.00	--	4.52	3.62	.03	--	--	--	498	.68	2,660	49	2.8	757	7.6
Aug. 18-19	2,270	--	1.65	.67	2.00	--	3.05	1.31	.03	--	--	--	266	.36	817	46	1.9	418	7.7
Aug. 20-22	327	--	2.59	1.89	4.04	--	3.82	4.68	.08	--	--	--	545	.74	242	47	2.7	808	7.7
Aug. 23-24	109	--	3.59	3.35	6.00	--	5.56	7.29	.17	--	--	--	810	1.10	120	46	3.2	1,170	7.6
Aug. 25-26	214	--	3.24	2.68	3.30	--	4.49	4.75	.06	--	--	--	574	.78	167	36	1.9	854	8.1
Aug. 27-Sept. 5	161	--	6.62		6.35	--	5.74	7.29	--	--	--	--	814	1.11	179	49	3.5	1,180	7.8
Sept. 6-8	1,210	--	2.80		3.78	--	3.36	3.19	--	--	--	--	424	.58	702	57	3.2	637	7.6
Sept. 9-30	1,230	15	3.39	3.55	5.17	.16	5.70	6.31	.14	.02	.02	.21	737	1.00	1,230	42	2.8	1,070	7.7
Total or weighted average[c]	153,600	--	6.22		2.61	--	4.38	4.43	--	--	--	--	536	0.73	112,000	30	1.5	801	--

b Includes 0.17 equivalent per million of carbonate (CO_3).
c Represents 100 percent of runoff for water year October 1953 to September 1954.

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POWDER RIVER NEAR LOCATE, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 12, at present site of Locate (5 miles west of former site of Locate), Custer County, 3 miles upstream from Locate Creek, and 25 miles east of Miles City.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1954.
Water temperatures: February 1951 to May 1954.
Sediment records: March 1950 to September 1953.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 3,940 micromhos July 23; minimum daily, 686 micromhos Sept. 8.
Percent sodium: Maximum, 83 Oct. 22-24; minimum, 22 Aug. 12-13.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 3,940 micromhos July 23, 1954; minimum daily, 407 micromhos Feb. 14, 1952.
Percent sodium: Maximum, 83 Oct. 22-24, 1953; minimum, 19 Aug. 6-7, 1953.
REMARKS.--Values reported for dissolved solids are sums of determined constituents unless otherwise noted. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-21, 1953..	370	--	13.36		14.57	--	4.69	22.28	1.04	--	--	--	1,910	2.60	962	52	5.6	2,430	7.9
Oct. 22-24	3,570	--	1.24		5.96	--	2.95	4.18	--	--	--	--	a495	.67	2,390	83	7.6	735	7.4
Oct. 25-26	280	--	6.98		9.91	--	3.98	12.45	.45	--	--	--	1,130	1.54	431	59	5.3	1,560	7.9
Oct. 27-Nov. 20 .	2,900	--	14.96		10.57	--	4.46	19.99	1.02	--	--	--	1,780	2.42	7,020	41	3.9	2,160	7.9
Nov. 21-Dec. 8..	4,210	--	15.96		9.52	--	4.59	19.36	1.47	--	--	--	1,750	2.38	10,020	37	3.4	2,140	8.0
Dec. 9-20.....	1,820	13	13.62	8.10	14.18	0.25	6.51	27.69	2.14	0.05	0.07	0.21	2,450	3.33	6,060	39	4.3	2,860	7.7
Dec. 21-Jan. 8, 1954	5,890	--	17.24		8.96	--	5.80	18.84	1.58	--	--	--	1,800	2.45	14,430	34	3.1	2,180	7.9
Jan. 9-Feb. 4 ...	5,940	--	16.96		9.13	--	6.19	18.11	1.69	--	--	--	1,780	2.42	14,370	35	3.1	2,180	8.1
Feb. 5-28.....	19,140	--	10.56		5.91	--	3.65	11.55	1.13	--	--	--	1,120	1.52	29,090	36	2.6	1,470	7.9
Mar. 1-31	28,150	10	8.38	4.50	8.00	.16	3.92	15.20	1.69	.03	.07	.15	1,420	1.93	54,330	38	3.2	1,830	8.0
Apr. 1-25.....	16,440	--	13.40		10.18	--	3.70	18.53	1.55	--	--	--	1,620	2.20	36,170	43	3.9	2,060	7.5
Apr. 26-May 4 ..	5,550	--	11.86		7.57	--	3.69	14.37	1.38	--	--	--	1,330	1.81	10,050	39	3.1	1,720	7.7
May 5-17	11,230	--	9.36		5.52	--	3.34	10.62	1.13	--	--	--	1,010	1.37	15,390	37	2.5	1,350	7.7
May 18-25	12,100	--	6.96		3.39	--	2.84	7.04	.62	--	--	--	a700	.95	11,500	32	1.8	976	7.6
May 26-June 2...	6,380	--	5.90		4.09	--	2.82	6.62	.56	--	--	--	a709	.96	6,120	41	2.4	956	7.7
June 3	655	--	5.30		6.78	--	3.34	8.08	.68	--	--	--	a822	1.12	734	56	4.2	1,170	7.8
June 4-14	3,360	16	5.84	3.32	8.70	.17	3.75	12.60	1.21	.05	.04	.15	1,210	1.65	5,540	48	4.1	1,640	8.0
June 15-19	789	--	13.12		11.31	--	4.31	18.53	1.64	--	--	--	1,680	2.28	1,800	46	4.4	2,120	8.0

a Residue on evaporation at 180°C.

June 20, 1954 ...	278	--	9.54	9.18	--	b4.13	14.57	1.16	--	--	--	1,270	1.73	481	46	4.2	1,680	8.2
June 21-July 15..	1,180	--	13.16	12.35	--	4.26	19.88	1.41	--	--	--	1,850	2.52	2,970	48	4.8	2,220	7.8
July 16-21.....	201	--	7.24	11.83	--	4.92	13.64	.65	--	--	--	1,320	1.80	362	62	6.2	1,740	7.4
July 22.....	379	--	5.20	7.57	--	5.31	7.56	.25	--	--	--	a852	1.16	440	59	4.7	1,200	7.3
July 23-Aug. 5...	1,560	--	31.80	17.05	--	6.06	40.39	2.99	--	--	--	3,460	4.71	7,350	34	4.3	3,780	7.1
Aug. 6-7.....	448	--	10.12	12.44	--	3.90	17.38	.96	--	--	--	1,650	2.24	1,000	55	5.5	2,040	7.5
Aug. 8.....	2,740	--	13.68	5.48	--	6.85	12.60	.51	--	--	--	1,350	1.84	5,040	29	2.1	1,650	7.2
Aug. 9-11.....	3,010	--	12.00	3.87	--	3.23	12.49	.25	--	--	--	1,100	1.50	4,520	24	1.6	1,380	7.2
Aug. 12-13	1,160	--	26.48	7.65	--	4.29	29.15	1.27	--	--	--	2,410	3.28	3,600	22	2.1	2,670	7.0
Aug. 14-16	1,390	--	12.00	7.91	--	3.57	16.03	.90	--	--	--	1,490	2.03	2,820	40	3.2	1,750	7.1
Aug. 17.....	3,530	--	16.88	8.78	--	7.01	18.42	1.24	--	--	--	1,850	2.52	8,900	34	3.0	2,170	7.1
Aug. 18.....	3,370	--	7.76	3.61	--	4.52	6.77	.23	-	--	--	a786	1.07	3,610	32	1.8	1,030	7.0
Aug. 19-25	3,010	--	12.72	4.00	--	2.80	13.74	.31	--	--	--	1,290	1.75	5,270	24	1.6	1,450	8.2
Aug. 26-31.....	647	--	15.44	7.22	--	3.38	19.05	.62	--	--	--	1,650	2.24	1,450	31	2.6	1,950	7.5
Sept. 1-4	121	--	14.68	11.70	--	4.21	21.65	.96	--	--	--	1,810	2.46	298	44	4.3	2,230	8.0
Sept. 5-6	8,400	--	5.60	4.74	--	5.15	5.52	.23	--	--	--	a652	.89	7,480	43	2.8	969	7.3
Sept. 7-8	2,040	--	3.88	4.17	--	2.84	4.75	.06	--	0.04	--	a486	.66	1,350	52	3.0	727	7.7
Sept. 9-12	718	--	7.00	6.09	--	2.93	9.89	.42	--	--	--	a692	1.21	869	46	3.3	1,220	7.5
Sept. 13-30	558	17	7.34 | 4.00	11.22	0.21	4.64	17.38	.85	0.03	.01	0.19	1,540	2.09	1,170	49	4.7	1,970	7.7
Total or weighted average[c]	163,500	--	11.52	7.17	--	4.05	13.62	1.13	--	--	--	1,290	1.75	285,600	38	3.0	1,640	--

a Residue on evaporation at 180°C.
b Includes 0.20 equivalent per million of carbonate (CO_3).
c Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1953 to September 1954.

PLATTE RIVER BASIN

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.

LOCATION.--Three hundred feet downstream from gaging station, 1 mile northwest of Guernsey, Platte County, and 1.1 miles downstream from Guernsey Dam.
DRAINAGE AREA.--16,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to August 1954.
Water temperatures: October 1951, April to September 1952, March to September 1953, May to August 1954.
Sediment records: April 1947 to June 1953.
EXTREMES, May to August 1954.--Specific conductance: Minimum daily, 551 micromhos July 22.
Percent sodium: Maximum, 39 May 1-9; minimum, 28 Aug. 1-8.
EXTREMES, 1951-53, 1954.--Specific conductance: Minimum daily, 429 micromhos May 21, 1953.
Percent sodium: Maximum, 39 Oct. 1-23, 1951, Apr. 17-24, 1952, May 1-9, 1954; minimum, 25 June 1-7, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, October 1953 to August 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 21, 1953	40	--	5.82		2.87	--	3.51	4.75	--	--	--	--	547	0.74	30	33	1.7	822	7.8
Nov. 3	42	--	6.44		3.70	--	3.44	6.25	--	--	--	--	651	.89	37	36	2.1	952	7.5
Dec. 2	50	7.4	3.99	2.35	3.48	0.15	3.51	5.62	0.68	0.03	0.05	0.12	626	.85	43	35	2.0	923	7.4
Jan. 5, 1954	50	--	8.38		4.87	--	4.34	7.91	--	--	--	--	865	1.18	59	37	2.4	1,200	7.5
Feb. 3	44	10	4.49	2.71	4.17	.14	3.72	6.93	.82	.03	.07	.13	740	1.01	44	36	2.2	1,050	7.6
Mar. 2	490	--	7.38		4.48	--	3.59	7.45	--	--	--	--	775	1.05	515	38	2.3	1,110	7.3
Apr. 8	40	--	7.12		4.04	--	3.64	6.83	--	--	--	--	729	.99	40	36	2.1	1,040	7.9
Apr. 20	40	--	7.36		4.35	--	3.69	7.18	--	--	--	--	770	1.05	42	37	2.3	1,090	7.8
May 1-6	4,440	--	7.48		4.70	--	3.56	7.77	--	--	--	--	799	1.09	4,840	39	2.4	1,140	7.8
May 7-9	9,840	--	7.00		4.44	--	3.36	7.49	--	--	--	--	756	1.03	10,140	39	2.4	1,080	8.0
May 10-12	13,130	--	6.28		3.91	--	3.08	6.31	--	--	--	--	670	.91	11,950	38	2.2	980	8.1

May 13-17, 1954...	26,460	13	3.34	2.04	3.26	.13	2.87	5.31	62	.02	.02	.12	566	.77	20,370	37	2.0	835	7.9
May 18-24.....	26,890	--	4.32		1.83	--	2.69	3.08	--	--	--	--	398	.54	14,520	30	1.2	594	7.3
May 25-June 5	3,830	--	4.32		1.78	--	2.75	3.02	--	--	--	--	388	.53	2,030	29	1.2	586	7.3
June 9-12.....	8,360	--	4.54		1.96	--	2.85	3.35	--	--	--	--	417	.57	4,770	30	1.3	621	7.3
June 13-14	4,380	--	5.12		2.57	--	[a]3.06	4.33	--	--	--	--	494	.67	2,930	33	1.6	731	8.5
June 15-19.....	15,550	--	4.64		2.13	--	2.72	3.68	--	--	--	--	433	.59	9,170	31	1.4	654	7.3
June 20-July 4	63,330	--	4.18		1.70	--	2.62	3.02	--	--	--	--	376	.51	32,300	29	1.2	567	7.7
July 5-14	79,970	--	4.28		1.78	--	2.67	3.10	--	--	--	--	392	.53	42,380	29	1.2	591	7.5
July 15-24	74,860	--	4.06		1.70	--	2.67	2.83	--	--	--	--	383	.52	38,930	30	1.2	561	7.7
July 25-31	46,250	--	4.22		1.70	--	2.65	2.98	--	--	--	--	380	.52	24,050	29	1.2	575	7.3
Aug. 1-8.....	63,290	16	2.64	1.56	1.70	.09	2.64	3.04	.34	.03	.02	.08	383	.52	32,910	28	1.2	573	7.6
Aug. 9-19.....	70,670	--	4.12		1.70	--	2.62	3.00	--	--	--	--	374	.51	36,040	29	1.2	560	7.5
Aug. 20-31	63,110	--	4.30		1.78	--	2.72	3.14	--	--	--	--	386	.52	32,820	29	1.2	589	8.1
Total or weighted average [b]	575,200	--	4.40		1.96	--	2.70	3.35	--	--	--	--	411	0.56	321,000	31	1.3	614	--
Total or weighted average[c]	692,500	--	4.58		2.09	--	2.77	3.60	--	--	--	--	432	0.59	408,600	31	1.4	644	--

a Includes 0.27 equivalent per million of carbonate (CO_3).
b Represents 82 percent of runoff for water year October 1953 to September 1954.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging stations at highway bridges, half a mile and 2½ miles, respectively, south of Brady, Lincoln County, and 18 miles downstream from confluence of North Platte and South Platte Rivers.
DRAINAGE AREA.--56,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 872 micromhos Jan. 27 (chan. 1); minimum daily, 358 micromhos Dec. 28 (chan. 1).
Percent sodium: Maximum, 45 July 1-30; minimum, 32 Mar. 5-31.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 1,070 micromhos Feb. 19, 1953 (chan. 1); minimum daily, 345 micromhos Nov. 26, 1952 (chan. 1).
Percent sodium: Maximum, 45 July 1-30, 1954; minimum, 22 Nov. 26, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis from each of two major channels composited by discharge. Composite periods normally identical to those of Supply Canal (Tri-County Diversion) near Maxwell, Nebr. Records of specific conductance of daily samples, taken at each of the two major channels, available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953 ..	7,420	--	3.76		2.48	--	3.36	2.58	--	--	--	--	408	0.55	4,080	40	1.8	612	7.7
Nov. 1-30.....	9,670	--	3.72		2.17	--	3.34	2.27	--	--	--	--	379	.52	5,030	37	1.6	578	7.6
Dec. 1-22	6,940	36	2.84	1.02	2.17	0.22	3.46	2.25	0.39	0.03	0.03	0.10	406	.55	3,820	35	1.6	601	7.8
Dec. 23-27	1,830	--	4.62		2.70	--	3.85	3.04	--	--	--	--	484	.66	1,210	37	1.6	708	7.8
Dec. 28-Jan. 18, 1954	8,080	--	4.02		2.09	--	3.52	2.35	--	--	--	--	422	.57	4,610	34	1.5	596	8.1
Jan. 19-Feb. 7 ...	12,520	--	4.20		2.30	--	3.43	2.77	--	--	--	--	444	.60	7,510	35	1.6	639	8.0
Feb. 8-28	8,560	--	3.90		1.96	--	3.34	2.33	--	--	--	--	396	.54	4,620	33	1.4	575	8.1
Mar. 1-3	843	--	4.22		2.13	--	3.74	2.37	--	--	--	--	423	.58	489	34	1.5	613	8.2
Mar. 4	434	--	5.52		3.17	--	a4.13	4.16	--	--	--	--	612	.83	360	36	1.9	823	8.5
Mar. 5-31	9,660	32	2.79	1.11	1.91	.21	3.34	2.17	.39	.03	.03	.09	394	.54	5,220	32	1.4	576	8.1
Apr. 1-30	9,500	--	3.86		2.13	--	3.28	2.42	--	--	--	--	396	.54	5,130	36	1.5	591	7.9
May 1-28	10,200	--	3.74		2.04	--	3.23	2.31	--	--	--	--	384	.52	5,300	35	1.5	576	8.0
May 29-June 30 ..	8,100	36	2.54	1.10	2.30	.25	3.15	2.50	.45	.03	.01	.11	404	.55	4,460	37	1.7	593	8.2

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

July 1-30, 1954...	63,670	--	4.02	3.26	--	3.93	3.02	--	--	--	--	477	.65	41,390	45	2.3	716	7.8
July 31-Aug. 19 ..	26,190	--	3.84	3.04	--	3.79	2.71	--	--	--	--	451	.61	15,980	44	2.2	674	7.8
Aug. 20-31.....	2,530	--	3.72	2.70	--	3.57	2.69	--	--	--	--	428	.58	1,470	42	2.0	635	7.8
Sept. 1-30	6,960	39	2.45 | 1.25	2.61	.24	3.46	2.71	.45	.03	.01	.13	425	.58	4,040	40	1.9	629	8.0
Total or weighted average[b]	193,100	--	3.92	2.65	--	3.61	2.66	--	--	--	--	437	0.59	114,700	40	1.9	649	--

b Represents 100 percent of runoff for water year October 1953 to September 1954.

PLATTE RIVER BASIN--Continued

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

LOCATION.--At gaging station at Parshall Flume in sec. 28, T. 13 N., R. 29 W., near Maxwell, Lincoln County.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,080 micromhos Jan. 21; minimum daily, 589 micromhos Nov. 8.
Percent sodium: Maximum, 47 July 1-30, Aug. 20-31; minimum, 37 Mar. 5-31.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 1,210 Micromhos Mar. 26, Apr. 6, 14, 15, 1952; minimum daily (revised), 499 micromhos May 15, 1951.
Percent sodium: Maximum, 47 July 1-30, Aug. 20-31, 1954; minimum, 36 Mar. 27 to Apr. 14, May 26 to June 8, 1952, Jan. 29 to Feb. 18, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Composite periods normally identical to these of Platte River at Brady, Nebr. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in reports of State Engineer.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953.	89,470	--	3.98		3.13	--	3.65	3.08	--	--	--	--	469	0.64	57,260	44	2.2	701	7.9
Nov. 1-30.....	73,770	--	3.92		2.83	--	3.51	2.98	--	--	--	--	451	.61	45,000	42	2.0	668	7.6
Dec. 1-22	57,780	29	3.09	1.33	3.09	0.28	3.65	3.54	0.59	0.03	0.03	0.15	503	.68	39,290	40	2.1	735	7.8
Dec. 23-27	10,910	--	5.08		3.22	--	3.87	3.98	--	--	--	--	553	.75	8,180	39	2.0	806	8.0
Dec. 28-Jan. 18, 1954	55,060	--	5.46		3.61	--	3.90	4.64	--	--	--	--	607	.83	45,700	40	2.2	868	8.2
Jan. 19-Feb. 7..	50,740	--	5.92		3.78	--	3.87	5.48	--	--	--	--	652	.89	45,160	39	2.2	939	8.1
Feb. 8-28	51,930	--	5.30		3.30	--	3.52	4.75	--	--	--	--	586	.80	41,540	38	2.0	842	8.1
Mar. 1-3	6,450	--	6.44		4.35	--	3.74	6.35	--	--	--	--	730	.99	6,390	40	2.4	1,030	7.8
Mar. 4	2,140	--	6.32		4.17	--	3.80	6.10	--	--	--	--	704	.96	2,050	40	2.3	1,000	7.9
Mar. 5-31	66,700	30	3.69	1.61	3.26	.28	3.47	4.58	.71	.03	.06	.13	578	.79	52,690	37	2.0	835	7.7
Apr. 1-30	76,010	--	5.34		3.65	--	3.36	5.00	--	--	--	--	600	.82	62,330	41	2.2	879	7.9
May 1-28	67,640	--	4.62		3.43	--	3.43	4.12	--	--	--	--	525	.71	48,020	41	2.1	783	8.0
May 29-June 30 .	96,580	20	2.64	1.56	3.48	.28	3.38	3.81	.65	.03	.03	.13	505	.69	66,640	44	2.4	763	8.0

July 1-30, 1954..	124,600	--	3.96	3.48	--	3.75	3.33	--	--	--	--	480	.65	80,990	47	2.5	735	7.9
July 31-Aug. 19 .	80,050	--	3.82	3.26	--	3.72	3.14	--	--	--	--	464	.63	50,430	46	2.4	708	8.0
Aug. 20-31.....	27,750	--	3.76	3.35	--	3.59	3.19	--	--	--	--	462	.63	17,480	47	2.4	701	7.5
Sept. 1-30	91,280	28	2.45 | 1.37	3.26	.28	3.62	3.12	.59	.03	.01	.16	462	.63	57,510	44	2.4	702	7.5
Total or weighted average [a]	1,029,000	--	4.48	3.35	--	3.61	4.21	--	--	--	--	519	0.71	726,700	43	2.2	770	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on State Highway 51, 0.5 mile southeast of Julesburg, Sedgwick County, 4 miles upstream from Colorado-Nebraska State line, and 8 miles downstream from Lodgepole Creek.
DRAINAGE AREA.--22,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1954.
Water temperatures: October 1945 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 2,180 micromhos Dec. 23; minimum daily, 725 micromhos Sept. 15.
Percent sodium: Maximum, 37 June 22 to Aug. 10; minimum, 31 Sept. 15.
EXTREMES, 1945-54.--Specific conductance: Maximum daily, 2,180 micromhos Dec. 23, 1953; minimum daily, 617 micromhos Aug. 19, 1953.
Percent sodium: Maximum, 82 Mar. 1-12, 1947; minimum, 29 Aug. 6-10, 1951, Aug. 19, 1953.
REMARKS.--Values reported for dissolved solids are sums of determined constituents unless otherwise noted. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	954	--	12.46		7.04	--	--	--	--	--	--	--	1,340	1.82	1,740	36	2.8	1,750	--
Oct. 11-Nov. 10	7,840	--	14.16		7.74	--	--	--	--	--	--	--	1,500	2.04	15,990	35	2.9	1,940	--
Nov. 11-Dec. 11	16,500	35	10.58	4.16	8.04	0.67	6.42	14.99	1.97	0.03	0.01	0.29	1,540	2.09	34,490	34	3.0	1,970	7.5
Dec. 12-Jan. 15, 1954	21,320	--	14.80		7.96	--	--	--	--	--	--	--	1,560	2.12	45,200	35	2.9	1,970	--
Jan. 16-31	8,820	--	14.56		7.87	--	--	--	--	--	--	--	1,540	2.09	18,430	35	2.9	1,950	--
Feb. 1-28	14,300	--	14.00		7.87	--	--	--	--	--	--	--	1,480	2.01	28,740	36	3.0	1,880	--
Mar. 1-31	15,260	30	9.53	4.39	7.78	.38	4.85	15.20	1.78	.04	.07	.26	1,480	2.01	30,670	35	3.0	1,870	8.1
Apr. 1-13	4,820	--	13.12		7.52	--	--	--	--	--	--	--	1,420	1.93	9,300	36	2.9	1,830	--
Apr. 14-18	696	--	11.28		6.09	--	--	--	--	--	--	--	1,200	1.63	1,130	35	2.6	1,590	--
Apr. 19-May 15	3,520	--	12.48		6.96	--	--	--	--	--	--	--	1,340	1.82	6,410	36	2.8	1,740	--
May 16-25	1,410	--	11.30		6.00	--	--	--	--	--	--	--	1,180	1.60	2,260	35	2.5	1,570	--
May 26-June 11	1,160	32	7.98	3.82	6.44	.43	3.98	13.22	1.78	.04	.04	.22	1,290	1.75	2,030	34	2.7	1,660	7.8
June 12	60	--	10.18		5.31	--	--	--	--	--	--	--	1,070	1.46	88	34	2.4	1,440	--
June 13-21	561	--	12.48		6.78	--	--	--	--	--	--	--	1,320	1.80	1,010	35	2.7	1,700	--
June 22-July 9	718	--	11.32		6.65	--	--	--	--	--	--	--	1,260	1.71	1,230	37	2.8	1,630	--

July 10-Aug. 10, 1954	982	--	11.32	6.61	--	--	--	--	--	--	--	1,260	1.71	1,680	37	2.8	1,630	--
Aug. 11-Sept. 14	1,160	41	7.19 | 4.51	6.65	.46	4.00	13.32	1.69	.04	.04	.24	1,280	1.74	2,020	35	2.7	1,650	7.9
Sept. 15	186	--	4.92	2.22	--	--	--	--	--	--	--	a 480	.65	121	31	1.4	725	--
Sept. 16-30	744	--	12.48	6.87	--	--	--	--	--	--	--	1,310	1.78	1,320	36	2.7	1,710	--
Total or weighted average [b]	101,000	--	14.04	7.74	--	--	--	--	--	--	--	1,490	2.03	203,900	36	2.9	1,890	--

a Residue on evaporation at 180°C.
b Represents 100 percent of runoff for water year October 1953 to September 1954.

KANSAS RIVER BASIN

REPUBLICAN RIVER ABOVE MEDICINE CREEK AT CAMBRIDGE, NEBR.

LOCATION.--At bridge south of Cambridge, Furnas County, on State Highway 47, 1 mile upstream from gaging station at Cambridge, a quarter of a mile upstream from confluence with Medicine Creek, and 2.3 miles upstream from Cambridge diversion dam.
DRAINAGE AREA.--13,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 726 micromhos Jan. 21; minimum daily, 267 micromhos Aug. 17.
Percent sodium: Maximum, 27 June 11-14, Sept. 21-30; minimum, 11 July 26-29.
EXTREMES, 1950-54.--Specific conductance: Maximum daily (1951-54), 830 micromhos Aug. 21, 1952; minimum daily, 267 micromhos Aug. 17, 1954.
Percent sodium: Maximum, 29 Apr. 15-27, 1951, June 25 to July 4, Aug. 5-29, 1952; minimum, 9 July 11-14, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Water discharge computed by subtracting the discharge of Medicine Creek at Cambridge from that of the Republican River at Cambridge. Records of discharge for the Republican River at Cambridge and Medicine Creek at Cambridge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 24-Nov. 3, 1953	845	---	4.58		1.35	--	4.92	0.96	--	--	--	--	387	0.53	448	23	0.9	581	8.0
Nov. 4-30	6,920	--	4.48		1.26	--	4.77	.85	--	--	--	--	362	.49	3,390	22	.8	553	8.0
Dec. 1-31	7,920	52	3.14	1.58	1.30	0.36	5.01	.87	0.28	0.06	0.07	0.12	393	.53	4,200	20	.8	572	8.1
Jan. 1-31, 1954	6,600	--	4.68		1.30	--	4.93	.90	--	--	--	--	386	.52	3,430	22	.8	578	8.0
Feb. 1-28	10,410	48	2.79	1.29	1.09	.33	4.33	.71	.24	.04	.07	.12	336	.46	4,790	20	.8	498	8.0
Mar. 1-31	8,120	--	4.58		1.26	--	4.88	.83	--	--	--	--	386	.52	4,220	22	.8	556	8.2
Apr. 1-18	4,390	--	4.30		1.35	--	4.69	.87	--	--	--	--	379	.52	2,280	24	.9	551	8.2
Apr. 19-30	1,710	--	4.40		1.43	--	a4.81	.98	--	--	--	--	386	.52	889	25	1.0	572	8.2
May 1-17	3,950	44	2.54	1.46	1.39	.38	4.38	.94	.31	.05	.05	.13	355	.48	1,900	24	1.0	537	8.0
May 18-21	2,050	--	3.68		1.17	--	4.06	.79	--	--	--	--	341	.46	943	24	.9	495	7.5
May 22-31	2,970	--	4.28		1.35	--	4.69	.96	--	--	--	--	371	.50	1,490	24	.9	558	8.0

a Includes 0.17 equivalent per million of carbonate (CO_3).

June 1-10, 1954..	1,970	--	4.02	1.39	--	4.49	.87	--	--	--	--	364	.50	985	26	1.0	536	7.7
June 11-14	218	--	4.00	1.48	--	4.62	.96	--	--	--	--	367	.50	109	27	1.0	548	8.0
June 15-18	722	--	3.42	1.17	--	3.87	.81	--	--	--	--	315	.43	310	25	.9	471	7.6
June 19-30	270	--	4.18	1.48	--	a4.97	.79	--	--	--	--	394	.54	146	26	1.0	551	8.2
July 26-29	288	--	2.52	.33	--	2.88	.08	--	--	--	--	196	.27	78	11	.3	296	7.5
Aug. 17-20.....	2,530	--	2.56	.48	--	2.82	.33	--	--	--	--	216	.29	734	15	.4	315	7.5
Aug. 21-25.....	220	--	2.92	.74	--	3.34	.46	--	--	--	--	267	.36	79	19	.6	381	7.7
Sept. 21-30	526	40	2.00 | 1.56	1.48	43	4.11	1.04	.31	.05	.02	.22	339	.46	242	27	1.1	513	7.4
Total or weighted average b.....	62,620	--	4.26	1.22	--	4.59	0.83	--	--	--	--	361	0.49	30,660	22	0.8	534	--
Total or weighted average c.....	63,480	--	4.26	1.22	--	4.59	0.83	--	--	--	--	361	0.49	31,110	22	0.8	534	--

a Includes 0.17 equivalent per million of carbonate (CO_3).
b Represents 99 percent of runoff for water year October 1953 to September 1954. Does not include periods of no flow.
c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

PART 7. LOWER MISSISSIPPI RIVER BASIN

ARKANSAS RIVER BASIN

ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, COLO.

LOCATION.--At gaging station 1 mile upstream from Caddoa Creek, 1 3/4 miles downstream from John Martin Dam, Bent County, and 3 miles southeast of Hasty.
DRAINAGE AREA.--18,917 square miles (revised), of which 785 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: August 1942 to August 1943, October 1945 to July 1949 (intermittent and weekly samples), January 1951 to September 1954 (daily samples).
Water temperatures: January 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 4,740 micromhos Dec. 23; minimum observed, 1,060 micromhos May 25.
Percent sodium: Maximum, 42 Feb. 1-10; minimum, 27 July 23-26, 28 to Aug. 31.
EXTREMES, 1951-54.--Specific conductance: Maximum observed, 4,740 micromhos Dec. 23, 1953; minimum observed, 830 micromhos June 19, 1952.
Percent sodium: Maximum, 42 Feb. 1-10, 1954; minimum, 25 June 19-20, 1953.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1341.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ...	464	22	18.41	12.17	19.13	--	4.95	42.26	2.99		0.07		3,270	4.45	2,060	38	4.9	3,820	7.6
Oct. 11-20	525	20	17.81	12.34	19.57	--	4.93	41.85	2.99		.08		3,250	4.42	2,320	39	5.0	3,780	7.6
Oct. 21-31	750	17	18.01	12.17	18.74	--	5.03	41.43	2.99		.09		3,210	4.37	3,280	38	4.8	3,780	7.7
Nov. 1-10.....	930	20	17.02	11.18	17.61	--	5.29	37.47	2.79		.10		2,970	4.04	3,760	38	4.7	3,550	7.6
Nov. 11-20.....	956	18	17.42	12.17	17.78	--	5.33	39.76	2.85		.10		3,100	4.22	4,030	38	4.6	3,680	7.6
Nov. 21-24.....	547	16	10.68	7.07	8.26	--	4.74	20.00	1.49		.06		1,660	2.26	1,240	32	2.8	2,170	7.8
Nov. 25-30.....	22	20	16.82	13.32	21.05	--	5.39	41.85	3.41		.09		3,300	4.49	99	41	5.4	3,880	7.7
Dec. 1-10.....	39	17	16.07	14.23	20.87	--	5.74	41.85	3.53		.05		3,300	4.49	175	41	5.4	3,920	7.7
Dec. 11-20.....	38	17	16.47	13.65	21.05	--	6.18	41.85	3.50		.05		3,320	4.52	172	41	5.4	3,930	7.7
Dec. 21-31.....	49	--	17.22	14.31	21.96	--	5.93	44.55	3.64		.07		3,560	4.84	237	41	5.5	4,150	7.7
Jan. 1-10, 1954 ...	52	25	15.07	14.88	20.26	--	6.70	40.39	3.36		.03		3,240	4.41	229	40	5.2	3,880	7.7
Jan. 11-20	39	21	16.82	15.46	21.74	--	6.72	44.76	3.61		.07		3,530	4.80	187	40	5.4	4,170	7.6
Jan. 21-31	35	39	15.37	15.05	21.52	0.21	6.49	42.26	3.44		.05		3,390	4.61	161	41	5.5	4,000	7.6

Feb. 1-10, 1954 ...	32	57	15.57	15.71	22.61	.22	6.52	44.55	3.67	.06	3,560	4.84	155	42	5.7	4,140	7.7
Feb. 11-20	31	23	15.57	15.87	21.52	--	6.54	43.72	3.55	.05	3,450	4.69	145	41	5.4	4,090	7.8
Feb. 21-28	28	58	13.77	16.86	21.52	--	6.16	42.68	3.50	.03	3,390	4.61	129	41	5.5	4,020	7.8
Mar. 1-10	34	22	15.67	15.62	21.31	--	6.80	41.85	3.41	.03	3,350	4.56	155	41	5.4	3,970	7.7
Mar. 11-20	31	22	17.42	15.62	22.18	--	6.72	44.55	3.67	.05	3,550	4.83	150	40	5.5	4,160	7.8
Mar. 21-31	45	25	16.82	15.05	21.39	--	6.64	42.68	3.47	.04	3,410	4.64	209	40	5.4	4,020	7.8
Apr. 1-10	5,380	21	17.22	14.47	20.87	--	5.72	42.89	3.33	.04	3,370	4.58	24,640	40	5.2	3,940	7.8
Apr. 11-20	10,610	11	17.22	12.75	18.48	--	4.02	40.60	2.90	.05	3,110	4.23	44,880	38	4.8	3,650	7.6
Apr. 21-30	674	12	19.21	11.76	19.00	--	4.70	42.26	3.02	.07	3,260	4.43	2,990	38	4.8	3,830	7.1
May 1-10	728	13	19.41	11.10	19.00	--	4.98	42.26	2.99	.06	3,260	4.43	3,230	38	4.9	3,820	7.6
May 11-16	722	14	17.42	11.51	17.31	--	4.42	39.97	2.68	.06	3,050	4.15	3,000	37	4.6	3,620	7.6
May 17-20	1,600	20	10.38	5.92	9.57	--	3.87	21.03	1.47	.03	1,700	2.31	3,700	37	3.4	2,200	7.5
May 21-23, 26-31, June 1-2	7,120	16	8.13	4.19	6.70	--	3.36	14.89	1.04	.05	1,240	1.69	12,030	35	2.7	1,680	7.5
May 24-25	2,820	19	5.34	2.30	5.04	--	3.29	8.95	.68	.01	824	1.12	3,160	40	2.6	1,190	7.3
June 3-5	472	17	11.98	6.33	10.61	--	4.28	22.48	1.81	.12	1,860	2.53	1,190	37	3.5	2,470	7.6
June 6-10	274	17	17.42	11.51	18.05	--	4.51	39.76	2.90	.09	3,070	4.18	1,150	38	4.7	3,640	7.7
June 11-15	329	13	17.02	11.35	17.61	--	3.85	39.35	2.93	.06	3,010	4.09	1,350	38	4.7	3,560	7.6
June 16-19	506	18	11.68	6.91	10.26	--	3.70	23.53	1.75	.06	1,880	2.56	1,300	36	3.4	2,380	7.7
June 20-28	373	18	18.21	13.08	19.92	--	4.20	43.72	3.13	.05	3,340	4.54	1,690	39	5.0	3,870	7.7
June 29-30, July 1-7	3,590	24	10.08	5.10	6.83	--	3.72	17.32	1.13	.05	1,430	1.94	6,960	31	2.5	1,860	7.6
July 8-20	686	19	14.07	8.63	13.48	--	3.70	30.40	2.28	.08	2,370	3.22	2,210	37	4.0	2,900	7.8

ARKANSAS RIVER BASIN--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 21-22, 27, 1954	506	28	12.18	7.73	10.87	--	4.85	23.94	1.78		0.04		1,980	2.69	1,360	35	3.4	2,470	7.7
July 23-26, 28-31	11,150	19	7.68	3.87	4.22	--	3.77	11.76	.48		.07		1,020	1.39	15,500	27	1.8	1,380	7.5
Aug. 1-10	16,510	15	7.39	3.70	4.13	--	2.75	12.08	.48		.05		986	1.34	22,120	27	1.8	1,330	7.6
Aug. 11-20	18,290	15	7.58	3.62	4.13	--	2.26	12.47	.48		.07		994	1.35	24,690	27	1.7	1,340	7.6
Aug. 21-31	16,930	13	8.63	3.45	4.52	--	2.39	13.59	.56		.06		1,080	1.47	24,890	27	1.8	1,450	7.8
Sept. 1-8	11,350	15	9.43	4.52	5.91	--	2.65	16.47	.76		.05		1,300	1.77	20,090	30	2.2	1,680	7.9
Sept. 9-10	163	16	15.87	10.53	15.31	--	4.10	34.98	2.43		.06		2,710	3.69	601	37	4.2	3,200	7.5
Sept. 11-20	553	16	17.81	12.09	18.48	0.21	4.54	40.60	3.05		.06		3,150	4.28	2,370	38	4.8	3,670	7.5
Sept. 21-30	375	14	18.61	12.34	19.13	.20	4.87	42.05	3.19		.04		3,270	4.45	1,670	38	4.9	3,780	7.7
Total or weighted avsrage	116,400	16	10.13	5.84	7.96	--	3.24	19.51	1.16		0.06		1,550	2.11	245,600	33	2.8	1,960	--

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ARKANSAS RIVER AT ARKANSAS CITY, KANS.

LOCATION.--At gaging station at Chestnut Avenue highway bridge, half a mile west of Arkansas City, Cowley County, and 5.9 miles (revised) upstream from Walnut River, and at mile 701.9.
DRAINAGE AREA.--43,713 square miles (revised), of which about 7,607 square miles does not contribute.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1954.
Water temperatures: October 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 4,720 micromhos Oct. 5; minimum daily, 470 micromhos May 29.
Percent sodium: Maximum, 78 Oct. 5, Apr. 30; minimum, 46 May 29.
Sodium adsorption ratio: Maximum, 16 Oct. 5; minimum, 1.8 May 29.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 4,720 micromhos Oct. 5, 1953; minimum daily, 438 micromhos Aug. 9, 1953.
Percent sodium: Maximum, 78 Oct. 5, 1953, Apr. 30, 1954; minimum, 45 Aug. 8-10, 1953.
Sodium adsorption ratio: Maximum, 16 Oct. 5, 1953; minimum, 1, 8 May 29, 1954.
REMARKS.--Values reported for dissolved solids are residue on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1953 to September 1954 given in WSP 1341.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-4, 1953 ..	1,220	--	5.89	2.47	19.52	--	a4.17	3.77	20.31	--	0.19	--	1,690	2.30	2,810	70	9.5	2,930	8.4
Oct. 5.....	524	--	6.84	3.26	35.22	--	a4.02	5.83	36.10	--	.18	--	2,770	3.77	1,970	78	16	4,720	8.3
Oct. 6	377	--	4.29	1.83	13.00	--	b3.12	2.87	13.03	--	.18	--	1,160	1.58	595	68	7.4	2,100	8.3
Oct. 7-10.....	1,319	--	5.69	2.47	18.87	--	4.02	3.60	19.46	--	.21	--	1,610	2.19	2,890	70	9.3	2,820	8.1
Oct. 11-20	3,277	10	5.49	2.55	18.74	0.23	4.02	3.50	18.47	0.03	16	0.26	1,580	2.15	7,050	69	9.4	2,760	7.9
Oct. 21-25.....	1,968	--	4.89	2.07	16.70	--	3.83	3.19	16.50	--	.21	--	1,400	1.90	3,750	71	8.9	2,520	7.7
Oct. 26.....	1,018	--	3.79	1.49	12.91	--	2.84	2.42	12.75	--	.21	--	1,100	1.50	1,520	71	7.9	1,950	7.8
Oct. 27.....	1,351	--	3.29	1.35	10.18	--	2.69	2.12	9.81	--	.19	--	886	1.20	1,630	69	6.7	1,600	8.0
Oct. 28.....	1,018	--	2.99	1.13	7.74	--	2.49	2.00	7.28	--	.16	--	711	.97	985	65	5.4	1,290	8.0
Oct. 29-31	2,281	--	3.99	1.61	12.91	--	3.28	2.52	12.64	--	.16	--	1,110	1.51	3,450	70	7.7	2,000	7.6
Nov. 1-10	6,486	11	4.74	1.97	15.13	.19	3.59	3.04	14.52	.03	.18	.18	1,290	1.75	11,390	69	8.3	2,260	7.3
Nov. 11-20.....	8,987	--	4.69	1.89	15.87	--	3.57	3.16	15.37	--	.18	--	1,370	1.86	16,760	71	8.7	2,360	7.9
Nov. 21-22.....	2,515	--	3.59	1.40	9.96	--	2.98	2.48	9.31	--	.10	--	910	1.24	3,120	67	6.3	1,580	7.4
Nov. 23-30.....	6,783	--	4.69	1.81	15.00	--	3.69	3.21	13.96	--	.15	--	1,290	1.75	11,910	70	8.3	2,230	7.7

a Includes 0.17 equivalent per million of carbonate (CO_3).
b Includes 0.07 equivalent per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT ARKANSAS CITY, KANS.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Dec. 1-4, 1953	4,691	--	4.79	1.89	15.74	--	3.49	3.50	15.09	--	0.14	--	1,380	1.88	8,810	70	8.6	2,360	8.1
Dec. 5	1,377	--	3.69	1.32	10.04	--	3.13	2.44	9.31	--	.06	--	923	1.26	1,730	67	6.4	1,570	8.0
Dec. 6-10	6,599	--	4.44	1.73	13.74	--	3.51	3.19	12.55	--	.12	--	1,200	1.63	10,780	69	7.8	2,050	7.9
Dec. 11-20	10,690	14	5.09	1.97	16.09	0.19	3.75	3.64	15.09	0.03	.15	0.17	1,380	1.88	20.090	69	8.5	2,370	8.0
Dec. 21-31	10,730	14	5.49	2.30	16.70	.18	3.92	4.02	15.93	.03	.18	.17	1,460	1.99	21,330	68	8.5	2,510	8.0
Jan. 1-10, 1954	9,471	--	5.29	2.14	15.74	--	3.95	4.29	14.38	--	.16	--	1,420	1.93	18,310	68	8.2	2,380	7.7
Jan. 11-15, 17-19	5,871	--	6.69	2.80	20.92	--	4.42	5.18	20.02	--	.23	--	1,830	2.49	14,630	69	9.6	3,120	7.5
Jan. 16, 20	1,329	--	5.49	2.30	15.78	--	4.03	4.21	14.39	--	.27	--	1,400	1.90	2,530	67	8.0	2,390	8.1
Jan. 21-22, 25-31	6,764	--	5.79	2.38	17.00	--	4.29	4.29	15.93	--	.24	--	1,500	2.04	13,810	68	8.4	2,580	7.5
Jan. 23-24	1,488	--	7.39	3.12	24.44	--	4.65	4.79	24.25	--	.19	--	2,080	2.83	4,210	70	11	3,500	8.2
Feb. 1-10	12,840	--	5.29	2.14	13.96	--	3.57	4.54	12.55	--	.15	--	1,290	1.75	22,550	65	7.3	2,200	7.9
Feb. 11-20	10,880	--	5.84	2.63	16.87	--	3.87	5.87	14.67	--	.14	--	1,520	2.07	22,510	67	8.2	2,540	7.8
Feb. 21-28	10,570	--	5.09	2.06	14.74	--	3.62	4.83	13.54	--	.10	--	1,340	1.82	19,290	67	7.8	2,300	8.0
Mar. 1-10	10,870	--	5.59	2.63	16.05	--	3.88	5.33	14.81	--	.13	--	1,470	2.00	21,760	66	7.9	2,510	8.0
Mar. 11-20	10,350	--	5.64	2.63	16.74	--	3.80	5.56	15.37	--	.13	--	1,520	2.07	21,410	67	8.2	2,580	7.8
Mar. 21-25	5,252	--	5.64	2.36	17.83	--	3.64	5.37	16.78	--	.11	--	1,590	2.16	11,370	69	8.9	2,660	7.9
Mar. 26-27	4,126	--	3.74	1.48	8.13	--	2.87	2.96	7.47	--	.09	--	884	1.20	4,960	61	5.0	1,430	8.0
Mar. 28-31	4,915	--	4.89	2.19	13.74	--	3.54	4.56	12.69	--	.00	--	1,320	1.80	8,830	66	7.3	2,180	8.1
Apr. 1-10	9,172	6.4	5.09	2.35	17.09	.16	3.70	5.14	15.57	.02	.04	.30	1,450	1.97	18,100	69	8.9	2,490	8.0
Apr. 11-20	8,120	--	5.49	2.35	18.00	--	3.79	5.04	17.20	--	.11	--	1,560	2.12	17,240	70	9.1	2,710	7.9
Apr. 21-22	1,874	--	5.59	2.61	21.26	--	3.51	4.79	21.15	--	.00	--	1,840	2.50	4,690	72	11	3,090	8.2
Apr. 23-29	5,829	--	4.89	2.81	17.00	--	3.56	4.41	16.22	--	.01	--	1,490	2.03	11,820	69	8.7	2,550	7.9
Apr. 30	1,148	--	5.59	2.51	28.87	--	c3.07	5.66	27.08	--	.10	--	2,190	2.98	3,420	78	14	3,700	8.3
May 1-3	4,748	--	4.34	1.70	14.83	--	3.24	3.85	12.97	--	.07	--	1,240	1.69	8,020	71	8.6	2,160	8.1
May 4-7	11,680	--	3.09	.95	7.30	--	2.75	2.02	6.49	--	.05	--	693	.94	11,020	64	5.2	1,190	8.1
May 8-10	5,605	--	4.14	1.42	12.39	--	2.98	3.25	11.70	--	.05	--	1,110	1.51	8,470	69	7.4	1,920	8.2

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

May 11-20, 1954.	10,440	--	4.79	1.89	15.96	--	3.36	4.21	15.37	--	.05	--	1,380	1.88	19,610	70	8.7	2,420	7.8
May 21-25.....	5,375	--	4.89	2.21	18.70	--	3.47	4.62	17.77	--	.05	--	1,570	2.14	11,490	72	9.9	2,720	8.2
May 26-27	7,775	--	2.64	.62	3.91	--	2.56	1.29	3.78	--	.02	--	463	.63	4,900	55	3.1	802	7.6
May 28	7,636	--	2.79	1.31	5.31	--	d2.54	1.83	5.08	--	.09	--	602	.82	6,260	56	3.7	1,020	8.3
May 29	9,957	--	1.90	.44	1.96	--	1.98	.62	1.75	--	.08	--	285	.39	3,860	46	1.8	470	8.2
May 30-31	8,926	--	2.64	.72	4.57	--	d2.49	1.42	4.20	--	.05	--	499	.68	6,060	58	3.5	856	8.4
June 1.....	2,876	--	3.09	1.05	6.04	--	2.74	1.69	5.92	--	.19	--	659	.90	2,580	59	4.2	1,100	7.9
June 2.....	2,281	--	3.74	1.30	8.78	--	3.08	2.25	8.46	--	.08	--	855	1.16	2,650	64	5.6	1,420	8.1
June 3-10	12,610	--	4.94	2.38	21.79	--	3.10	4.39	21.72	--	.10	--	1,750	2.38	30,050	75	11	3,030	8.1
June 11-20	14,160	18	4.49	2.31	15.61	20	3.39	3.79	15.23	.03	.04	.04	1,330	1.81	25,640	69	8.5	2,320	8.0
June 21-25	8,233	--	3.84	1.36	13.48	--	2.98	2.75	12.83	--	.07	--	1,120	1.52	12,550	72	8.4	1,960	7.7
June 26-30.....	4,463	--	5.09	1.99	18.48	--	3.65	3.98	17.63	--	.07	--	1,530	2.08	9,290	72	9.8	2,640	7.7
July 1-2	1,767	--	5.09	2.47	17.92	--	e3.68	3.73	18.33	--	.08	--	1,490	2.03	3,580	70	9.2	2,590	8.6
July 3-10	4,598	--	4.79	1.77	14.61	--	3.51	3.44	14.10	--	.08	--	1,230	1.67	7,700	69	8.0	2,120	8.0
July 11-20	3,199	--	5.59	2.91	24.18	--	3.05	4.16	24.54	--	.10	--	1,890	2.57	8,230	74	12	3,240	8.1
July 21-31	2,144	--	5.59	2.91	24.39	--	2.79	3.91	25.66	--	.15	--	1,940	2.64	5,660	74	12	3,320	7.9
Aug. 1-10	1,968	--	5.79	2.81	25.61	--	3.54	3.77	25.44	--	.11	--	1,980	2.69	5,300	75	12	3,550	8.0
Aug. 11-20	920	--	7.49	3.41	28.18	--	b4.53	3.66	31.02	--	.06	--	2,310	3.14	2,890	72	12	4,100	8.3
Aug. 21-31	1,559	--	5.99	3.21	25.48	--	4.20	3.81	25.38	--	.12	--	2,020	2.75	4,290	73	12	3,550	7.9
Sept. 1-10	1,664	--	5.39	2.81	22.61	--	3.90	3.50	23.27	--	.10	--	1,870	2.54	4,240	73	11	3,330	8.0
Sept. 11,13-20 .	1,355	--	5.89	2.51	22.09	--	b4.41	3.12	22.56	--	.14	--	1,800	2.45	3,320	72	11	3,190	8.3
Sept. 12	276	--	4.59	1.91	13.35	--	e3.53	2.52	13.88	--	.16	--	1,190	1.62	447	67	7.4	2,100	8.5
Sept. 21-30	672	16	6.79	3.51	25.00	.31	4.47	3.75	27.13	.05	.15	.03	2,130	2.90	1,950	70	11	3,950	8.0
Total or weighted average	331,000	--	4.69	4.69	14.78	--	3.42	3.75	14.02		.11	--	1,290	1.75	581,200	69	8.1	2,230	--

b Includes 0.07 equivalent per million of carbonate (CO_3).
d Includes 0.13 equivalent per million of carbonate (CO_3).
e Includes 0.27 equivalent per million of carbonate (CO_3).

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, 2 miles upstream from Grayhorse Creek, and at mile 594.0.
DRAINAGE AREA.--54,465 square miles (revised) of which 7,615 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: January 1950 to September 1954.
Water temperatures: January 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 5,800 micromhos May 30; minimum daily, 1,120 micromhos May 2.
Percent sodium: Maximum, 86 May 30; minimum, 66 Dec. 6-10, Jan. 11-31, May 1-3.
EXTREMES, January 1950 to September 1954.--Specific conductance: Maximum daily, 5,800 micromhos May 30, 1954; minimum daily, 319 micromhos July 16, 1951.
Percent sodium: Maximum, 86 May 30, 1954; minimum, 36 July 18-20, 1950.
REMARKS.--Values reported for dissolved solids are residue on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1953 to September 1954 given in WSP 1341.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-9, 1953	3,473	--	4.94	2.50	18.61	--	3.26	3.60	19.74	--	0.02	--	1,530	2.08	7,230	71	9.7	2,740	7.8
Oct. 10	520	--	5.69	3.01	25.18	--	2.87	4.43	27.08	--	.05	--	2,020	2.75	1,430	74	12	3,580	8.2
Oct. 11-14	1,617	--	5.34	2.94	22.74	--	3.38	4.06	24.25	--	.03	--	1,840	2.50	4,050	73	11	3,310	8.0
Oct. 15-20	2,202	--	5.29	2.55	19.13	--	3.57	3.52	20.59	--	.01	--	1,580	2.15	4,740	71	9.7	2,830	8.1
Oct. 21-29	5,421	--	5.19	2.41	17.70	--	3.47	3.27	19.18	--	.01	--	1,490	2.03	10,990	70	9.1	2,880	8.0
Oct. 30	1,964	--	7.58	3.42	23.13	--	3.13	3.46	27.92	--	.11	--	2,160	2.94	5,770	68	9.9	3,590	8.0
Oct. 31	2,043	--	3.24	1.48	11.83	--	2.64	2.19	11.62	--	.11	--	987	1.34	2,740	71	7.7	1,770	8.1
Nov. 1-10	9,291	--	4.39	1.97	13.87	--	3.31	2.77	13.96	--	.06	--	1,240	1.69	15,680	69	7.8	2,120	8.0
Nov. 11-18	5,248	--	4.69	2.30	17.39	--	3.36	3.31	17.20	--	.04	--	1,460	1.99	10,430	71	9.3	2,530	8.2
Nov. 19	3,451	--	2.69	.90	7.31	--	1.43	.71	8.74	--	.12	--	750	1.02	3,520	67	5.4	1,230	7.4
Nov. 20	2,460	--	3.14	1.32	10.70	--	2.39	1.92	10.44	--	.07	--	947	1.29	3,170	71	7.1	1,620	7.9
Nov. 21-30	24,970	--	4.19	1.81	12.78	--	2.90	2.46	12.97	--	.10	--	1,150	1.56	39,100	68	7.4	1,990	7.8
Dec. 1-5	10,300	--	4.49	1.97	14.26	--	3.16	2.64	14.52	--	.09	--	1,270	1.73	17,810	69	7.9	2,190	8.1
Dec. 6-10	15,350	--	3.09	1.32	8.44	--	2.43	1.75	8.69	--	.10	--	789	1.07	16,490	66	5.7	1,370	7.8
Dec. 11-20	15,660	--	4.99	1.97	15.61	--	3.59	3.21	15.23	--	.13	--	1,360	1.85	28,980	69	8.3	2,340	7.9
Dec. 21-31	14,200	--	5.59	2.30	16.61	--	3.82	3.48	16.92	--	.14	--	1,500	2.04	29,000	68	8.4	2,570	8.2

Jan. 1-10, 1954 ...	15,230	--	5.64	2.38	16.61	--	3.87	3.83	16.36	--	.14	--	1,480	2.01	30,690	67	8.3	2,570	8.0
Jan. 11-20.....	11,090	--	6.04	2.63	17.13	--	4.10	4.21	16.78	--	.14	--	1,550	2.11	23,390	66	8.2	2,640	8.2
Jan. 21-31.....	11,300	--	6.19	2.71	17.31	--	4.10	4.04	17.91	--	.16	--	1,600	2.18	24,610	66	8.2	2,750	7.7
Feb. 1-10	13,480	--	5.34	2.30	15.57	--	3.72	3.89	15.51	--	.15	--	1,400	1.90	25,700	67	8.0	2,430	7.7
Feb. 11-20.....	12,570	--	5.54	2.55	16.31	--	3.65	4.89	15.37	--	.08	--	1,460	1.99	24,980	67	8.1	2,480	7.7
Feb. 21-28	10,940	--	5.29	2.55	16.22	--	3.41	4.60	16.08	--	.07	--	1,460	1.99	21,740	67	8.2	2,540	7.9
Mar. 1-10	12,690	--	5.59	2.63	17.13	--	3.62	4.58	16.92	--	.08	--	1,530	2.08	26,430	68	8.5	2,650	7.9
Mar. 11-20	12,280	--	5.69	2.88	19.09	--	3.67	5.27	18.47	--	.05	--	1,630	2.22	27,250	69	9.2	2,860	7.8
Mar. 21-27	9,501	--	5.19	2.80	20.87	--	3.16	5.06	20.59	--	.05	--	1,770	2.41	22,890	72	10	3,290	7.3
Mar. 28-31	11,010	--	4.34	2.06	12.96	--	2.92	3.39	12.41	--	.08	--	1,160	1.58	17,380	67	7.2	2,000	7.7
Apr. 1-10.....	15,620	--	4.89	2.63	18.13	--	2.75	4.50	18.05	--	.03	--	1,550	2.11	32,970	71	9.4	2,690	7.4
Apr. 11-14	4,554	--	4.99	2.51	18.35	--	2.82	4.46	18.76	--	.01	--	1,630	2.22	10,100	71	9.5	2,740	7.9
Apr. 15-20	6,559	--	5.39	2.81	20.57	--	2.87	4.56	21.72	--	.00	--	1,810	2.46	16,160	71	10	3,080	7.5
Apr. 21-29.....	11,380	--	4.59	2.51	20.22	--	2.69	4.14	20.87	--	.05	--	1,670	2.27	25,880	74	11	2,940	7.6
Apr. 30.....	2,221	--	3.84	1.81	12.31	--	a2.71	2.54	12.83	--	.00	--	1,220	1.66	3,690	69	7.4	1,950	8.3
May 1-3, 1954	38,860	--	2.89	1.03	7.61	--	2.36	1.44	7.76	--	.00	--	716	0.97	37,870	66	5.4	1,260	7.9
May 4, 8	9,917	--	3.49	1.27	12.22	--	2.39	2.17	12.41	--	.01	--	1,080	1.47	14,580	72	7.9	1,860	8.1
May 5, 9	8,331	--	4.39	1.69	17.65	--	2.54	2.96	18.05	--	.01	--	1,470	2.00	16,670	74	10	2,530	8.0
May 6-7, 10	11,250	--	5.09	1.91	23.79	--	2.80	3.79	24.25	--	.00	--	1,920	2.61	29,390	77	13	3,280	8.0
May 11-20	21,380	12	5.49	3.11	34.09	.15	2.82	5.18	34.69	.03	.03	.01	2,520	3.43	73,350	80	16	4,380	7.5
May 21-25	7,624	--	5.09	2.47	31.66	--	2.67	5.25	31.31	--	.04	--	2,350	3.20	24,390	81	16	4,120	8.2
May 26-27	12,690	--	3.69	1.35	15.78	--	2.61	2.75	15.65	--	.03	--	1,290	1.75	22,290	76	10	2,290	8.2
May 28	12,580	--	3.79	1.29	18.70	--	2.34	2.75	18.47	--	.05	--	1,560	2.12	26,700	79	12	2,580	8.2

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

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT RALSTON, OKLA.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 29, 1954	10,910	--	4.94	1.10	30.70	--	b 2.20	3.68	30.18	--	0.10	--	2,170	2.95	32,220	82	18	3,940	8.3
May 30	10,230	--	5.69	2.31	47.40	--	c 2.70	5.39	46.54	--	.08	--	3,230	4.39	45,000	86	24	5,800	8.3
May 31	15,110	--	4.49	1.63	31.09	--	2.49	3.68	31.02	--	.08	--	2,260	3.07	46,500	84	18	4,020	8.1
June 1-10	55,560	14	5.49	3.01	35.05	0.19	2.74	5.04	36.66	0.03	.03	0.09	2,630	3.58	198,900	80	17	4,580	7.7
June 11-20	18,530	14	5.99	2.01	27.00	.18	3.03	4.68	28.77	.03	.02	.09	2,130	2.90	53,740	77	14	3,700	7.8
June 21-30	17,120	22	3.89	3.51	23.22	.21	b 3.10	4.14	23.41	.04	.03	.13	1,810	2.46	42,170	75	12	3,190	8.3
July 1-10	9,461	14	5.39	2.61	24.87	.28	2.82	4.23	26.79	.03	.05	.23	1,980	2.69	25,500	75	12	3,580	8.2
July 11-20	4,756	--	4.49	2.61	22.87	--	2.47	4.12	23.41	--	.02	--	1,870	2.54	12,110	76	12	3,230	7.6
July 21-31	3,062	--	4.69	2.71	22.31	--	2.49	3.71	25.38	--	.03	--	1,810	2.46	7,550	75	12	3,320	8.1
Aug. 1-10	2,674	--	4.59	2.61	21.57	--	2.43	3.41	22.00	--	.04	--	1,700	2.31	6,190	75	11	3,140	8.1
Aug. 11	516	--	2.89	1.11	8.17	--	c 2.42	1.50	7.95	--	.10	--	694	.94	487	67	5.8	1,260	8.5
Aug. 12-20	2,739	--	4.14	2.46	18.87	--	2.46	3.25	19.74	--	.03	--	1,520	2.07	5,670	74	10	2,860	8.0
Aug. 21-31	2,749	--	3.99	2.61	18.09	--	2.25	2.83	20.02	--	.03	--	1,520	2.07	5,690	73	10	2,820	7.8
Sept. 1-10	1,799	10	4.49	2.61	20.26	.31	2.56	3.06	21.01	.03	.03	.00	1,600	2.18	3,920	73	11	2,990	7.9
Sept. 11-20	1,428	--	4.99	1.41	20.22	--	2.77	3.27	21.86	--	.04	--	1,710	2.33	3,320	76	11	3,100	7.4
Sept. 21-30	1,228	--	5.39	2.41	20.26	--	3.11	3.25	22.56	--	.03	--	1,680	2.28	2,810	72	10	3,030	7.4
Total or weighted average	559,100	--	5.69	2.22	20.57	--	2.97	3.73	20.90	--	0.06	--	1,670	2.27	1,271,000	72	10	2,920	--

b Includes 0.07 equivalent per million of carbonate (CO_3).
c Includes 0.13 equivalent per million of carbonate (CO_3).

CIMARRON RIVER AT PERKINS, OKLA.

LOCATION.--At gaging station at bridge on State Highway 40, 1 mile south of Perkins, Payne County, 1½ miles upstream from Dugout Creek, 4 miles downstream from Wildhorse Creek, and at mile 87.3.
DRAINAGE AREA.--17,852 square miles (revised), of which 4,926 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1954.
Water temperatures: October 1952 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 24,600 micromhos Aug. 28; minimum daily, 601 micromhos Nov. 22.
Percent sodium: Maximum 92 Aug. 30 to Sept. 1; minimum, 63 Nov. 21-22.
Sodium adsorption ratio: Maximum, 65 Feb. 5; minimum, 3.8 Nov. 21-22.
EXTREMES, 1952-54.--Specific conductance: Maximum daily, 27,400 micromhos Jan. 11, 12, 1953; minimum daily, 601 micromhos Nov. 22, 1953.
Percent sodium: Maximum 92 Dec. 31, 1952; Jan. 1-2, 11-13, Feb. 21-23, Mar. 11-12, May 28, 1953, Aug. 30 to Sept. 1, 1954; minimum, 63 Nov. 21-22, 1953.
Sodium adsorption ratio: Maximum, 82 Jan. 11-12, 1953; minimum, 3.8 Nov. 21-22, 1953.
REMARKS.--Values for reported dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1953 to September 1954 given in WSP 1341.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-6, 1953	317		10.93	5.23	94.64		3.92	8.45	98.43		--		6,650	9.04	2,870	85	33	11,100	7.8
Oct. 7	424		7.49	3.41	57.69		5.21	6.41	56.97		--		4,060	5.52	2,350	84	25	6,980	7.5
Oct. 8	444		4.09	1.55	36.80		2.67	4.23	35.54		--		2,540	3.45	1,540	87	22	4,540	7.7
Oct. 9-10	381		3.69	1.47	24.77		2.13	4.06	23.69		0.05		1,800	2.45	933	83	15	3,220	7.8
Oct. 11	121		4.99	2.14	26.66		2.72	4.27	27.08		.06		2,060	2.80	339	79	14	3,730	8.1
Oct. 12-14	256		5.94	2.80	36.66		3.61	4.18	36.66		--		2,740	3.73	954	81	18	4,650	7.9
Oct. 15	89		6.89	3.62	52.18		2.92	5.83	54.15		--		3,770	5.13	458	83	23	6,630	8.0
Oct. 16	278		4.09	2.06	29.13		2.02	3.14	29.61		--		2,130	2.90	805	83	17	3,910	7.8
Oct. 17	196		8.68	4.36	72.18		3.06	7.20	73.33		--		4,970	6.76	1,330	85	28	8,660	8.0
Oct. 18-19	325		4.49	2.30	27.09		3.38	3.44	26.51		.02		2,010	2.73	890	80	15	3,490	8.1
Oct. 20	81		5.34	2.55	34.40		3.34	3.44	34.69		--		2,550	3.47	282	81	17	4,530	8.1
Oct. 21-22	214		6.69	3.01	46.53		3.03	4.31	49.64		--		3,350	4.56	977	83	21	5,980	8.0
Oct. 23	436		3.29	1.39	21.44		1.95	1.98	22.84		.05		1,540	2.09	915	82	14	2,860	7.9
Oct. 24	1,805		4.44	1.84	26.79		2.97	2.69	28.49		--		2,000	2.72	4,910	81	15	3,550	8.1
Oct. 25-28	6,065		1.90	.64	6.87		1.79	.83	6.91		.05		564	.77	4,660	73	6.1	1,050	7.8

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 29, 1953	885		2.64	1.28	14.05		1.84	1.37	14.81		0.06		1,090	1.48	1,310	78	10	1,980	7.8
Oct. 30-31	1,139		5.74	2.56	58.70		2.25	4.85	59.79		--		3,960	5.39	6,140	88	29	7,030	7.8
Nov. 1	417		4.09	1.55	27.39		2.31	3.54	28.20		.08		2,030	2.76	1,150	83	16	3,630	8.0
Nov. 2-3	579		6.09	2.41	40.27		2.79	5.16	41.18		--		2,920	3.97	2,300	83	20	5,140	8.0
Nov. 4-6	639		9.53	4.13	99.14		3.06	7.72	104.07		--		6,780	9.22	5,890	88	38	11,500	8.0
Nov. 7-9	510		10.03	4.99	140.02		3.65	7.95	144.40		--		9,280	12.62	6,440	90	51	15,400	8.1
Nov. 10-15	750		9.83	4.51	101.75		4.36	7.27	104.07		--		6,780	9.22	6,920	88	38	11,600	8.2
Nov. 16-19	1,823		11.23	5.19	120.45		4.49	8.68	124.94		--		8,050	10.95	19,970	88	42	13,600	8.1
Nov. 20	10,910		1.90	.58	6.68		2.31	.69	6.06		.10		524	.71	7,780	73	6.0	1,020	8.0
Nov. 21-22	13,900		1.80	.56	4.09		2.21	.58	3.84		.03		389	.53	7,360	63	3.8	717	8.0
Nov. 23	1,260		1.90	.70	7.91		1.77	.90	7.90		.06		634	.86	1,090	75	6.9	1,170	7.9
Nov. 24	813		5.44	2.86	56.53		2.70	4.43	58.10		--		3,800	5.17	4,210	87	28	6,740	8.0
Nov. 25-26	1,210		4.29	1.67	27.61		2.98	2.69	28.77		--		1,990	2.71	3,280	82	16	3,620	8.1
Nov. 27-28	889		6.29	2.81	53.05		3.61	4.58	55.00		--		3,660	4.98	4,430	85	25	6,520	8.1
Nov. 29-30	764		7.88	3.52	81.75		3.38	6.62	84.05		--		5,490	7.47	5,710	88	34	9,360	8.0
Dec. 1-2	904		9.33	4.51	126.97		3.46	7.66	131.14		--		8,440	11.48	10,390	90	48	14,300	8.0
Dec. 3	1,234		4.44	2.00	36.87		3.39	2.37	37.79		--		2,590	3.52	4,350	85	21	4,720	8.1
Dec. 4	2,440		7.29	3.21	86.53		4.16	4.62	89.69		--		5,820	7.92	19,330	89	38	9,760	8.2
Dec. 5-8	10,240		3.79	1.45	33.27		2.11	2.85	33.56		--		2,320	3.16	32,330	86	21	4,180	7.9
Dec. 9-10	1,123		2.89	1.11	21.00		2.08	2.37	20.87		.07		1,500	2.04	2,290	84	15	2,750	7.9
Dec. 11-20	3,725		9.23	4.01	107.41		3.92	7.18	109.43		--		7,150	9.72	36,250	89	42	12,100	8.1
Dec. 21-22	589		9.43	4.43	95.23		5.23	6.91	97.58		--		6,500	8.84	5,210	87	36	11,000	8.2
Dec. 23-31	2,194		11.33	5.01	126.10		4.65	9.01	128.61		--		8,460	11.51	25,260	89	44	14,000	8.1
Jan. 1-7, 10, 1954	2,108		11.43	5.29	139.15		[a]4.79	9.39	144.40		--		9,340	12.70	26,810	89	48	15,500	8.3
Jan. 8-9	571		12.87	5.89	192.20		4.62	10.64	198.55		--		12,500	17.00	9,720	91	63	20,300	8.2
Jan. 11-20	2,299		11.13	5.19	127.41		4.83	9.14	130.58		--		8,600	11.70	26,910	89	45	14,200	8.2
Jan. 21-31	2,263		11.23	5.39	127.84		4.59	9.18	131.99		--		8,640	11.75	26,620	88	44	14,300	8.0

a Includes 0.17 equivalents per million of carbonate (CO_3).

Feb. 1-4, 1954 ...	920	10.48	5.84	145.67	3.97	9.74	148.63	--	9,710	13.21	12,160	90	51	16,000	8.1
Feb. 5.....	313	12.28	7.07	203.50	3.79	11.80	201.37	--	13,100	17.82	5,590	91	65	20,700	8.2
Feb. 6-8.....	972	8.93	5.26	146.54	4.18	9.37	142.99	--	9,360	12.73	12,380	91	55	15,600	8.2
Feb. 9-10.....	579	7.83	4.61	110.45	b4.48	7.93	109.43	--	7,290	9.91	5,750	90	44	12,200	8.3
Feb. 11-19.....	2,097	9.58	5.84	139.58	4.06	9.20	136.22	--	8,960	12.19	25,570	90	50	14,800	8.1
Feb. 20.....	772	4.99	2.88	60.01	2.69	4.06	59.79	--	3,990	5.43	4,190	88	30	6,970	8.2
Feb. 21.....	1,180	5.39	2.80	50.01	c3.87	4.41	50.20	--	3,480	4.73	5,590	86	25	6,050	8.3
Feb. 22.....	720	7.44	4.11	98.71	c3.10	6.89	97.02	--	6,370	8.66	6,240	90	41	10,800	8.3
Feb. 23.....	450	4.09	2.47	26.13	b3.25	4.12	25.10	.18	1,930	2.62	1,180	80	14	3,440	8.3
Feb. 24-25.....	591	7.24	4.28	82.18	3.70	7.12	83.20	--	5,640	7.67	4,540	88	34	9,550	8.0
Feb. 26-28.....	631	10.28	5.59	126.97	3.95	8.62	127.76	--	8,410	11.44	7,220	89	45	13,900	7.8
Mar. 1-4.....	781	11.18	6.09	153.06	4.02	10.24	155.69	--	10,300	14.01	10,960	90	52	16,600	8.2
Mar. 5-6.....	456	12.33	7.40	196.55	4.21	11.45	201.65	--	13,100	17.82	8,140	91	63	20,800	8.2
Mar. 7-10.....	865	9.78	6.02	143.50	c4.19	9.56	148.63	--	9,690	13.18	11,410	90	51	15,700	8.3
Mar. 11-20.....	1,672	10.78	6.60	150.89	c4.28	10.01	155.40	--	9,930	13.50	22,600	90	51	16,700	8.3
Mar. 21-26.....	1,759	10.23	6.59	138.71	4.23	9.68	142.99	--	9,490	12.91	22,730	89	48	15,400	8.1
Mar. 27.....	1,289	6.24	3.36	57.40	d3.74	6.37	59.23	--	4,070	5.54	7,140	86	26	7,010	8.4
Mar. 28.....	912	3.49	1.73	28.26	2.33	2.85	28.20	.03	2,000	2.72	2,480	84	18	3,520	8.1
Mar. 29	478	4.64	2.47	41.66	c2.62	4.04	42.87	--	2,970	4.04	1,930	85	22	5,140	8.3
Mar. 30-31.....	613	8.18	3.72	82.62	3.77	6.93	84.61	--	5,700	7.75	4,760	87	34	9,590	8.1

b Includes 0.10 equivalents per million of carbonate (CO_3).
c Includes 0.13 equivalents per million of carbonate (CO_3).
d Includes 0.23 equivalents per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-2, 1954	460		7.58	3.82	76.97		e4.23	6.87	77.56		--		5,340	7.26	3,340	87	32	9,080	8.4
Apr. 3-5	657		8.93	5.21	123.06		3.21	9.12	122.12		--		8,160	11.10	7,290	90	46	13,600	8.1
Apr. 6-9	629		10.03	6.19	164.37		3.90	9.76	164.14		--		10,900	14.82	9,330	91	58	17,700	8.0
Apr. 10	131		5.79	1.21	52.62		b2.44	4.00	53.59		--		3,540	4.81	631	88	28	6,570	8.3
Apr. 11-16	1,012		10.43	5.31	127.84		4.33	9.02	127.76		--		8,630	11.74	11,880	89	46	14,300	8.0
Apr. 17-20	764		7.98	4.70	89.14		4.15	7.79	89.97		--		6,040	8.21	6,280	88	35	10,300	8.2
Apr. 21-28	1,486		11.03	5.71	131.76		3.54	11.24	133.40		--		8,980	12.21	18,160	89	46	14,700	7.9
Apr. 29-30	528		11.38	8.72	69.57		3.05	14.03	66.28		--		5,080	6.91	3,650	82	25	8,440	8.2
May 1	924		8.78	2.82	58.70		2.98	8.41	59.23		--		4,340	5.90	5,460	83	24	7,180	8.2
May 2-3	13,410		5.79	1.29	23.74		2.43	6.37	21.86		0.03		1,920	2.61	35,040	77	13	3,240	8.2
May 4-5	5,950		5.64	1.32	16.87		1.97	6.14	15.51		.04		1,470	2.00	11,910	71	9.0	2,520	8.2
May 6-10	5,581		12.92	3.70	115.23		2.39	12.37	115.07		--		8,020	10.91	60,930	87	40	13,300	8.1
May 11	869		5.79	2.01	53.92		2.08	5.00	53.59		--		3,720	5.06	4,400	87	27	6,320	8.2
May 12-13	1,337		6.19	2.65	40.53		4.36	4.31	40.33		--		2,980	4.05	5,420	82	19	5,270	8.2
May 14	520		8.08	3.32	74.79		f3.76	6.89	74.74		--		5,230	7.11	3,700	87	31	8,630	8.5
May 15-16, 19	1,240		9.73	4.03	101.75		3.62	8.91	99.84		--		6,840	9.30	11,540	88	39	11,500	8.2
May 17-18, 20	1,081		12.03	5.19	142.19		3.43	10.91	141.58		--		9,390	12.77	13,820	89	48	15,900	8.1
May 21	389		12.18	6.20	180.89		2.92	12.28	184.73		--		12,100	16.46	6,400	91	60	19,800	8.2
May 22	361		9.73	4.03	106.10		d3.16	9.39	105.48		--		7,160	9.74	3,520	89	40	12,000	8.4
May 23-25	1,611		12.23	5.37	180.02		a3.38	11.30	180.78		--		11,800	16.05	25,870	91	61	19,300	8.3
May 26	16,280		5.89	1.81	55.22		2.72	5.43	55.00		--		3,810	5.18	84,460	88	28	6,600	8.2
May 27	18,350		3.49	1.47	31.35		2.08	3.04	31.31		--		2,220	3.02	55,440	86	20	3,980	8.1
May 28-29	15,070		5.79	1.51	46.09		2.26	5.29	46.54		--		3,290	4.47	67,510	86	24	5,680	8.1
May 30-31	7,557		6.99	2.59	87.84		2.39	6.22	87.71		--		5,830	7.93	59,970	90	40	10,100	7.9

a Includes 0.17 equivalents per million of carbonate (CO_3).
b Includes 0.10 equivalents per million of carbonate (CO_3).
d Includes 0.23 equivalents per million of carbonate (CO_3).
e Includes 0.30 equivalents per million of carbonate (CO_3).
f Includes 0.33 equivalents per million of carbonate (CO_3).

June 1, 1954	2,797		6.39	3.01	83.49		g2.76	6.06	85.17		--		5,590	7.60	21,280	90	39	9,480	8.4
June 2-3	3,461		6.39	3.21	75.66		2.79	5.91	73.89		--		4,970	6.76	23,420	89	35	8,450	8.3
June 4-5	1,924		6.09	2.79	62.62		g2.79	5.77	61.48		--		4,290	5.83	11,240	88	30	7,220	8.4
June 6	655		8.18	4.02	82.62		h3.41	7.58	83.20		--		5,610	7.63	5,000	87	33	9,350	8.5
June 7	555		8.08	3.92	85.66		h3.28	7.74	84.61		--		5,820	7.92	4,400	88	35	9,630	8.4
June 8-10	1,329		9.63	4.43	86.97		d3.84	8.37	89.69		--		6,460	8.79	11,690	86	33	10,700	8.5
June 11-12	754		8.73	4.91	101.32		2.44	8.81	101.81		--		6,790	9.23	6,970	88	39	11,200	8.3
June 13	1,575		6.99	4.21	72.62		2.85	5.98	73.33		--		5,020	6.83	10,760	87	31	8,430	8.2
June 14	710		9.43	4.93	98.27		i 3.53	8.04	101.81		--		6,680	9.08	6,460	87	37	11,200	8.5
June 15	541		6.29	2.99	53.05		i 3.68	4.73	52.74		--		3,710	5.05	2,730	85	25	6,310	8.5
June 16-17	996		7.09	3.55	62.18		f 3.84	5.58	63.46		--		4,500	6.12	6,100	85	27	7,400	8.5
June 18	1,507		3.94	2.98	37.35		h2.95	3.41	37.51		--		2,650	3.60	5,440	84	20	4,600	8.4
June 19	1,398		5.44	2.52	40.53		2.29	5.00	41.18		--		2,930	3.98	5,580	84	20	5,040	8.2
June 20	1,073		9.53	4.33	100.45		2.74	9.22	101.25		--		6,710	9.13	9,800	88	38	11,300	8.3
June 21-24	1,843		8.28	3.12	42.88		2.46	9.47	41.74		--		3,310	4.50	8,300	79	18	5,470	8.3
June 25	186		10.28	4.02	55.66		2.69	9.85	56.12		--		4,230	5.75	1,070	80	21	6,920	8.3
June 26-28	432		11.68	4.72	71.75		c3.44	10.20	74.74		--		5,290	7.19	3,110	81	25	8,790	8.4
June 29	127		9.98	5.92	85.66		1.67	10.39	87.43		--		5,890	8.01	1,020	84	30	9,910	8.1
June 30	111		10.43	4.83	91.75		1.64	10.20	94.20		--		6,320	8.60	956	86	33	10,600	8.0

c Includes 0.13 equivalents per million of carbonate (CO_3).
d Includes 0.23 equivalents per million of carbonate (CO_3).
f Includes 0.33 equivalents per million of carbonate (CO_3).
g Includes 0.07 equivalents per million of carbonate (CO_3).
h Includes 0.20 equivalents per million of carbonate (CO_3).
i Includes 0.27 equivalents per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 1, 1954	99		10.63	3.13	96.10		2.03	9.91	95.61		--		6,390	8.69	863	87	37	10,800	8.1
July 2	91		8.48	5.52	80.01		2.10	8.39	81.79		--		5,610	7.63	697	85	30	9,320	8.2
July 3-6	311		10.33	6.21	99.58		2.67	9.31	101.25		--		6,830	9.29	2,900	86	35	11,300	8.2
July 7	58		10.73	6.79	110.88		2.74	10.01	113.66		--		7,440	10.12	583	86	37	12,500	8.3
July 8	50		12.43	4.13	103.06		2.62	9.12	106.33		--		6,960	9.47	470	86	36	11,700	8.2
July 9-10	77		10.63	6.51	106.10		2.61	9.24	108.02		--		7,230	9.83	761	86	36	12,000	8.2
July 11-12	75		11.63	6.87	112.19		2.67	9.60	117.04		--		7,650	10.40	785	86	37	12,800	8.2
July 13	38		8.63	6.73	97.40		1.64	8.16	100.12		--		6,490	8.83	333	86	35	11,200	8.1
July 14-20	248		12.13	7.17	113.93		3.03	9.01	117.33		--		7,860	10.69	2,650	86	37	12,800	8.1
July 21-24	121		12.72	7.88	114.36		3.13	8.85	120.43		--		8,080	10.99	1,330	85	36	13,000	8.2
July 25-27	77		11.93	7.19	98.27		3.06	7.68	108.02		--		7,360	10.01	775	84	32	12,100	8.2
July 28-29	46		11.93	7.99	113.49		2.67	8.33	122.12		--		8,080	10.99	502	85	36	13,000	8.2
July 30	19		8.08	6.28	83.92		1.80	6.62	89.12		--		5,760	7.83	148	85	31	10,000	8.0
July 31	16		11.93	6.51	105.23		c2.97	8.29	113.66		--		7,560	10.28	169	85	35	12,400	8.4
Aug. 1	26		9.18	8.02	71.75		g2.30	5.66	80.38		--		5,230	7.11	184	81	24	8,910	8.3
Aug. 2	63		9.53	6.59	104.36		1.92	8.24	110.84		--		7,270	9.89	628	87	37	12,500	8.1
Aug. 3	26		9.18	5.42	71.75		2.16	5.66	77.56		--		5,170	7.03	181	83	27	9,070	8.2
Aug. 4-10	81		10.33	7.39	92.62		2.51	7.02	99.84		--		6,540	8.89	720	84	31	11,400	8.0
Aug. 11-12	18		11.13	7.97	95.66		c2.67	7.33	106.61		--		6,930	9.42	167	83	31	11,800	8.3
Aug. 13-18	51		4.99	4.41	46.09		g4.46	4.52	46.54		--		3,350	4.56	233	83	21	6,110	8.3
Aug. 19-20	14		3.79	4.01	43.40		2.16	4.12	45.13		--		3,060	4.16	59	85	22	5,560	8.2
Aug. 21-23	13		6.59	4.41	46.96		3.93	4.46	50.77		--		3,590	4.88	63	81	20	6,430	8.1
Aug. 24	3.0		2.79	5.21	29.53		2.23	3.06	31.59		--		2,230	3.03	9.0	79	15	3,900	8.2

c Includes 0.13 equivalents per million of carbonate (CO_3).
g Includes 0.07 equivalents per million of carbonate (CO_3).

Aug. 25-26, 1954	44		4.19	6.01	51.75		2.06	4.75	55.00		--		3,670	4.99	218	84	23	6,530	8.2
Aug. 27-29	458		19.56	18.04	217.42		4.74	14.76	237.47		--		15,200	20.67	9,480	85	50	23,800	8.2
Aug. 30-31	355		6.59	1.99	94.79		c 3.23	5.89	94.20		--		6,060	8.24	2,930	92	46	10,400	8.3
Sept. 1	1,109		5.94	2.72	97.40		3.23	5.54	93.07		--		6,190	8.42	9,340	92	47	10,400	8.2
Sept. 2-3	2,721		2.20	.96	7.87		2.21	.81	8.12		.09		668	.91	2,470	71	6.3	1,260	8.2
Sept. 4-6	383		3.69	1.91	31.18		2.57	2.21	32.43		--		2,210	3.01	1,150	85	19	4,100	8.0
Sept. 7-8	117		5.99	1.91	55.66		2.88	3.68	56.41		--		3,830	5.21	610	88	28	6,900	8.1
Sept. 9-10	81		8.68	2.82	85.23		g 3.15	5.29	87.43		--		5,820	7.92	644	88	36	9,790	8.3
Sept. 11-14	96		10.73	2.23	99.58		b 3.03	5.87	103.51		--		6,600	8.98	861	88	39	11,400	8.3
Sept. 15-20	47		7.24	7.80	113.06		2.54	6.68	113.66		--		7,300	9.93	463	88	41	12,500	8.2
Sept. 21-30	37	10	9.53	6.59	108.71	0.38	2.75	6.72	117.33	.02	.05	.12	7,370	10.02	370	87	38	12,800	7.9
Total or weighted average	220,900	--	6.14	2.55	59.14		2.79	5.39	59.23	--	--	--	4,060	5.52	1,221,000	87	28	6,890	--

b Includes 0.10 equivalents per million of carbonate (CO_3).
c Includes 0.13 equivalents per million of carbonate (CO_3).
g Includes 0.07 equivalents per million of carbonate (CO_3).

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.

LOCATION.--At gaging station at bridge on U. S. Highways 64 and 71 at Van Buren, Crawford County, 1.3 miles downstream from Lee Creek, 8.6 miles downstream from Poteau River, and at mile 353.4.
DRAINAGE AREA.--150,483 square miles (revised), of which 22,241 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1954.
Water temperatures: October 1945 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum, 8,980 micromhos Apr. 1; minimum, 206 micromhos Jan. 26.
Percent sodium: Maximum, 78 June 1-3, 6-9; minimum, 51 May 6-10.
EXTREMES, 1945-54.--Specific conductance: Maximum, 8,980 micromhos Apr. 1, 1954; minimum, 132 micromhos May 11, 1948.
Percent sodium: Maximum, 80 Oct. 21-24, 1946; minimum, 32 July 18-27, 1951.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Fayetteville, Ark. Records of discharge for water year October 1953 to September 1954 given in WSP 1341.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-6, 9, 1953.	26,580	7.4	5.44	2.22	19.35	0.24	2.84	1.69	22.34	0.00	0.03	0.10	1,700	2.31	61,400	71	9.9	2,900	8.1
Oct. 7, 10-12, 16.	22,180	8.0	4.09	1.64	13.57	.18	2.20	1.06	16.02	.00	.03	--	1,230	1.67	37,040	70	8.0	2,160	7.8
Oct. 8, 13-15.....	16,360	7.5	3.59	1.48	10.70	.16	2.23	.94	12.97	.01	.03	--	992	1.35	22,090	67	6.7	1,780	7.9
Oct. 17-27.....	96,520	8.5	5.79	2.55	18.48	.23	2.90	1.17	23.41	.01	.03	.05	1,690	2.30	222,000	68	9.1	2,940	8.1
Oct. 28-30.....	91,440	7.2	3.89	1.56	12.70	.17	1.77	.58	15.65	.01	.06	--	1,160	1.58	144,500	69	7.7	2,040	7.3
Oct. 31, Nov. 1-3	57,720	6.5	3.14	1.15	8.35	.15	1.84	.96	10.12	.01	.04	--	837	1.14	65,800	65	5.7	1,420	8.2
Nov. 4-8.....	42,470	7.1	4.29	1.81	13.87	.20	2.21	1.62	15.96	.00	.06	.10	1,310	1.78	75,600	69	7.9	2,130	7.8
Nov. 9-10	17,240	8.6	5.54	2.30	17.65	.23	a2.19	1.48	21.74	.00	.04	--	1,680	2.28	39,310	69	8.9	2,720	8.4
Nov. 11-20, 23-24	94,350	6.4	6.34	2.47	20.83	.25	2.47	1.37	26.62	.00	.05	.05	2,010	2.73	257,600	70	9.9	3,230	8.2
Nov. 21-22, 25-27	75,150	7.0	5.14	2.06	18.74	.21	2.25	1.42	22.48	.00	.07	.20	1,760	2.39	179,600	72	9.9	2,880	7.7
Nov. 28-29	24,930	6.6	3.49	1.15	13.13	.18	2.08	1.08	14.75	.00	.06	--	1,150	1.56	38,890	73	8.7	1,950	8.0
Nov. 30, Dec. 1-5	62,200	7.4	3.54	1.48	9.61	.17	1.97	.90	11.79	.00	.06	.00	955	1.30	80,860	65	6.1	1,620	7.8
Dec. 6-9	79,580	8.3	4.69	2.22	15.44	.14	1.87	.83	18.95	.00	.07	--	1,340	1.82	144,800	69	8.3	2,400	7.9
Dec. 10-11.....	25,350	--	3.69	1.40	12.31	--	1.90	1.77	14.36	--	.05	--	1,080	1.47	37,260	71	7.7	1,900	8.2
Dec. 12-13.....	28,640	--	4.44	1.89	18.92	--	b2.09	1.56	22.11	--	.05	--	1,600	2.18	62,440	75	11	2,700	8.3
Dec. 14-20	64,860	8.0	3.94	1.97	14.44	.17	2.11	1.29	16.89	.00	.05	.00	1,260	1.71	110,900	70	8.4	2,220	8.1
Dec. 21-23, 25-27	39,990	6.8	4.69	1.97	14.18	.18	2.48	1.19	17.23	.00	.04	.00	1,290	1.75	69,980	67	7.7	2,270	8.2
Dec. 24, 28-29...	18,330	7.7	5.89	2.30	18.83	.22	b2.79	1.44	23.55	.00	.08	--	1,700	2.31	42,340	69	9.3	2,960	8.3
Dec. 30-31.....	12,970	--	7.38	3.29	27.83	--	c3.25	1.90	33.28	--	.06	--	2,360	3.21	41,630	72	12	3,990	8.5

a Includes 0.13 equivalent per million of carbonate (CO_3). b Includes 0.07 equivalent per million of carbonate (CO_3). c Includes 0.30 equivalent per million of carbonate (CO_3).

Jan. 1-4, 1954 ...	26,580	7.7	5.89	2.22	20.05	.23	2.67	1.25	25.10	.01	.07	.00	1,790	2.43	64,590	71	10	3,190	8.1
Jan. 5, 8-9	21,160	7.7	6.74	2.63	25.00	.25	2.92	1.87	29.05	.00	.06	--	2,260	3.07	64,960	72	12	3,720	8.0
Jan. 6-7	13,370	9.6	8.33	3.12	30.00	.33	3.13	2.00	36.95	--	.08	--	2,740	3.73	49,870	72	13	4,270	7.7
Jan. 10-16	47,480	4.8	5.79	2.22	19.05	.21	2.66	1.37	23.97	.01	.05	.00	1,720	2.34	111,100	69	9.5	3,030	8.1
Jan. 17-19, 23 ...	63,150	--	3.24	1.48	11.83	--	1.46	1.04	13.96	--	.07	--	1,020	1.39	87,780	71	7.7	1,830	8.2
Jan. 20-24	45,200	--	1.75	.74	5.26	--	.92	.50	6.43	--	.06	--	505	.69	31,190	68	4.7	908	7.4
Jan. 21,26	55,540	--	.49	.44	1.17	--	.44	.38	1.27	--	.04	--	183	.25	13,880	56	1.7	249	7.6
Jan. 22, 25, 27...	87,270	--	.75	.48	1.96	--	.48	.38	2.31	--	.04	--	249	.34	29,670	61	2.5	363	7.2
Jan. 28-29	56,130	--	1.35	.53	3.87	--	.62	.35	4.94	--	.04	--	412	.56	31,430	67	4.0	683	7.7
Jan. 30-31	46,410	--	.90	.50	2.65	--	.56	.31	3.22	--	.04	--	302	.41	19,030	65	3.2	476	7.7
Feb. 1	15,150	--	2.15	.76	6.22	--	1.18	.31	7.33	--	.01	--	662	.90	13,640	68	5.2	1,030	8.0
Feb. 2-3, 9	29,320	5.6	3.64	1.48	13.05	.15	1.62	.73	15.51	.02	.02	--	1,170	1.59	46,620	71	8.2	2,030	7.9
Feb. 4, 7-8	30,800	5.6	4.69	2.30	18.65	.19	1.79	1.04	22.84	.01	.02	--	1,680	2.28	70,220	72	10	2,840	7.7
Feb. 5-6, 10	30,430	4.2	4.39	1.97	15.87	.18	1.80	.96	20.02	.01	.02	--	1,520	2.07	62,990	71	8.9	2,580	7.0
Feb. 11, 18	17,990	5.7	5.79	3.45	26.96	.28	2.20	1.64	31.31	--	.02	--	2,300	3.13	56,310	74	13	3,930	7.8
Feb. 12-15	34,250	5.9	4.59	2.14	18.26	.19	1.85	1.23	22.00	.01	.02	.15	1,580	2.15	73,640	73	10	2,740	7.8
Feb. 16, 19	17,430	5.3	3.59	1.56	14.18	.16	1.69	1.19	16.22	--	.01	--	1,230	1.67	29,110	73	8.8	2,120	7.9
Feb. 17.....	7,021	--	5.29	2.47	20.65	--	2.33	1.33	24.54	--	.00	--	1,930	2.62	18,400	73	10	3,100	8.2
Feb. 20-21, 24 ...	43,400	2.8	2.64	1.32	11.61	.12	1.21	.98	13.40	.01	.02	--	1,040	1.41	61,190	74	8.3	1,770	7.7
Feb. 22	14,740	--	2.45	1.15	9.83	--	1.18	.54	11.22	--	.02	--	984	1.34	19,750	73	7.3	1,480	8.0
Feb. 23, 25-26 ...	36,750	3.0	3.54	1.56	15.18	.16	1.38	1.81	17.77	.01	.03	--	1,330	1.81	66,520	74	9.5	2,270	7.8
Feb. 27-28.....	20,510	4.3	5.94	3.21	26.61	.26	1.80	1.87	32.15	--	.02	--	2,280	3.10	63,580	74	12	3,770	8.0

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1, 3-4, 1954	24,990	--	5.89	2.88	25.79	--	2.02	1.44	31.02	--	0.02	--	2,180	2.96	73,970	75	12	3,820	7.8
Mar. 2, 5-7	28,600	4.7	5.29	2.38	22.66	0.21	2.03	1.52	25.95	0.01	.05	0.00	1,870	2.54	72,640	74	12	3,270	7.7
Mar. 8-10	15,230	6.0	4.69	2.38	17.61	.20	2.34	1.60	20.02	.01	.04	.00	1,550	2.11	32,140	71	9.3	2,710	8.0
Mar. 11, 18	11,030	--	5.09	3.45	22.35	--	2.64	1.77	25.95	--	.02	--	1,890	2.57	28,350	72	11	3,350	8.0
Mar. 12-14	20,690	4.4	4.54	2.30	16.70	.19	2.28	1.69	19.74	.01	.05	.05	1,460	1.99	41,170	70	9.1	2,610	8.1
Mar. 15-17	13,430	5.0	4.14	1.73	13.78	.17	2.20	1.35	16.08	.01	.04	.00	1,230	1.67	22,430	70	8.0	2,190	8.0
Mar. 19-23	26,360	3.6	5.29	2.88	22.96	.24	2.26	1.62	26.79	.01	.04	.10	1,940	2.64	69,590	73	11	3,400	7.9
Mar. 24-26, 30	34,350	4.0	4.84	1.40	16.22	.18	1.92	1.37	19.74	.01	.04	.00	1,420	1.93	66,300	72	9.2	2,530	7.8
Mar. 27-28	23,680	--	3.34	1.89	14.61	--	1.57	1.35	17.20	--	.03	--	1,260	1.71	40,490	74	9.1	2,260	7.7
Mar. 29, 31	18,980	--	5.09	2.88	21.83	--	1.70	1.42	25.95	--	.03	--	1,860	2.53	48,020	73	11	3,270	7.7
Apr. 1	9,283	--	14.17	7.73	65.66	--	d1.87	1.64	84.60	--	.11	--	5,830	7.93	73,610	75	20	8,980	8.3
Apr. 2-3	18,550	6.5	8.38	3.12	38.05	.41	2.06	2.04	46.25	.02	.09	--	3,280	4.46	82,730	76	16	5,150	8.1
Apr. 4-6, 9	32,230	3.9	4.39	2.14	19.70	.25	b2.09	1.96	22.14	.02	.07	.05	1,620	2.20	70,910	74	11	2,880	8.3
Apr. 7-8	13,310	3.3	5.09	2.71	25.00	.26	d2.21	2.39	28.06	.02	.06	--	2,220	3.02	40,200	76	13	3,510	8.4
Apr. 10	7,021	--	3.79	2.22	16.78	--	e2.15	1.87	18.05	--	.06	--	1,660	2.26	15,870	74	9.7	2,420	8.5
Apr. 11-12	15,530	1.8	3.59	1.56	13.87	.19	1.95	1.60	15.23	--	.07	--	1,230	1.67	25,940	72	8.6	2,040	7.9
Apr. 13-15	27,310	--	2.74	1.32	8.78	--	1.41	.94	10.58	--	.02	--	845	1.15	31,410	68	6.2	1,450	7.7
Apr. 16-17, 19	48,480	--	.85	.82	2.78	--	.79	.42	3.16	--	.02	--	313	.43	20,850	62	3.0	513	7.8
Apr. 18, 20	26,580	--	.85	.90	4.04	--	.59	.54	4.46	--	.01	--	389	.53	14,090	70	4.3	648	7.1
Apr. 21	6,466	--	3.39	1.97	15.13	--	b1.35	1.31	17.49	--	.05	--	1,480	2.01	13,000	74	9.2	2,190	8.3
Apr. 22-24	25,170	4.7	5.94	1.73	24.31	.26	1.67	1.79	27.64	--	.07	--	2,100	2.86	71,990	75	12	3,350	7.6
Apr. 25-26	17,410	4.1	3.89	2.63	17.70	.24	1.84	1.64	21.29	--	.06	--	1,560	2.12	36,910	72	9.8	2,700	8.2
Apr. 27-28	12,970	3.3	5.14	2.55	21.96	.25	f1.98	1.77	25.66	--	.06	--	1,990	2.71	35,150	73	11	3,150	8.3
Apr. 29-30	28,050	--	3.70	2.14	15.65	--	b1.73	1.48	18.05	--	.07	--	1,460	1.99	55,820	73	9.2	2,280	8.4

b Includes 0.07 equivalent per million of carbonate (CO_3).
d Includes .10 equivalent per million of carbonate (CO_3).
e Includes .17 equivalent per million of carbonate (CO_3).
f Includes .03 equivalent per million of carbonate (CO_3).

May 1-5, 1954 ...	1,250,000	6.6	1.60	.62	3.09	.09	1.36	.35	3.47	.02	.05	--	349	.47	587,500	57	2.9	588	7.7
May 6-10	705,300	6.6	1.70	.59	2.44	.09	1.56	.50	2.54	.02	.03	0.05	304	.41	289,200	51	2.3	506	7.7
May 11-16	135,300	--	1.70	.82	4.00	--	1.41	.67	4.51	--	.04	--	449	.61	82,530	61	3.6	762	8.0
May 12, 14-15....	278,300	5.0	2.49	.68	5.26	.10	1.59	.62	6.06	.03	.03	--	534	.73	203,200	62	4.2	921	8.1
May 13, 19	125,000	--	2.79	1.32	8.22	--	1.70	.79	10.01	--	.07	--	850	1.16	145,000	67	5.7	1,410	8.2
May 17-18	69,820	--	2.20	1.07	6.70	--	1.64	.92	7.33	--	.06	--	646	.88	61,440	67	5.2	1,130	8.1
May 20-25	138,700	4.4	3.69	1.32	9.65	.13	2.21	1.31	10.86	.01	.03	.15	945	1.29	178,900	65	6.1	1,620	8.1
May 26, 28-29, 31	143,000	4.3	4.24	1.56	11.13	.15	2.29	1.58	12.69	.01	.06	.10	1,080	1.47	210,200	65	6.5	1,840	8.0
May 27, 30.....	71,800	--	4.04	2.55	15.65	--	2.15	1.33	18.61	--	.09	--	1,480	2.01	144,300	70	8.6	2,510	8.2
June 1-3, 6-9	210,400	7.4	3.99	1.73	20.79	.31	2.16	2.00	22.00	.01	.09	--	1,640	2.23	469,200	78	12	2,930	7.8
June 4-5.....	67,440	--	3.44	1.32	12.65	--	2.06	1.77	13.11	--	.04	--	1,080	1.47	99,140	73	8.2	1,910	7.7
June 10-13, 17 ...	111,600	9.0	3.49	1.73	16.92	.18	2.11	1.85	18.47	.01	.02	.00	1,400	1.90	212,000	76	10	2,500	7.9
June 14-16, 18-19, 26	95,440	8.0	3.34	1.56	12.87	.15	2.23	1.54	14.38	.01	.03	--	1,090	1.48	141,300	72	8.2	1,960	7.8
June 20-25, 27-30	131,800	7.2	3.84	1.73	14.91	.20	2.13	1.71	16.50	.02	.03	.20	1,270	1.73	228,000	72	8.9	2,200	7.8
July 1-2, 9-10....	47,800	4.6	3.39	1.81	15.22	.20	1.85	1.67	16.58	.01	.04	--	1,250	1.70	81,260	74	9.4	2,250	7.9
July 3-5, 7	38,120	5.0	2.89	1.40	11.44	.22	1.75	1.69	11.99	.01	.03	--	949	1.29	49,170	72	7.8	1,730	7.9
July 6, 8	13,860	--	2.99	1.07	8.04	--	2.03	1.42	8.46	--	.02	--	752	1.02	14,140	66	5.6	1,310	8.2
July 11, 16.....	22,890	--	3.24	1.32	11.61	--	1.70	1.71	12.27	--	.01	--	995	1.35	30,900	72	7.7	1,720	8.2
July 12-15, 17 ...	43,060	5.0	2.74	1.23	7.13	.15	1.92	1.29	8.12	.01	.02	.05	690	.94	40,480	63	5.1	1,250	8.1
July 18, 20-22, 25	33,840	4.5	2.64	1.07	5.83	.12	2.00	1.12	6.71	.01	.03	--	592	.81	27,410	60	4.3	1,070	8.0
July 19, 26-29, 31	31,220	4.8	2.60	.90	4.96	.10	2.16	.96	5.42	.01	.02	--	504	.69	21,540	58	3.7	914	8.2
July 23-24, 30....	20,230	5.0	3.04	1.32	8.78	.15	a2.05	1.04	9.65	.01	.03	--	827	1.12	22,660	66	5.9	1,420	8.4

a Includes 0.13 equivalent per million of carbonate (CO_3).

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ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 1, 5, 7, 1954	15,510	--	2.64	0.90	4.96	--	2.13	0.67	5.78	--	0.00	0.05	540	0.73	11,320	58	3.7	936	7.9
Aug. 2-4, 6	15,770	2.4	2.94	1.15	7.04	0.15	b2.22	.98	8.04	0.01	.03	--	709	.96	15,140	62	4.9	1,220	8.3
Aug. 8-11	17,490	5.9	2.45	.77	4.26	.11	2.02	.54	4.88	.01	.02	--	473	.64	11,190	56	3.4	814	8.2
Aug. 12, 18	8,747	--	2.70	.90	6.26	--	a2.08	.52	7.05	--	.01	--	590	.80	7,000	63	4.7	1,060	8.3
Aug. 13	5,157	--	4.09	1.56	12.31	--	e2.05	.77	15.23	--	.00	--	1,160	1.58	8,150	69	7.4	2,060	8.3
Aug. 14-17	18,880	2.9	2.94	.99	8.65	.15	1.87	.67	10.10	.01	.01	--	819	1.11	20,960	68	6.2	1,390	8.1
Aug. 19-26	37,410	6.6	2.40	.73	5.09	.10	1.93	.44	5.87	.01	.01	.05	535	.73	27,310	61	4.1	914	8.1
Aug. 27-28	8,489	--	3.29	1.56	11.39	--	d1.97	.79	13.54	--	.01	--	990	1.35	11,460	70	7.4	1,740	8.3
Aug. 29-31	8,469	4.7	2.59	.99	6.87	.14	b2.07	.62	7.76	.01	.02	--	647	.88	7,450	65	5.1	1,140	8.3
Sept. 1-4	8,688	5.2	3.04	.90	6.13	.13	2.39	.64	6.99	.02	.02	--	648	.88	7,650	60	4.4	1,080	8.2
Sept. 5-10	10,710	1.9	3.59	1.32	8.83	.17	2.74	.92	9.87	.02	.01	.00	875	1.19	12,740	63	5.6	1,470	7.8
Sept. 11-19	17,950	3.1	3.54	1.40	8.83	.15	2.61	1.10	9.73	.01	.02	.00	888	1.21	21,720	63	5.6	1,480	7.7
Sept. 20-30	14,350	5.2	3.74	1.48	10.44	.17	2.62	.87	12.13	.02	.02	.05	1,030	1.40	20,090	66	6.5	1,710	8.2
Total or weighted average	6,134,990	--	2.99	1.23	9.61	--	1.74	0.94	11.11	--	0.04	--	891	1.21	7,423,600	69	6.6	1,520	--

a Includes 0.13 equivalent per million of carbonate (CO_3).
b Includes .07 equivalent per million of carbonate (CO_3).
d Includes .10 equivalent per million of carbonate (CO_3).
e Includes .17 equivalent per million of carbonate (CO_3).

CANADIAN RIVER NEAR WHITEFIELD, OKLA.

LOCATION.--At gaging station at bridge on State Highway 2, three-quarters of a mile north of Whitefield, Haskell County, 5½ miles upstream from Snake Creek, and at mile 18.8.
DRAINAGE AREA.--47,576 square miles, of which 9,700 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: September 1944 to February 1945, September 1946 to September 1954.
Water temperatures: September 1944 to February 1945, September 1946 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 17,700 micromhos Mar. 28; minimum daily, 531 micromhos May 3.
Percent sodium: Maximum, 77 Apr. 21-24; minimum, 49 May 2, 7.
EXTREMES, 1944-45, 1946-54.--Specific conductance: Maximum daily, 18,900 micromhos Dec. 2, 1952; minimum daily, 71.7 micromhos Jan. 2, 1948.
Percent sodium: Maximum, 80 Nov. 6-14, Dec. 21-23, 1947; minimum, 37 Feb. 3-5, 1948.
REMARKS.--Values reported for dissolved solids are residue on evaporation at 180°C. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1953 to September 1954 given in WSP 1341.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-3, 1953	569		13.17	5.13	48.70		2.79	0.71	64.30		--		4,290	5.83	3,320	73	16	7,030	8.1
Oct. 4-5	3,967		5.74	2.22	19.79		1.54	.37	26.23		0.01		1,810	2.46	9,770	71	9.9	3,070	7.8
Oct. 6-7	6,728		3.59	1.41	12.31		1.23	.40	15.74		.02		1,150	1.56	10,530	71	7.8	1,970	7.7
Oct. 8	1,174		6.54	2.86	23.96		1.39	.46	31.87		--		2,060	2.80	3,290	72	11	3,630	7.8
Oct. 9-10	1,589		10.68	4.52	41.09		1.77	.71	55.00		--		3,520	4.79	7,610	73	15	6,080	7.8
Oct. 11-12	1,023		10.98	4.52	42.61		1.85	.69	56.41		--		3,640	4.95	5,070	73	15	6,260	7.9
Oct. 13-14	734		13.77	5.53	53.49		2.00	.62	71.07		--		4,550	6.19	4,550	73	17	7,730	7.9
Oct. 15-16	599		15.57	6.03	60.44		2.06	.56	80.38		--		5,130	6.98	4,180	74	18	8,600	7.9
Oct. 17-18	488		20.31	7.89	80.45		2.18	.65	107.45		--		6,410	8.72	4,260	74	21	11,200	7.8
Oct. 19-20	430		17.76	6.84	68.70		2.39	.62	91.66		--		5,860	7.97	3,430	74	20	9,700	7.9
Oct. 21-22	488		15.57	6.23	60.44		2.47	.62	80.38		--		5,200	7.07	3,450	73	18	8,600	7.9
Oct. 23	1,087		19.21	7.39	76.10		2.31	.67	101.25		--		6,080	8.27	9,000	74	21	10,600	8.0
Oct. 24	30,740		11.48	4.62	42.48		2.36	1.85	55.00		--		3,660	4.98	153,200	73	15	6,240	7.9
Oct. 25	30,940		4.69	1.83	16.26		1.84	.46	20.87		.07		1,440	1.96	60,650	71	9.0	2,560	7.9
Oct. 26-27	65,850		3.99	1.49	13.05		1.70	.48	16.36		.03		1,180	1.60	105,800	70	7.9	2,090	7.8
Oct. 28	25,980		3.79	1.33	11.26		1.85	.31	14.24		.05		1,040	1.41	36,780	69	7.1	1,870	7.9
Oct. 29-31	43,500		3.09	1.23	7.70		1.88	1.19	9.08		.04		766	1.04	45,360	64	5.3	1,350	7.9

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Nov. 1-3, 1953	17,790		3.89	1.89	10.57		2.20	1.69	12.13		0.06		984	1.34	23,830	65	6.2	1,750	7.9
Nov. 4-6	23,290		5.54	2.71	18.09		2.16	1.50	21.86		.06		1,580	2.15	50,080	69	8.9	2,780	7.7
Nov. 7	9,798		7.63	3.62	27.57		1.93	1.00	35.25		--		2,360	3.21	31,480	71	12	4,050	7.7
Nov. 8-10	9,164		9.53	4.36	36.05		1.84	.81	47.38		--		3,080	4.19	38,420	72	14	5,240	7.6
Nov. 11-13	4,566		8.78	3.87	32.09		2.46	1.02	40.89		--		2,780	3.78	17,280	72	13	4,700	7.9
Nov. 14-16	3,550		11.48	5.35	43.14		2.74	1.23	56.41		--		3,710	5.05	17,930	72	15	6,240	7.9
Nov. 17-20	9,251		13.87	6.41	55.66		2.47	1.17	71.07		--		4,720	6.42	59,440	73	18	7,750	7.9
Nov. 21	27,570		10.63	4.28	40.61		1.72	.50	52.18		--		3,460	4.71	129,900	73	15	5,770	7.7
Nov. 22-27	49,350		4.74	2.30	15.83		1.90	.69	19.74		.04		1,410	1.92	94,720	69	8.5	2,480	7.6
Nov. 28-30	5,766		6.39	2.88	22.48		1.98	.71	29.33		--		1,900	2.58	14,910	71	10	3,450	7.5
Dec. 1-3	7,087		9.68	4.28	34.66		2.41	.98	45.13		--		2,930	3.98	28,270	71	13	5,160	7.3
Dec. 4	22,610		4.49	1.89	14.22		1.75	.60	17.77		.04		1,260	1.71	38,780	69	7.9	2,280	7.7
Dec. 5	24,400		7.04	2.96	26.09		1.62	.46	33.84		--		2,230	3.03	74,060	72	12	3,840	7.5
Dec. 6-10	34,210		4.19	1.89	14.26		1.62	.54	18.19		.04		1,260	1.71	58,680	70	8.2	2,250	7.5
Dec. 11	3,610		4.89	2.14	16.52		1.64	.52	21.15		.07		1,450	1.97	7,130	70	8.8	2,560	7.6
Dec. 12-16	13,200		6.24	2.80	21.92		2.03	.65	28.77		.07		1,930	2.62	34,670	71	10	3,350	7.8
Dec. 17-18	3,062		8.48	3.87	30.53		2.46	.81	39.77		--		2,580	3.51	10,760	71	12	4,510	7.9
Dec. 19-20	2,672		10.73	4.85	38.70		2.87	.90	50.77		--		3,300	4.49	12,000	71	14	5,650	8.0
Dec. 21-25	5,631		14.92	6.58	53.05		3.20	1.02	73.33		--		4,840	6.58	37,100	71	16	7,950	7.9
Dec. 26-31	5,669		20.21	8.88	75.66		3.62	1.21	101.25		--		6,700	9.11	51,700	72	20	10,700	7.8
Jan. 1-10, 1954	7,928		21.71	9.54	84.79		3.08	1.19	112.53		--		6,930	9.42	74,790	73	21	11,700	8.1
Jan. 11-16	6,149		21.01	9.13	84.36		3.08	1.06	108.30		--		6,790	9.23	56,830	74	22	11,500	8.2
Jan. 17-20	12,610		9.08	4.11	35.61		1.77	.73	46.54		--		2,940	4.00	50,490	73	14	5,230	7.8
Jan. 21	7,517		12.72	5.67	51.75		1.93	.73	66.28		--		4,260	5.79	43,590	74	17	7,240	7.9
Jan. 22-23	18,430		2.50	1.07	8.09		.92	.31	10.29		.04		744	1.01	18,660	69	6.1	1,330	7.5
Jan. 24	4,304		3.69	1.58	13.26		.93	.29	17.06		.06		1,130	1.54	6,620	72	8.2	2,080	7.7

Jan. 25, 1954	5,316	9.28	3.95	36.92	1.34	.52	47.95	--	3,110	4.23	22,500	74	14	5,270	7.8
Jan. 26-29	29,950	4.69	2.06	17.83	1.02	.37	22.70	.04	1,550	2.11	63,190	73	9.7	2,740	7.4
Jan. 30	3,273	7.88	3.45	31.05	1.47	.60	39.77	--	2,590	3.52	11,540	73	13	4,640	7.7
Jan. 31	2,519	11.88	5.18	49.57	1.57	.71	64.30	--	4,060	5.52	13,920	74	17	6,830	7.7
Feb. 1-10	13,800	14.02	6.25	59.14	1.97	.96	75.58	--	4,840	6.58	90,940	74	19	8,200	7.8
Feb. 11-20	11,180	16.17	6.23	67.40	2.13	1.71	87.99	.04	6,000	8.16	91,350	75	20	9,390	7.8
Feb. 21-23	12,910	8.68	3.45	34.79	1.11	.69	45.69	--	3,050	4.15	53,610	74	14	5,120	7.6
Feb. 24-28	9,473	19.61	7.89	83.49	1.90	1.12	108.30	--	7,110	9.67	91,680	75	22	11,500	7.0
Mar. 1-10	8,313	14.07	6.33	56.96	2.21	1.02	73.33	.06	5,070	6.90	57,370	74	18	8,030	8.0
Mar. 11-13	1,698	17.07	6.93	70.44	1.21	.98	94.48	--	6,280	8.54	14,510	75	20	9,920	7.6
Mar. 14-20	2,872	22.65	8.95	96.97	1.66	1.02	126.35	--	8,370	11.38	32,720	75	24	13,000	7.7
Mar. 21-23	2,168	23.15	9.45	100.88	1.54	1.00	133.40	--	8,850	12.04	26,120	76	25	13,700	7.3
Mar. 24	1,035	14.57	5.83	60.44	1.72	.69	78.40	--	5,380	7.32	7,580	75	19	8,380	8.0
Mar. 25-26	5,494	7.49	2.61	27.74	1.56	.42	36.66	--	2,680	3.64	20,040	73	12	4,160	7.7
Mar. 27	3,154	9.53	3.77	38.79	1.33	.54	51.33	--	3,810	5.18	16,360	74	15	5,600	8.0
Mar. 28-29	8,489	30.09	11.68	127.84	1.97	1.06	168.37	--	11,100	15.10	128,300	75	28	16,700	7.8
Mar. 30	2,916	17.17	6.03	70.44	2.06	.87	92.51	--	6,180	8.40	24,530	75	21	9,720	8.1
Mar. 31	2,261	10.08	4.02	40.57	2.39	.79	52.18	--	3,600	4.90	11,080	74	15	5,880	8.2
Apr. 1-3	3,993	9.68	4.42	38.70	2.43	.83	49.36	--	3,410	4.64	18,530	73	15	5,630	8.1
Apr. 4-10	4,306	12.77	5.93	54.79	1.80	1.02	68.25	--	4,760	6.47	27,900	75	18	7,560	7.6
Apr. 11-15	3,197	15.87	6.93	68.27	1.84	.92	88.84	--	5,830	7.93	25,370	75	20	9,460	7.8
Apr. 16-20	4,895	21.11	7.69	92.62	1.41	1.00	118.17	--	7,910	10.76	52,710	76	24	12,400	7.6
Apr. 21-24	3,154	22.70	7.90	100.88	1.39	1.08	128.04	--	8,480	11.53	36,400	77	26	13,400	7.7
Apr. 25-28	3,251	17.71	7.29	75.66	1.82	1.17	97.02	--	6,380	8.68	28,230	75	21	10,500	7.6
Apr. 29	2,241	13.17	5.63	54.35	a 2.10	.87	69.94	--	4,720	6.42	14,400	74	18	7,650	8.3
Apr. 30	24,790	7.98	3.62	31.96	b 1.51	.67	41.18	--	2,940	4.00	99,230	73	13	4,630	8.3

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

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 1, 1954	102,700		5.04	1.52	15.39		1.80	0.14	19.74		0.08		1,580	2.15	221,000	70	8.5	2,420	8.2
May 2, 7	277,300		2.50	1.10	4.78		1.57	.40	6.43		.05		519	.71	195,900	49	3.6	924	8.1
May 3-6	438,700		1.95	.55	3.22		1.52	.44	3.78		.03		361	.49	215,600	56	2.9	633	8.0
May 8-10	56,230		2.79	1.01	5.87		1.67	.64	7.56		.05		640	.87	48,990	61	4.3	1,120	8.1
May 11, 18-19	59,310		4.24	1.68	11.09		2.21	.61	13.82		.04		1,080	1.47	87,190	65	6.5	1,900	8.2
May 12, 15-17	103,000		3.09	1.15	7.44		1.87	.44	9.36		.04		750	1.02	105,100	64	5.1	1,320	8.0
May 13-14	110,300		2.89	1.03	5.65		1.98	.44	7.33		.04		620	.84	93,070	59	4.0	1,080	7.8
May 20	8,053		6.04	2.56	16.35		c 2.79	1.64	20.31		.05		1,610	2.19	17,650	66	7.9	2,650	8.4
May 21-26	37,070		7.24	3.36	21.83		2.82	2.12	27.36		.03		2,020	2.75	101,900	67	9.5	3,470	8.1
May 27	30,940		4.94	2.22	12.39		2.46	2.38	14.52		.07		1,230	1.67	51,810	63	6.5	2,130	8.2
May 28	26,980		8.78	3.52	28.83		d 2.15	1.96	36.38		--		2,540	3.45	93,270	70	12	4,390	8.3
May 29-31	50,380		4.69	2.15	12.09		2.36	2.31	13.96		.05		1,230	1.67	84,350	64	6.6	2,040	8.1
June 1	6,902		6.89	2.83	21.61		2.46	2.29	25.52		.18		1,920	2.61	18,040	69	9.8	3,180	8.2
June 2-7	26,340		5.69	2.55	17.09		2.67	2.46	19.60		.07		1,540	2.09	55,220	67	8.4	2,610	8.2
June 8	7,458		2.20	.68	3.96		1.67	.44	4.79		.10		448	.61	4,550	58	3.3	737	8.0
June 9	8,648		3.64	1.60	9.74		1.80	1.15	12.41		.08		978	1.33	11,510	65	6.0	1,650	8.1
June 10	6,605		6.29	2.91	21.65		b 2.13	.92	27.36		.04		1,910	2.60	17,170	70	10	3,230	8.3
June 11	4,443		4.44	1.64	15.74		1.70	.79	19.04		.04		1,360	1.85	8,230	72	9.0	2,300	8.2
June 12	3,372		6.49	2.71	23.92		b 1.91	1.19	28.77		--		2,040	2.77	9,360	72	11	3,380	8.3
June 13-17	15,270		9.48	4.12	34.66		2.43	1.17	44.56		--		3,130	4.26	65,070	72	13	4,950	8.2
June 18	8,112		13.47	5.43	52.18		1.77	.83	69.94		--		4,730	6.43	52,230	73	17	7,350	8.1
June 19-20	7,121		10.58	4.52	41.74		1.82	.90	55.00		--		3,830	5.21	37,120	73	15	6,040	8.1
June 21	1,587		11.08	4.92	45.66		a 2.03	.92	59.23		--		4,120	5.60	8,900	74	16	6,500	8.3

a Includes 0.13 equivalents per million of carbonate (CO_3).
b Includes 0.07 equivalents per million of carbonate (CO_3).
c Includes 0.30 equivalents per million of carbonate (CO_3).
d Includes 0.10 equivalents per million of carbonate (CO_3).

June 22, 1954	1,396	13.07	5.53	53.49	a 2.03	1.23	69.10	--	4,530	6.16	8,610	74	18	7,520	8.3
June 23-24	2,888	15.47	6.73	67.40	a 1.93	1.21	86.02	--	5,630	7.66	22,130	75	20	9,030	8.3
June 25	1,119	14.17	6.03	59.57	e 2.23	2.29	75.58	--	5,060	6.88	7,710	75	19	8,180	8.3
June 26	895	12.67	5.93	54.35	2.06	2.29	68.25	--	4,620	6.28	5,630	75	18	7,480	8.2
June 27-30	2,664	12.18	5.62	47.40	2.47	2.12	61.48	--	4,240	5.77	15,370	73	16	6,830	8.2
July 1	678	11.68	5.72	45.66	1.64	1.73	61.77	--	4,050	5.51	3,740	72	15	6,560	8.1
July 2	565	9.98	4.82	34.27	2.49	1.39	45.13	--	3,210	4.37	2,470	70	13	4,940	8.2
July 3	508	11.98	6.42	45.66	2.26	1.58	59.51	--	4,390	5.97	3,030	71	15	6,600	8.1
July 4-8	2,396	13.47	6.93	50.44	2.43	1.25	67.69	--	4,740	6.45	15,460	71	16	7,370	8.1
July 9	500	11.38	6.52	43.48	2.36	2.79	55.28	--	3,790	5.15	2,580	71	15	6,240	8.2
July 10	405	10.28	5.52	40.70	1.64	2.23	51.05	--	3,490	4.75	1,920	72	14	5,790	8.0
July 11	357	10.08	5.32	41.79	1.74	1.81	53.02	--	3,720	5.06	1,810	73	15	5,950	8.1
July 12-14	893	11.98	6.52	45.66	2.46	1.42	59.79	--	3,970	5.40	4,820	71	15	6,520	8.1
July 15-19	1,119	14.07	7.53	54.79	2.39	1.00	70.51	--	5,020	6.83	7,640	72	17	7,520	8.0
July 20	234	6.78	4.52	30.05	2.33	.62	40.33	--	2,800	3.81	892	69	12	4,540	8.2
July 21-25	885	14.27	7.33	53.92	2.43	.75	71.92	--	5,120	6.96	6,170	71	16	7,720	8.1
July 26-26	395	14.87	7.53	59.96	2.33	.73	75.87	--	5,260	7.15	2,830	72	17	8,080	8.0
July 29-31	361	13.97	6.83	51.31	2.49	.65	67.97	--	4,420	6.01	2,170	71	16	7,310	8.0
Aug. 1-3	450	13.57	6.03	49.57	1.90	.58	66.28	--	4,260	5.79	2,610	72	16	7,490	8.0
Aug. 4-6	526	18.71	8.49	73.49	2.29	.69	97.02	--	6,180	8.40	4,420	73	20	10,400	8.1
Aug. 7-8	553	21.26	10.94	86.10	2.05	.81	115.07	--	7,000	9.52	5,270	73	21	12,300	8.0
Aug. 9	260	23.25	14.55	94.79	1.95	.87	127.76	--	7,730	10.51	2,730	71	22	13,100	8.1
Aug. 10	222	21.26	8.54	88.27	1.77	1.62	117.89	--	7,680	10.44	2,320	75	23	12,500	8.1
Aug. 11-15	659	20.66	14.54	86.10	2.08	1.42	117.89	--	7,440	10.12	6,670	71	21	12,500	7.9

a Includes 0.13 equivalents per million of carbonate (CO_3).
e 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 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 16-18, 1954..	216		18.91	9.69	76.97		2.56	1.12	102.66		--		6,590	8.96	1,940	73	20	10,800	8.1
Aug. 19-20.....	115		16.77	7.23	66.10		2.69	.87	88.84		--		5,480	7.45	858	73	19	9,490	8.2
Aug. 21-31	534		13.97	6.83	53.05		2.82	.60	69.10		--		4,180	5.68	3,040	72	16	7,040	8.0
Sept. 1-4.....	182		11.28	7.52	37.66		2.52	.44	53.59		--		3,500	4.76	869	67	12	6,030	8.1
Sept. 5-10	202		9.18	5.02	30.48		2.51	.35	41.74		--		2,780	3.78	766	68	11	4,920	8.1
Sept. 11-17.....	180		8.18	3.52	25.48		2.85	.33	33.28		--		2,250	3.06	553	69	11	4,040	8.2
Sept. 18-20	71		7.49	3.91	21.70		d2.77	.33	30.46		--		2,040	2.77	198	66	9.1	3,690	8.3
Sept. 21-29	200		7.49	3.51	20.22		d3.12	.35	28.20		--		1,940	2.64	529	65	8.6	3,460	8.3
Sept. 30	48		5.69	3.01	14.44		d2.44	.33	20.45		0.03		1,440	1.96	93	62	6.9	2,570	8.3
Total or weighted average	2,151,000		5.09	2.06	16.39		1.82	0.73	20.93		--		1,500	2.04	4,393,000	70	8.6	1,850	--

d Includes 0.10 equivalents per million of carbonate (CO_3).

RED RIVER AT DENISON DAM NEAR DENISON, TEX.

LOCATION.--Immediately below dam on Red River, 1.7 miles upstream from Sand Creek, 3 miles upstream from gaging station near Colbert, Bryan County, Okla., and 4 miles northwest of Denison, Grayson County.
DRAINAGE AREA.--39,719 square miles above dam, 39,777 square miles above gaging station, of which 5,936 square miles is probably non-contributing.
RECORDS AVAILABLE.--Chemical analyses: May 1944 to September 1954.
Water temperatures: October 1945 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 2,090 micromhos Nov. 6; minimum daily, 1,350 micromhos June 21.
Percent sodium: Maximum, 58 Nov. 1-30; minimum, 54 June 1-30.
EXTREMES, 1944-54.--Specific conductance: Maximum daily, 3,520 micromhos Aug. 14, 1944; minimum daily, 656 micromhos Oct. 16, 1945.
Percent sodium: Maximum, 59 July 3-10, 1944; minimum, 31 Nov. 1-10, 1945.
REMARKS.--Values reported for dissolved solids are residues on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Colbert, Okla., for water year October 1953 to September 1954 given in WSP 1341. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953 ..	135,000	11	4.69	2.30	8.70	--	2.08	4.54	9.36	--	0.02	0.20	a946	1.29	174,200	55	4.7	1,660	7.7
Nov. 1-30	70,560	8.8	4.99	2.22	10.00	0.15	2.02	4.98	10.44	0.03	.02	.18	1,040	1.41	99,490	58	5.3	1,750	7.9
Dec. 1-31	136,600	9.0	4.89	2.38	9.48	.14	2.03	5.29	9.81	.02	.02	.17	1,020	1.39	189,900	56	5.0	1,760	7.8
Jan. 1-31, 1954 ..	123,600	8.2	4.69	2.30	8.83	.14	2.05	4.71	9.45	.03	.02	.15	963	1.31	161,900	55	4.7	1,690	8.0
Feb. 1-28	121,900	12	4.54	2.06	8.13	.14	2.10	4.25	8.40	.03	.02	.20	948	1.29	157,300	55	4.5	1,560	7.9
Mar. 1-31	153,300	12	4.59	2.06	8.26	.14	2.10	4.29	8.52	.03	.02	.19	953	1.30	199,300	55	4.5	1,560	8.1
Apr. 1-30	161,600	9.8	4.59	2.14	8.26	--	2.10	4.27	8.52	.02	.03	.23	942	1.28	206,800	55	4.5	1,580	7.8
May 1-31.....	762,400	9.5	4.54	2.14	8.39	--	2.15	4.27	8.74	.03	.02	.19	946	1.29	983,500	56	4.6	1,590	7.9
June 1-30.....	568,500	15	4.19	1.81	7.13	--	2.11	3.68	7.76	.02	.04	.20	838	1.14	648,100	54	4.1	1,420	7.7
July 1-31.....	283,400	15	4.19	1.73	7.17	--	2.10	3.71	7.76	.02	.03	.20	830	1.13	320,200	55	4.2	1,390	7.9
Aug. 1-31	196,000	13	4.24	1.73	7.52	.13	2.05	3.73	7.56	.01	.02	.08	849	1.15	225,400	55	4.3	1,430	7.6
Sept. 1-30	146,500	14	4.29	1.73	7.39	--	2.08	3.79	7.61	.02	.02	.12	851	1.16	169,900	55	4.3	1,430	7.6
Total or weighted average	2,859,360	12	4.44	1.97	8.00	--	2.10	4.16	8.43	0.02	0.03	0.18	908	1.23	3,517,000	56	4.5	1,530	--

a Sum of determined constituents.

PART 8. WESTERN GULF OF MEXICO BASINS

SABINE RIVER BASIN

SABINE RIVER NEAR RULIFF, TEX.

LOCATION.--At gaging station at bridge on State Highway 235, 2.4 miles north of Ruliff, Newton County, 4.2 miles upstream from Kansas City Southern Railway Bridge, 4.5 miles downstream from Cypress Creek and at mile 40.
DRAINAGE AREA.--9,440 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1947 to September 1954.
Water temperatures: October 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 588 micromhos Dec. 21; minimum daily, 61.6 micromhos May 6.
Percent sodium: Maximum, 78 Dec. 16-22; minimum, 56 Mar. 10-20.
EXTREMES, 1945-46, 1947-54.--Specific conductance: Maximum daily, 774 micromhos Dec. 26, 1948; minimum daily, 32.9 micromhos May 22, 1953.
Percent sodium: Maximum, 86 Dec. 26-27, 1948; minimum, 27 June 3-7, 10, 1946.
REMARKS.--Values reported for dissolved solids are 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 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-2, 10-20, 1953	25,230	23	0.36	0.25	1.27		0.59	0.14	1.13		0.02		134	0.18	4,540	68	2.3	211	7.2
Oct. 3-9	15,850	21	.45	.27	2.33		.52	.18	2.34		.01		196	.27	4,280	76	3.9	346	7.1
Oct. 21-31	20,060	22	.32	.21	1.04		.56	.12	.87		.02		114	.16	3,210	66	2.0	178	7.0
Nov. 1-10	19,850	20	.32	.20	1.21		.51	.13	1.07		.02		139	.19	3,770	70	2.4	193	6.9
Nov. 11-20	21,160	21	.34	.23	1.61		.54	.14	1.49		.01		147	.20	4,230	74	3.0	247	7.1
Nov. 21-30	28,150	20	.34	.23	1.78		.52	.17	1.66		.00		156	.21	5,910	76	3.3	266	6.9
Dec. 1-15	142,800	11	.35	.21	1.28		.29	.23	1.30		.02		146	.20	28,560	70	2.4	219	6.9
Dec. 16-22	69,100	14	.65	.40	3.76		.29	.52	3.98		.02		326	.44	30,400	78	5.2	543	6.6
Dec. 23-31	93,420	13	.41	.23	.90		.36	.29	.87		.02		a 102	.14	13,080	58	1.6	182	6.6
Jan. 1-11, 15-17, 1954	142,000	14	.35	.21	.88		.29	.27	.87		.01		a 97	.13	18,460	61	1.7	186	7.2
Jan. 12-14, 18-23	110,400	15	.38	.31	1.61		.26	.44	1.58		.02		a 150	.20	22,080	70	2.7	278	6.8
Jan. 24-31	121,700	13	.40	.30	1.30		.23	.46	1.30		.01		a 130	.18	21,910	65	2.2	243	7.1

a Sum of determined constituents.

Feb. 1-8, 1954...	126,500	12	.48	.30	1.11	.43	.42	1.02		.02		a 121	.16	20,240	59	1.8	218	7.1
Feb. 9-18	118,800	15	.65	.34	1.32	.51	.54	1.24		.02		a 148	.20	23,760	57	1.9	269	7.2
Feb. 19-28	74,380	16	.60	.37	1.52	.52	.52	1.44		.01		a 160	.22	16,360	61	2.2	288	7.3
Mar. 1-9	79,340	16	.55	.39	1.71	.38	.54	1.72		.01		201	.27	21,420	65	2.5	305	7.2
Mar. 10-20	60,100	19	.55	.39	1.19	.49	.44	1.18		.02		170	.23	13,820	56	1.7	245	7.2
Mar. 21-31	53,080	20	.55	.35	1.58	.52	.42	1.52		.02		177	.24	12,740	64	2.4	286	7.2
Apr. 1-10	44,210	18	.55	.41	1.66	.56	.44	1.61		.01		182	.25	11,050	63	2.4	305	7.3
Apr. 11-16, 26-30	88,820	14	.49	.35	1.69	.44	.50	1.58		.01		176	.24	21,320	67	2.6	285	7.0
Apr. 17-25	228,700	9.0	.25	.15	.65	.28	.23	.73		.01		a 81	.11	25,160	68	1.9	145	6.6
May 1-3, 11-14, 16-20	298,700	11	.27	.18	.75	.20	.21	.73		.06		a 81	.11	32,860	62	1.6	133	6.4
May 4-10, 15	323,300	9.6	.19	.14	.49	.20	.13	.45		.04		a 57	.08	25,860	60	1.2	83.6	6.4
May 21-31	341,200	12	.31	.18	.75	.23	.25	.73		.03		a 84	.11	37,530	60	1.5	138	6.5
June 1-10	127,500	20	.50	.25	1.07	.61	.29	.87		.05		136	.18	22,950	59	1.7	201	7.4
June 11-20	56,130	24	.55	.17	1.72	.64	.31	1.47		.02		182	.25	14,030	70	2.9	273	7.3
June 21-30	34,890	24	.55	.33	1.50	.69	.29	1.38		.02		161	.22	7,680	63	2.3	272	7.2
July 1-10	20,610	22	.55	.37	1.41	.82	.25	1.24		.02		159	.22	4,530	61	2.1	269	7.6
July 11-20	14,850	22	.55	.35	1.30	.87	.19	1.10		.04		153	.21	3,120	59	1.9	243	7.4
July 21-31	13,120	21	.50	.35	1.34	.84	.17	1.13		.04		149	.20	2,620	61	2.1	243	7.2
Aug. 1-10	13,740	20	.45	.26	1.24	.72	.15	1.07		.01		a 129	.18	2,470	64	2.1	223	7.0
Aug. 11-20	8,690	20	.47	.28	1.29	.79	.16	1.07		.02		a 133	.18	1,560	63	2.1	223	6.9
Aug. 21-31	9,190	20	.45	.26	1.29	.77	.14	1.07		.02		134	.18	1,650	64	2.2	225	6.9
Sept. 1-10	7,370	21	.44	.27	1.41	.79	.13	1.18		.02		141	.19	1,400	67	2.4	231	7.4
Sept. 11-20	6,820	22	.44	.27	1.47	.79	.13	1.24		.02		147	.20	1,360	67	2.5	242	7.5
Sept. 21-30	6,530	20	.35	.23	1.45	.80	.11	1.10		.02		138	.19	1,240	71	2.7	225	7.7
Total or weighted average	2,966,000	14	0.41	0.24	1.13	0.36	0.29	1.07		0.03		121	0.16	474,600	63	2.0	202	--

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 and Santa Fe Railway bridge at Evadale, Jasper County, 600 feet downstream from Mill Creek, 15 miles upstream from Village Creek and at mile 55.
DRAINAGE AREA.--7,908 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1954.
Water temperatures: October 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 328 micromhos Aug. 28; minimum daily, 120 micromhos May 15.
Percent sodium: Maximum, 71 Nov. 21-30; minimum, 54 July 1-10.
EXTREMES, 1947-54.--Specific conductance: Maximum daily, 415 micromhos Nov. 29, 1952; minimum daily, 49.3 micromhos May 9, 1953.
Percent sodium: Maximum, 74 Dec. 21-31, 1948; minimum, 14 June 4-18, 1950.
REMARKS.--Values reported for dissolved solids are residues on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	14,030	25	0.45	0.30	1.07		0.70	0.21	0.87	0.02	0.02		139	0.19	2,670	59	1.7	199	7.4
Oct. 11-20	6,070	28	.50	.33	1.08		.80	.21	.85	.02	.03		134	.18	1,090	57	1.7	202	7.4
Oct. 21-31	8,840	26	.55	.33	1.11		.70	.23	1.02	.01	.03		147	.20	1,770	56	1.7	217	7.2
Nov. 1-10	8,570	26	.50	.36	1.23		.69	.20	1.16	.02	.02		152	.21	1,800	59	1.9	229	7.3
Nov. 11-20	8,120	26	.50	.32	1.70		.72	.21	1.55	.02	.02		174	.24	1,950	67	2.7	275	7.4
Nov. 21-30	8,770	24	.45	.30	1.82		.72	.23	1.58	.02	.02		184	.25	2,190	71	3.0	280	7.3
Dec. 1-10	11,720	15	.45	.22	1.24		.56	.27	1.04	.02	.02		154	.21	2,460	65	2.1	214	7.4
Dec. 11-20	16,160	15	.39	.21	1.15		.56	.25	.90	.02	.02		137	.19	3,070	66	2.1	187	7.0
Dec. 21-31	77,060	13	.32	.24	1.08		.33	.33	.93	.03	.02		138	.19	14,640	66	2.0	180	6.8
Jan. 1-10, 1954 ..	47,880	16	.36	.25	1.09		.29	.33	1.04	.03	.01		a 115	.16	7,660	64	2.0	203	7.1
Jan. 11-20	102,900	16	.36	.26	1.04		.26	.37	.99	.03	.01		a 112	.15	15,440	63	1.9	195	7.0
Jan. 21-31	76,260	14	.35	.25	.83		.28	.37	.73	.03	.02		a 96	.13	9,910	58	1.5	167	7.0
Feb. 1-10	64,130	18	.43	.34	1.12		.31	.50	1.04	.03	.01		a 128	.17	10,900	59	1.8	214	7.1
Feb. 11-19	45,860	20	.47	.40	1.27		.31	.54	1.24	.03	.02		165	.22	10,090	59	1.9	251	7.1
Feb. 20-28	36,240	18	.48	.39	1.22		.33	.54	1.18	.03	.01		159	.22	7,970	58	1.8	241	7.1
Mar. 1-10	46,000	17	.50	.40	1.29		.38	.54	1.24	.02	.01		165	.22	10,120	59	1.9	251	7.1
Mar. 11-20	35,350	16	.50	.40	1.40		.43	.56	1.27	.03	.01		165	.22	7,780	61	2.1	256	7.2
Mar. 21-31	24,940	16	.50	.37	1.29		.46	.48	1.18	.03	.01		158	.21	5,240	60	2.0	245	7.2

a Sum of determined constituents.

Apr. 1-10, 1954..	32,930	17	.50	.39	1.45	.46	.54	1.30	.02	.02		167	.23	7,570	62	2.2	264	7.0
Apr. 11-15, 21-22	49,450	15	.50	.36	1.44	.48	.50	1.27	.02	.03		170	.23	11,370	63	2.2	265	7.1
Apr. 16-20, 23-30	102,600	13	.39	.34	.92	.41	.33	.87	.02	.02		a 106	.14	14,360	56	1.5	189	7.2
May 1-2, 7-11 ...	103,200	20	.40	.25	1.01	.39	.31	.87	.04	.05		152	.21	21,670	61	1.8	190	7.2
May 3-6, 12-17...	129,100	16	.32	.19	.78	.33	.27	.62	.04	.04		a 91	.12	15,490	60	1.5	140	7.0
May 18-31	208,600	16	.31	.19	.74	.28	.29	.59	.04	.04		a 88	.12	25,030	60	1.5	139	7.0
June 1-10	80,230	17	.33	.24	.92	.38	.29	.76	.04	.02		127	.17	13,640	62	1.7	166	7.1
June 11-20.....	42,330	18	.38	.26	.90	.46	.29	.73	.04	.02		130	.18	7,620	58	1.6	169	7.3
June 21-30	27,450	19	.45	.28	.98	.62	.27	.76	.04	.02		132	.18	4,940	57	1.6	179	7.4
July 1-10	29,670	16	.50	.35	1.01	.67	.29	.85	.03	.02		137	.19	5,640	54	1.5	198	7.3
July 11-20	21,760	16	.55	.36	1.19	.74	.29	1.02	.03	.02		145	.20	4,350	57	1.8	226	7.1
July 21-31	18,600	17	.60	.39	1.38	.82	.29	1.21	.03	.02		159	.22	4,090	58	2.0	257	7.2
Aug. 1-10	7,520	22	.60	.36	1.34	.84	.27	1.16	.01	.02		158	.21	1,580	58	1.9	251	7.5
Aug. 11-20	13,520	22	.65	.39	1.56	1.00	.25	1.33	.01	.01		173	.24	3,240	60	2.2	284	7.4
Aug. 21-31	10,120	22	.65	.39	1.82	1.13	.23	1.47	.01	.02		187	.25	2,530	64	2.5	305	7.7
Sept. 1-10	5,070	28	.75	.47	1.56	1.33	.18	1.24	.02	.01		188	.26	1,320	56	2.0	299	7.7
Sept. 11-20	5,490	26	.75	.43	1.56	1.39	.16	1.16	.02	.01		181	.25	1,370	57	2.0	291	7.6
Sept. 21-30	4,050	24	.75	.43	1.71	1.49	.15	1.21	.02	.02		187	.25	1,010	59	2.2	303	7.5
Total or weighted average	1,531,000	17	0.40	0.28	1.04	0.41	0.35	0.90	0.03	0.02		127	0.17	260,300	60	1.8	194	--

a Sum of determined constituents.

TRINITY RIVER BASIN

TRINITY RIVER AT ROMAYOR, TEX.

LOCATION.--At gaging station at bridge on State Highway 105, 1.9 miles south of Romayor, Liberty County, 2.0 miles downstream from Gulf, Colorado and Santa Fe Railway bridge, 4.1 miles downstream from Big Creek, and at mile 94.
DRAINAGE AREA.--17,192 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to November 1949, February 1950 to September 1951, April 1953 to September 1954. Water temperatures: February 1950 to September 1951, April to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 3,170 micromhos Nov. 7; minimum daily, 108 micromhos Nov. 2. Percent sodium: Maximum, 86 Nov. 7; minimum, 36 May 21-31.
EXTREMES, 1945,50, 1953-54.--Specific conductance: Maximum daily, 3,170 micromhos Nov. 7, 1953; minimum daily, 103 micromhos Nov. 9, 1946. Percent sodium: Maximum, 86 Nov. 7, 1953; minimum, 23 June 11-20, 1946.
REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residue on evaporation and for concentrations more than 1,000 ppm are sums of determined constituents unless otherwise noted. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-3, 1953	1,590	17	2.94	0.55	14.32		3.69	1.62	12.47		0.03		1,040	1.41	2,240	80	11	1,820	8.2
Oct. 4-8, 28-30	19,110	18	2.40	.43	6.75		2.98	1.23	5.36		.01		a565	.77	14,710	70	5.7	980	8.2
Oct. 9-27, 31	16,010	20	2.30	.39	4.48		2.79	.81	3.55		.02		430	.58	9,290	62	3.9	739	8.1
Nov. 1-3	13,750	7.8	.50	.13	.81		.57	.29	.56		.02		a91	.12	1,650	56	1.4	159	7.5
Nov. 4, 9, 21-27	22,090	15	2.20	.46	7.40		2.38	1.52	5.98		.18		609	.83	18,330	74	6.4	1,060	7.8
Nov. 5-6, 8	8,690	17	2.79	.65	16.89		3.38	2.27	14.44		.24		1,210	1.65	14,340	83	13	2,120	7.9
Nov. 7	2,480	28	3.49	1.07	27.32		3.54	2.83	25.16		.35		1,900	2.58	6,400	86	18	3,170	8.2
Nov. 10-15, 19-20	13,670	16	1.80	.30	4.46		2.20	1.08	3.13		.15		414	.56	7,660	68	4.4	694	7.8
Nov. 16-18, 28-30	11,130	14	1.35	.35	3.06		1.59	.83	2.23		.11		317	.43	4,790	64	3.3	508	7.6
Dec. 1-4, 9, 20	42,210	14	1.95	.42	5.83		1.82	.96	5.33		.09		516	.70	29,550	71	5.4	898	7.5
Dec. 5-8, 10-19, 21, 31	159,600	12	1.30	.30	2.06		1.25	.65	1.69		.07		267	.36	57,460	56	2.3	396	7.4
Dec. 22-30	67,300	10	.75	.21	.92		.77	.40	.68		.03		187	.25	16,820	49	1.3	209	7.1
Jan. 1-10, 18-20, 22, 24, 1954	70,790	21	1.65	.40	3.36		1.44	.94	2.96		.07		356	.48	33,980	62	3.3	579	7.4
Jan. 11-17	27,010	21	1.40	.30	2.63		1.43	.54	2.31		.05		272	.37	9,990	61	2.9	449	7.3
Jan. 21	12,730	21	2.74		8.79		2.16	1.75	7.39		.23		716	.97	12,350	76	7.5	1,240	8.1
Jan. 23, 25-31	50,400	19	1.65	.30	1.73		1.72	.77	1.10		.09		246	.33	16,630	47	1.8	375	7.6

a Sum of determined constituents.

Feb. 1-4, 21-26, 1954	26,620	24	1.80	.53	2.14	1.67	.85	1.89	.06	302	.41	10,910	48	2.0	489	7.9
Feb. 5-13	21,880	32	2.25	.56	3.94	2.06	1.35	3.22	.12	438	.60	13,130	58	3.3	731	7.9
Feb. 14-20, 27	15,840	32	2.40	.54	4.26	2.25	1.42	3.41	.12	462	.63	9,980	59	3.5	768	7.9
Feb. 28, Mar. 2-8, 13-14	17,020	19	2.40	.57	5.76	2.15	1.48	5.02	.08	534	.73	12,420	66	4.7	938	7.9
Mar. 1, 9-12, 25, 28-31	14,460	15	2.69	.62	7.68	2.46	1.62	6.83	.08	671	.91	13,160	70	6.0	1,200	8.0
Mar. 15-24, 26-27	15,430	21	2.30	.58	5.36	2.25	1.25	4.68	.06	500	.68	10,490	65	4.5	880	8.0
Apr. 1-10, 19-20	21,500	14	2.54	.68	7.28	2.56	1.75	6.09	.10	630	.86	18,490	69	5.7	1,110	7.9
Apr. 11, 17, 26-30	13,930	12	1.95	.44	3.25	1.95	.98	2.62	.09	345	.47	6,550	58	3.0	596	7.8
Apr. 12-16, 18, 21-25	36,080	11	2.00	.54	5.37	2.13	1.42	4.23	.13	483	.66	23,810	68	4.8	845	7.8
May 1-4, 9, 17-20	110,000	15	1.65	.37	2.09	1.67	.62	1.75	.07	274	.37	40,700	51	2.1	448	7.5
May 5-8, 13-16	148,700	9.8	.85	.23	1.09	1.16	.10	.90	.00	a127	.17	25,280	50	1.5	238	6.2
May 10-12	14,880	16	2.15	.58	5.88	1.93	1.25	5.36	.07	526	.72	10,710	68	5.0	936	7.9
May 21-31	109,900	16	1.85	.35	1.25	1.77	.71	.90	.07	238	.32	35,170	36	1.2	364	7.6
June 1-11	20,430	26	2.45	.52	2.11	2.44	.87	1.72	.05	338	.46	9,400	42	1.7	525	8.0
June 12-25	16,790	19	2.74	.62	4.03	2.59	1.10	3.67	.03	468	.64	10,750	55	3.1	778	8.0
June 26-30	7,320	11	2.69	.61	6.08	2.64	1.58	5.13	.03	601	.82	6,000	65	4.7	994	8.0
July 1-10	6,230	13	2.99	.66	7.51	2.69	1.71	6.71	.05	669	.91	5,670	67	5.6	1,200	7.9
July 11-20	5,030	14	2.45	.68	9.28	2.67	1.56	8.12	.06	743	1.01	5,080	75	7.4	1,360	7.9
July 21-30	10,800	14	2.54	.61	7.69	2.97	1.92	5.92	.03	647	.88	9,500	71	6.1	1,160	7.9
July 31	8,730	6.4		.72	--	.67	--	.59	.05	82	.11	960	--	--	154	7.6

a Sum of determined constituents.

TRINITY RIVER BASIN--Continued

TRINITY RIVER AT ROMAYOR, TEX.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 1-4, 1954	15,210	9.0	1.20	0.18	2.76		1.38	0.58	2.14		0.04		263	0.36	5,480	67	3.3	454	7.5
Aug. 5-10	7,970	15	2.59	.42	6.37		2.74	1.04	5.58		.02		558	.76	6,060	68	5.2	1,010	7.8
Aug. 11-20	6,600	19	3.34	.61	9.90		3.88	2.54	7.39		.04		867	1.18	7,790	71	7.0	1,440	8.0
Aug. 21-31	4,080	14	2.89	.59	8.50		3.62	2.19	6.15		.02		a709	.96	3,900	71	6.4	1,260	7.9
Sept. 1-10	4,900	15	2.94	.62	8.91		3.87	2.08	6.49		.03		739	1.01	4,950	71	6.7	1,310	8.2
Sept. 11-20	3,980	20	3.09	.58	6.85		4.02	1.46	5.02		.02		617	.84	3,340	65	5.1	1,100	8.2
Sept. 21-30	3,860	20	3.19	.58	6.53		4.05	1.10	5.13		.02		600	.82	3,170	63	4.8	1,090	8.1
Total or weighted average	1,227,000	15	1.70	0.39	3.26		1.72	0.83	2.68		0.06		342	0.47	576,700	61	3.2	568	--

a Sum of determined constituents.

SAN JACINTO RIVER NEAR HUFFMAN, TEX.

LOCATION.--At Sheldon pumping plant of City of Houston, 5½ miles downstream from site of Huffman gaging station (discontinued) 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: September 1945 to July 1948, December 1948 to April 1954.
Water temperatures: January 1949 to April 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 561 micromhos Mar. 28; minimum daily, 163 michromhos Dec. 7.
Percent sodium: Maximum, 64 Oct. 27-31; minimum, 45 Dec. 5-13, 16-20.
EXTREMES, 1945-54.--Specific conductance: Maximum daily, 6,340 micromhos Nov. 23, 1951; minimum daily, 78.9 micromhos Sept. 1, 1945.
Percent sodium: Maximum, 79 Nov. 16, 18, 26, 1947; minimum, 18 June 3-10, 1950.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Austin, Tex. Gaging station discontinued Sept. 30, 1953.

Chemical analyses, October 1953 to April 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-13, 1953		21	1.20	0.34	2.65		1.41	0.11	2.65		0.02		253	0.34		63	3.0	461	7.6
Oct. 14-26		19	1.20	.32	2.46		1.31	.11	2.54		.02		239	.33		62	2.8	429	7.4
Oct. 27-31		12	.80	.31	1.99		.92	.12	2.03		.03		185	.25		64	2.7	341	7.4
Nov. 1-4, 23-25		17	.90	.16	1.04		1.05	.10	.93		.02		131	.18		50	1.4	222	7.3
Nov. 5-6, 8-11, 21		16	.70	.18	.98		.75	.12	.96		.03		120	.16		53	1.5	204	7.3
Nov. 7, 12-20, 22, 26-30		19	1.05	.21	1.84		1.08	.14	1.86		.02		191	.26		59	2.3	331	7.5
Dec. 1-4, 14-15		22	1.15	.30	2.09		1.18	.19	2.14		.03		219	.30		59	2.5	387	7.5
Dec. 5-13, 16-20		18	1.05	.22	1.06		1.07	.14	1.10		.02		144	.20		45	1.3	251	7.4
Dec. 21-31		14	.65	.16	.97		.67	.12	.96		.03		122	.17		54	1.5	195	7.3
Jan. 1-5, 14-20, 1954		14	.85	.25	1.23		.80	.14	1.38		.01		142	.19		53	1.7	256	7.5
Jan. 6, 10-13, 21-25		18	1.10	.30	1.56		1.05	.14	1.75		.02		180	.24		53	1.9	330	7.7
Jan. 7-9, 26-31		21	1.35	.37	2.10		1.21	.16	2.43		.02		232	.32		55	2.3	423	7.8
Feb. 1-11		22	1.60	.40	2.25		1.49	.17	2.57		.02		256	.35		53	2.2	469	7.8
Feb. 12-22		20	1.65	.40	2.55		1.52	.17	2.90		.01		275	.37		55	2.5	509	7.9
Feb. 23-28		17	1.35	.38	1.66		1.26	.14	1.97		.02		202	.27		49	1.8	375	7.9
Mar. 1-11		20	1.55	.31	2.06		1.47	.16	2.26		.03		235	.32		53	2.1	431	7.8
Mar. 12-22		20	1.65	.36	2.38		1.57	.15	2.65		.02		261	.35		54	2.4	480	7.8
Mar. 23-31, Apr. 1-5		18	1.70	.36	2.72		1.57	.14	3.05		.02		282	.38		57	2.7	524	7.8

BRAZOS RIVER BASIN

BRAZOS RIVER AT RICHMOND, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59 in Richmond, Fort Bend County, 925 feet downstream from Texas and New Orleans Railroad bridge and at mile 93.
DRAINAGE AREA.--44,050 square miles approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1954.
Water temperatures: November 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,910 micromhos Sept. 2; minimum daily, 208 micromhos Oct. 31.
Percent sodium: Maximum, 61 July 21-31, Aug 21-31, Sept. 1-10; minimum, 24 Oct. 29-31.
EXTREMES, 1945-54.--Specific conductance: Maximum daily, 2,540 micromhos Sept. 4, 1951; minimum daily, 187 micromhos Aug. 31, 1947.
Percent sodium: Maximum, 76 Dec. 3-4, 1945; minimum, 18 Aug. 27-31, 1947.
REMARKS.--Values reported for dissolved solids 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 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 28, 1953	42,800	19	2.59	1.07	2.26	0.10	3.11	0.85	2.14	0.02	0.02	0.18	a 352	0.48	20,540	38	1.7	611	8.0
Oct. 11-20	9,810	21	2.64	1.23	2.35	.10	3.33	1.00	2.03	.02	.01	.21	a 368	.50	4,910	37	1.7	639	8.0
Oct. 21-27	17,370	19	2.99	1.32	2.78	.10	3.67	1.31	2.23	.02	.03	.24	a 417	.57	9,900	39	1.9	715	8.1
Oct. 29-31	142,000	14	1.60	.30	.61	.08	1.82	.37	.37	.02	.08	--	168	.23	32,660	24	.6	244	8.0
Nov. 1-11	134,100	16	1.50	.27	.83	.10	1.62	.35	.68	.03	.02	.14	178	.24	32,180	31	.9	279	8.0
Nov. 12-16, 19-23, 25-26	47,700	15	2.05	.46	1.43	.10	2.15	.50	1.27	.02	.02	.11	242	.33	15,740	35	1.3	400	8.1
Nov. 17-18, 24, 27-30	17,730	14	2.74	.65	1.91	.11	2.93	.73	1.69	.03	.02	.30	312	.42	7,450	35	1.5	524	8.0
Dec. 1-4	27,590	13	2.79	.81	2.70	.10	2.88	.98	2.43	.03	.07	.16	384	.52	14,350	42	2.0	658	7.8
Dec. 5-18	306,200	18	1.60	.30	.70	.10	1.64	.46	.51	.04	.04	.09	187	.25	76,550	26	.7	273	7.7
Dec. 19-31	219,300	17	1.45	.36	.87	.09	1.57	.40	.79	.03	.03	.10	203	.28	61,400	31	.9	290	7.9
Jan. 1-9, 1954	58,330	20	1.55	.41	1.09	.10	1.67	.48	.96	.03	.03	.10	203	.28	16,330	35	1.1	326	7.8
Jan. 10-20	38,380	22	2.59	.67	1.52	.10	2.75	.79	1.33	.02	.03	.19	a 292	.40	15,350	31	1.2	490	8.0
Jan. 21-31	41,770	20	3.04	.90	2.52	.11	2.92	1.27	2.37	.02	.04	.12	392	.53	22,140	38	1.8	660	8.1

a Sum of determined constituents.

Feb. 1-10 ...	22,520	20	3.04	.90	3.04	.11	3.05	1.06	2.96	.02	.02	.14	416	.57	12,840	43	2.2	715	8.2
Feb. 11-19.....	16,030	18	2.69	1.15	4.13	.11	3.44	1.46	3.10	.09	.02	.12	a472	.64	10,260	51	3.0	787	8.2
Feb. 20-28.....	14,470	17	2.74	1.23	3.30	.11	2.88	1.46	3.13	.02	.02	.11	442	.60	8,680	45	2.3	763	8.1
Mar. 1-10	12,480	18	3.29	1.32	3.65	.11	3.57	1.58	3.24	.05	.02	.14	496	.67	8,360	44	2.4	836	8.2
Mar. 11-20	9,700	17	2.79	1.40	3.78	--	3.10	1.52	3.36	.02	.02	.20	a464	.63	6,110	47	2.6	805	8.1
Mar. 21-31	5,220	18	3.29	1.40	3.74	--	3.72	1.50	3.16	.02	.01	.22	a486	.66	3,450	44	2.4	836	8.1
Apr. 1-15	25,420	22	2.79	1.23	3.44	.08	3.13	1.42	3.02	.02	.03	.20	460	.63	16,010	46	2.4	781	8.1
Apr. 16, 24-28 ...	9,880	15	3.49	.99	5.17	--	2.51	2.33	4.94	.02	.02	.18	607	.83	8,200	54	3.4	1,040	8.1
Apr. 17-23, 29-30	14,040	15	4.29	1.32	7.04	--	2.84	2.91	7.11	.02	.02	.21	797	1.08	15,160	55	4.2	1,350	8.1
May 1-6, 15, 20 ..	79,370	18	3.79	1.32	6.13	.14	2.49	2.52	6.43	.03	.05	.10	699	.95	75,400	54	3.8	1,220	8.1
May 7-14, 16.....	64,440	18	2.84	.75	3.39	.15	2.21	1.69	3.24	.03	.06	.15	444	.60	38,660	48	2.5	767	8.1
May 17-19	70,870	17	1.90	.41	1.61	--	1.87	.71	1.35	.03	.07	--	240	.33	23,390	41	1.5	420	7.8
May 21-31	220,300	16	4.24	1.15	7.87	--	2.08	3.02	8.24	.02	.05	.18	840	1.14	251,100	59	4.8	1,430	8.1
June 1-10	102,000	15	4.79	1.15	8.96	--	2.13	3.68	9.59	.01	.05	.19	965	1.31	133,600	60	5.2	1,630	7.7
June 11-20	45,200	12	5.19	1.40	9.78	--	2.18	4.02	10.29	.02	.02	.24	1,020	1.39	62,830	60	5.4	1,730	7.8
June 21-30	24,600	13	5.09	1.40	9.44	--	2.39	3.87	10.01	.01	.03	.26	994	1.35	33,210	59	5.2	1,690	7.7
July 1-10	22,690	17	5.09	1.48	9.96	--	2.26	4.08	10.58	.01	.03	.19	a1,010	1.37	31,090	60	5.5	1,740	8.0
July 11-20	10,980	16	4.79	1.48	9.35	--	2.31	3.79	9.87	.01	.03	.20	993	1.35	14,820	60	5.3	1,660	8.0
July 21-31	19,600	16	4.69	1.56	9.74	--	2.15	3.87	10.29	.01	.04	.22	1,010	1.37	26,850	61	5.5	1,690	8.0
Aug. 1-3, 7-11, 15-20	25,660	15	4.79	1.48	9.39	.17	2.31	3.68	9.53	.01	.03	.11	992	1.35	34,640	59	5.3	1,650	7.9
Aug. 4-6, 12-14 ..	13,830	16	4.19	1.15	7.48	.15	2.33	2.89	7.56	.01	.03	.08	812	1.10	15,210	58	4.6	1,370	7.9
Aug. 21-31.....	17,450	13	4.99	1.56	10.44	.17	2.34	4.04	10.49	.01	.03	.11	a1,020	1.39	24,260	61	5.7	1,810	7.8
Sept. 1-10	10,670	14	4.89	1.64	10.48	.17	2.43	3.93	10.44	.01	.03	.15	a1,010	1.37	14,620	61	5.8	1,760	7.9
Sept. 11-20	6,270	17	4.44	1.73	8.65	.16	2.74	3.27	8.69	.01	.03	.12	921	1.25	7,840	58	4.9	1,550	8.0
Sept. 21-30	7,710	15	4.24	1.73	8.35	.15	2.93	3.16	8.18	.01	.02	.20	879	1.20	9,250	58	4.8	1,500	8.0
Total or weighted average	1,974,000	17	2.74	0.75	3.61	0.10	2.03	1.50	3.58	0.03	0.04	0.14	453	0.62	1,224,000	50	2.7	754	--

a Sum of determined constituents.

COLORADO RIVER BASIN

COLORADO RIVER AT AUSTIN, TEX.

LOCATION.--At raw-water intake of Austin City Water Plant, 4½ miles upstream from gaging station which is at Montopolis Bridge on U. S. Highway 183 at southeast edge of Austin, Travis County, 2.8 miles upstream from Walnut Creek, 3.8 miles downstream from Waller Creek, 5 miles downstream from Barton Creek and at mile 290.
DRAINAGE AREA.--38,400 square miles (revised), approximately, of which 11,900 square miles is probably non contributing.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1954.
Water temperatures: October 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 520 micromhos Jan. 27; minimum daily, 243 micromhos Dec. 2.
Percent sodium: Maximum, 27 May 1-31; minimum, 15 Nov. 1-30, Jan. 1-31.
EXTREMES, 1947-54.--Specific conductance: Maximum daily, 591 micromhos July 1, 1948; minimum daily, 243 micromhos Dec. 2, 1953.
Percent sodium: Maximum, 46 Nov. 1-30, 1951; minimum, 15 Nov. 1-30, 1953, Jan. 1-31, 1954.
REMARKS.--Values reported for dissolved solids are 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 1953 to September.1954 given in WSP 1342. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953	20,570	12	2.35	0.99	0.75		2.98	0.33	0.71	0.03	0.04		228	0.31	6,380	18	0.6	388	8.2
Nov. 1-30	16,110	14	2.64	1.15	.65		3.33	.31	.73	.02	.05		a 240	.33	5,320	15	.5	414	8.0
Dec. 1-31	31,050	12	2.79	1.15	.73		3.57	.35	.68	.01	.06		259	.35	10,868	16	.5	448	8.2
Jan. 1-31, 1954	29,930	12	2.89	1.40	.75		3.77	.42	.79	--	.06		272	.37	11,070	15	.5	477	8.2
Feb. 1-28	12,380	11	2.30	1.40	.93		3.26	.48	.82	.01	.06		256	.35	4,330	20	.7	452	8.2
Mar. 1-31	24,890	8.8	2.45	1.15	.90		3.23	.44	.79	.01	.03		248	.34	8,460	20	.7	440	8.2
Apr. 1-30	56,770	9.6	2.25	.99	.95		2.98	.37	.79	.03	.02		227	.31	17,600	23	.7	400	7.5
May 1-31	120,000	16	2.10	.82	1.07		2.85	.33	.76	.02	.03		a 224	.30	36,000	27	.9	389	8.2
June 1-30	116,800	13	2.10	.82	1.03		2.74	.35	.79	.02	.05		231	.31	36,210	26	.8	389	7.8
July 1-31	131,500	11	2.15	1.07	.85		2.90	.35	.79	.01	.02		234	.32	42,080	21	.7	407	8.0

a Sum of determined constituents.

Aug. 1-31, 1954...	93,880	8.6	2.30	.99	.97	2.97	.35	.90	.02	.02		234	.32	30,040	23	.8	410	7.6
Sept. 1-30	30,480	9.6	2.15	1.07	.97	2.90	.37	.90	.01	.01		233	.32	9,750	23	.8	418	7.9
Total or weighted average	684,400	12	2.25	0.99	0.96	2.98	0.35	0.79	0.02	0.03		235	0.32	219,100	23	0.8	408	--

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 and New Orleans Railroad bridge, 12 miles downstream from Jones Creek and at mile 67.
DRAINAGE AREA.--41,380 square miles, approximately, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: April 1944 to September 1954.
Water temperatures: October 1945 to September 1948, March 1940 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 569 micromhos Mar. 15; minimum daily, 179 micromhos Oct. 30.
Percent sodium: Maximum, 29 Mar. 1-31; minimum, 15 Dec. 5-12.
EXTREMES, 1944-54.--Specific conductance: Maximum daily, 721 micromhos Oct. 3, 1952; minimum daily, 179 micromhos Oct. 30, 1953.
Percent sodium: Maximum, 43 Nov. 1-30, 1951; minimum, 7 Jan. 19-24, 1945.
REMARKS.--Values reported for dissolved solids 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 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-26, 1953...	34,770	22	2.50	1.07	1.22	0.10	a 3.44	0.44	1.02	0.02	0.02	0.09	b 279	0.38	13,210	25	0.9	470	8.4
Oct. 27-31, Nov. 1-6.....	66,550	17	1.80	.41	.43	.09	1.93	.44	.34	.02	.04	.09	167	.23	15,310	16	.4	270	8.0
Nov. 7-30.....	31,980	14	2.50	.82	.91	.10	2.95	.52	.79	.02	.02	.08	b 243	.33	10,550	21	.7	410	8.1
Dec. 1-4, 13-31..	47,960	17	2.79	.90	.87	.09	3.16	.62	.76	.02	.06	.12	275	.37	17,750	19	.6	437	7.7
Dec. 5-12.....	51,290	14	2.20	.44	.48	.10	2.13	.73	.28	.03	.07	.07	201	.27	13,850	15	.4	318	7.7
Jan. 1-31, 1954 ..	48,200	13	2.50	1.07	1.04	.09	3.00	.62	.96	.02	.03	.06	270	.37	17,830	22	.8	454	7.9
Feb. 1-28.....	21,630	9.0	2.74	1.32	1.30	.09	3.54	.71	1.16	.02	.02	.16	306	.42	9,080	24	.9	532	8.0
Mar. 1-31.....	21,970	12	2.20	1.40	1.48	--	3.16	.73	1.21	.02	.04	.16	285	.39	8,570	29	1.1	504	8.2
Apr. 1-30.....	44,560	14	2.20	.99	1.04	.09	2.98	.50	.95	.02	.03	.12	250	.34	15,150	24	.8	435	8.2
May 1-31.....	79,150	20	2.10	.79	.87	.13	2.72	.40	.79	.02	.04	.14	230	.31	24,540	22	.7	391	7.9
June 1-30.....	53,640	13	2.15	.99	.87	.09	2.87	.40	.85	.02	.04	.18	234	.32	17,160	21	.7	404	8.1
July 1-31	53,870	11	2.20	.99	.87	.10	2.88	.37	.87	.02	.02	.12	231	.31	16,700	21	.7	401	8.2
Aug. 1-31.....	55,920	9.6	2.20	.99	1.04	.11	2.82	.42	1.10	.02	.02	.13	b 239	.33	18,450	24	.8	430	8.2
Sept. 1-30	25,920	14	2.30	1.07	1.09	.11	3.11	.40	1.02	.01	.02	.08	b 252	.34	8,810	24	.8	451	7.9
Total or weighted average	637,400	15	2.25	0.09	0.91	0.10	2.80	0.50	0.82	0.02	0.03	0.11	239	0.33	210,300	22	0.7	406	--

a Includes 0.13 equivalent per million carbonate (CO_3) b 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, 1300 feet upstream from Texas and New Orleans Railroad bridge, 10 miles upstream from Coleto Creek, and at mile 51.
DRAINAGE AREA.--5,161 square miles (revised).
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1948 to September 1954.
Water temperatures: November 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,260 micromhos Sept. 15; minimum daily, 224 micromhos Oct. 27.
Percent sodium: Maximum, 54 Sept. 13-20; minimum, 21 Oct. 26-31; Nov. 1-2.
EXTREMES, 1945-46, 1948-54.--Specific conductance: Maximum, 1,950 micromhos Jan. 11-17, 1946; minimum daily, 201 micromhos Sept. 1, 1953.
Percent sodium: Maximum, 67 July 23-24, 1950; minimum, 18 May 22-29, 1950.
REMARKS.--Values reported for dissolved solids 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 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-11, 1953 ...	9,420	21	2.35	1.23	1.52	0.09	3.18	0.50	1.49	0.02	0.05	0.30	308	0.42	3,960	29	1.1	514	8.1
Oct. 12-25.....	21,520	18	2.30	1.32	1.48	.07	3.20	.52	1.47	.02	.04	.21	304	.41	8,820	29	1.1	512	7.9
Oct. 26-31, Nov. 1-2	76,920	14	1.55	.52	.57	.10	1.80	.27	.54	.02	.06	.18	168	.23	17,690	21	.6	267	7.7
Nov. 3-9	12,530	16	2.30	.72	1.13	.11	2.59	.42	1.18	.02	.05	.25	255	.35	4,390	27	.9	421	7.9
Nov. 10-20	13,800	20	3.14	1.32	1.39	.08	3.87	.58	1.41	.01	.06	.47	350	.48	6,620	23	.9	570	8.2
Nov. 21-30	10,560	20	2.59	1.48	1.48	.06	3.51	.62	1.52	.01	.05	.26	329	.45	4,750	26	1.0	562	8.2
Dec. 1-7.....	20,940	16	3.29	1.32	1.57	.07	4.00	.60	1.52	.02	.06	.34	351	.48	10,050	25	1.0	588	8.1
Dec. 8-16	13,990	15	2.79	.99	1.09	.09	3.34	.56	.96	.02	.06	.29	286	.39	5,460	22	.8	471	8.0
Dec. 17-31	19,530	17	3.69	1.48	1.57	.07	4.56	.62	1.49	.01	.07	.33	386	.52	10,160	23	1.0	625	8.2
Jan. 1-4, 10, 15, 22-24, 30, 1954...	11,390	22	1.95	1.56	2.26	.08	2.59	.73	2.40	.02	.06	.16	344	.47	5,350	39	1.7	592	8.0
Jan. 5-6, 21, 25-29, 31.....	10,410	19	1.60	1.56	1.83	.07	2.41	.67	1.89	.02	.06	.09	a290	.39	4,060	36	1.5	510	8.0
Jan. 7-9, 11-14, 16-20	13,980	21	1.60	1.40	1.57	.07	2.43	.58	1.55	.02	.06	.08	a269	.37	5,170	34	1.3	464	8.1

a Sum of determined constituents.

GUADALUPE RIVER BASIN--Continued

GUADALUPE RIVER AT VICTORIA, TEX.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954	10,450	18	1.70	1.56	1.87	0.07	2.59	0.69	1.86	0.02	0.06	0.09	a298	0.41	4,280	36	1.5	527	8.1
Feb. 11-19	9,080	16	1.80	1.64	1.83	.07	2.65	.69	1.86	.02	.05	.11	a299	.41	3,720	34	1.4	534	8.0
Feb. 20-28	8,520	16	2.10	1.56	1.91	.08	2.84	.67	2.03	.02	.04	.14	339	.46	3,920	34	1.4	576	7.5
Mar. 1-10	8,670	18	2.30	1.64	2.09	.07	3.20	.73	2.12	.02	.04	.17	a344	.47	4,070	34	1.5	609	8.1
Mar. 11-20, 22, 24	9,910	15	2.20	1.64	2.17	--	3.16	.73	2.09	.02	.04	.19	340	.46	4,560	36	1.6	604	8.0
Mar. 21, 23, 25-31	6,790	16	2.59	1.73	2.48	--	3.41	.79	2.59	.02	.05	.23	391	.53	3,600	36	1.7	678	8.1
Apr. 1-13	14,730	19	2.69	1.64	2.57	--	3.48	.77	2.65	.02	.06	.18	404	.55	8,100	37	1.8	709	8.2
Apr. 14-19	6,120	18	2.20	.76	1.26	--	2.56	.58	1.07	.02	.06	.18	269	.37	2,260	30	1.0	434	8.0
Apr. 20-24, 30	4,630	23	2.99	1.40	2.17	--	3.67	.69	2.26	.02	.04	.21	a376	.51	2,360	33	1.5	661	8.2
Apr. 25-29	3,290	19	3.49	2.06	4.22	--	3.57	.94	5.16	.01	.02	.28	582	.79	2,600	43	2.5	994	8.1
May 1-10	11,050	29	2.10	1.40	2.09	--	2.97	.65	2.09	.02	.04	.23	a333	.45	4,970	37	1.6	583	8.2
May 11-15, 29-31	18,470	30	2.40	1.15	1.78	--	3.06	.60	1.78	.02	.07	.22	328	.45	8,310	33	1.3	554	8.2
May 16-28	13,650	23	1.95	.55	1.26	.11	2.26	.35	1.13	.03	.06	.20	236	.32	4,370	33	1.1	389	8.2
June 1-10	6,400	21	2.79	1.56	2.26	--	3.61	.71	2.40	.02	.03	.36	388	.53	3,390	34	1.5	663	8.1
June 11-20	3,950	21	2.45	1.48	2.22	--	3.29	.71	2.26	.02	.03	.26	360	.49	1,940	36	1.6	622	8.0
June 21-30	4,300	18	2.59	1.56	2.57	--	3.38	.75	2.68	.02	.03	.26	390	.53	2,280	38	1.8	680	8.0
July 1-10	3,600	19	2.00	1.56	2.65	.08	2.97	.73	2.65	.03	.01	.27	a362	.49	1,760	42	2.0	656	8.2
July 11-20	3,180	18	2.35	1.56	2.96	.09	3.16	.77	3.16	.02	.01	.29	a401	.55	1,750	43	2.1	725	8.1
July 21-31	2,240	19	2.59	1.81	4.87	.12	2.88	.96	5.64	.02	.01	.26	553	.75	1,680	52	3.3	997	7.7
Aug. 1-10	2,440	22	2.54	1.56	3.22	.10	3.51	.75	3.27	.03	.01	.28	a428	.58	1,420	43	2.2	761	8.0
Aug. 11-20	1,980	22	2.59	1.56	3.04	.09	3.62	.73	3.05	.02	.01	.25	420	.57	1,130	42	2.1	743	8.2
Aug. 21-31	2,220	21	2.69	1.64	3.48	.09	3.52	.87	3.61	.02	.01	.30	a456	.62	1,380	44	2.4	807	8.1
Sept. 1-12	2,630	26	2.50	1.73	3.52	.10	3.43	.81	3.50	.02	.01	.12	456	.62	1,630	45	2.4	805	8.2
Sept. 13-20	1,600	24	2.89	1.97	5.78	.12	3.39	.92	6.35	.02	.01	.19	650	.88	1,410	54	3.7	1,130	8.2
Sept. 21-30	2,150	23	2.50	1.48	3.09	.10	3.67	.69	2.76	.01	.01	.05	408	.55	1,180	43	2.2	728	8.1
Total or weighted average	397,000	19	2.30	1.15	1.61	0.09	2.93	0.56	1.64	0.02	0.05	0.22	304	0.41	162,800	31	1.2	516	--

a Sum of determined constituents.

NUECES RIVER BASIN

NUECES RIVER NEAR MATHIS, TEX.

LOCATION.--At intake tower at Lake Corpus Christi, 0.8 miles upstream from gaging station at bridge on U. S. Highway 59, 200 feet downstream from Texas and New Orleans Railroad bridge and 4 miles southwest of Mathis, San Patricio County.
DRAINAGE AREA.--16,660 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1954.
Water temperatures: October 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 879 micromhos May 19; minimum daily, 315 micromhos Nov. 7.
Percent sodium: Maximum, 57 June 1-10; minimum, 27 Aug. 1-31.
EXTREMES, 1947-54.--Specific conductance: Maximum daily, 1,040 micromhos July 1, 1948; minimum daily, 233 micromhos July 30, 1949.
Percent sodium: Maximum, 63 May 1-20, 1953; minimum, 24 Sept. 1-30, 1953.
REMARKS.--Values reported for dissolved solids are 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 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1953	65,690	31	2.25	0.30	1.39	0.16	2.79	0.62	0.68	0.03	0.04	0.18	a259	0.35	22,990	34	1.2	401	8.1
Nov. 1-30	40,890	23	1.90	.25	1.17	.13	2.34	.52	.51	.03	.02	.11	a211	.29	11,860	34	1.1	335	8.0
Dec. 1-31	2,710	19	2.20	.36	1.13	.13	2.69	.54	.54	.02	.02	.23	242	.33	894	30	1.0	368	8.0
Jan. 1-31, 1954	2,730	19	2.35	.37	1.17	.14	2.88	.52	.54	.02	.02	.18	247	.34	928	29	1.0	395	8.1
Feb. 1-28	3,260	19	2.54	.39	1.39	.16	3.10	.58	.71	.02	.02	.19	274	.37	1,210	31	1.1	437	7.8
Mar. 1-31	3,710	19	2.74	.38	1.83	--	3.46	.62	.90	.02	.03	.21	298	.41	1,520	37	1.5	489	8.2
Apr. 1-30	3,120	36	2.99	.44	3.17	.17	b4.02	.83	1.92	.02	.02	.25	a411	.56	1,750	47	2.4	670	8.4
May 1-31	3,710	32	2.94	.43	4.35	--	c4.17	1.04	2.71	.03	.06	.47	478	.65	2,410	56	3.4	801	8.5
June 1-10	19,730	29	2.45	.47	3.87	--	3.61	1.04	2.31	.03	.04	.42	428	.58	11,440	57	3.2	696	8.2
June 11-30	35,530	25	2.40	.40	2.09	.16	3.20	.67	1.18	.03	.04	.34	314	.43	15,280	41	1.8	514	8.0
July 1-31	145,300	24	2.30	.36	1.39	.18	2.88	.52	.73	.03	.03	.15	263	.36	52,310	33	1.2	414	8.0
Aug. 1-31	5,320	23	2.74	.35	1.22	.19	3.38	.48	.65	.03	.05	.18	276	.38	2,020	27	1.0	444	8.1
Sept. 1-30	4,630	24	2.64	.38	1.43	.20	3.36	.48	.79	.01	.04	.18	282	.38	1,760	31	1.2	465	8.1
Total or weighted average	336,300	26	2.30	0.35	1.65	0.16	2.92	0.60	0.87	0.02	0.03	0.20	275	0.37	124,400	37	1.4	437	--

a Sum of determined constituents.
b Includes 0.23 equivalent per million carbonate (CO_3)
c Includes 0.27 equivalent per million carbonate (CO_3)

RIO GRANDE BASIN

RIO GRANDE ABOVE CULEBRA CREEK NEAR LOBATOS, COLO.

LOCATION.--Half a mile southeast of La Sauces, 7 miles upstream from Culebra Creek, and 15 miles upstream from gaging station near Lobatos, Conejos County.
DRAINAGE AREA.--7,700 square miles above gaging station (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 585 micromhos Oct. 19; minimum observed, 206 micromhos May 12.
Percent sodium: Maximum, 53 Aug. 1-10; minimum, 27 Nov. 1-10, Feb. 1-10.
EXTREMES, 1946-54.--Specific conductance: Maximum observed, 1,070 micromhos July 26, 1948; minimum observed, 122 micromhos June 1, 1949.
Percent sodium: Maximum, 53 Aug. 1-10, 1954; minimum, 16 Dec. 1, 3-10, 1946.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Culebra Creek which enters Rio Grande between sampling point and gaging station is usually dry at its mouth. Inflow from other sources between sampling point and gaging station occurs only at times of heavy local rainfall. Records of discharge for gaging station near Lobatos, Colo. for water year October 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953..	902	42	1.90	0.68	1.83	0.18	2.85	1.35	0.37	0.04	0.02	0.18	305	0.41	370	40	1.6	438	7.2
Oct. 11-16	775	--	1.80	.62	1.17	--	--	--	--	--	--	--	257	.35	271	33	1.1	359	--
Oct. 17-19	309	--	2.40	.90	2.00	--	--	--	--	--	--	--	359	.49	151	38	1.6	513	--
Oct. 20-31	1,900	--	1.75	.70	1.22	--	--	--	--	--	--	--	264	.36	684	33	1.1	364	--
Nov. 1-10	1,540	--	1.75	.62	.87	--	--	--	--	--	--	--	273	.37	570	27	.8	332	--
Nov. 11-20	1,680	--	1.65	.58	.96	---	--	--	--	--	--	--	242	.33	554	30	.9	306	--
Nov. 21-30	4,240	--	1.65	.60	1.00	---	--	--	--	--	--	---	203	.28	1,190	31	.9	317	--
Dec. 1-10.....	5,110	--	1.65	.65	1.00	--	--	--	--	--	--	--	216	.29	1,480	30	.9	314	--
Dec. 11-20	4,970	--	1.80	.60	1.00	--	--	--	--	--	--	--	223	.30	1,490	29	.9	329	--
Dec. 21-31	4,530	--	1.70	.60	.91	--	--	--	--	--	--	--	212	.29	1,310	28	.8	312	--
Jan. 1-10, 1954 .	3,480	39	1.55	.47	.91	.12	2.16	.73	.17	.02	.02	.06	211	.29	1,010	30	.9	299	7.4
Jan. 11-20	3,570	--	1.60	.50	.83	--	--	--	--	--	--	--	204	.28	1,000	28	.8	282	--
Jan. 21-31	4,650	--	1.55	.49	.78	---	--	--	--	--	--	--	189	.26	1,210	28	.8	268	--

Feb. 1-10, 1954 ..	5,390	--	1.40	.45	.70	--	--	--	--	--	--	--	177	.24	1,290	27	.7	250	--
Feb. 11-20.....	6,080	--	1.65	.55	.87	--	--	--	--	--	--	--	224	.30	1,820	28	.8	295	--
Feb. 21-28	3,120	--	1.90	.62	1.12	--	--	--	--	--	--	--	248	.31	967	31	1.0	357	--
Mar. 1-10	2,760	--	1.85	.62	1.22	--	--	--	--	--	--	--	246	.33	911	33	1.1	358	--
Mar. 11-20	2,500	--	1.75	.61	1.04	--	--	--	--	--	--	--	242	.33	825	31	1.0	333	--
Mar. 21-31	2,210	--	1.75	.57	1.04	--	--	--	--	--	--	--	234	.32	707	31	1.0	325	--
Apr. 1-10	1,490	37	1.85	.54	1.30	.16	2.43	1.21	.11	.03	.01	.12	266	.36	536	34	1.2	381	7.5
Apr. 11-20.....	1,140	--	1.95	.67	1.39	--	--	--	--	--	--	--	275	.37	422	35	1.2	395	--
Apr. 21-30.....	940	--	1.65	.41	1.09	--	--	--	--	--	--	--	216	.29	273	35	1.1	317	--
May 1-10	641	--	1.60	.37	1.00	--	--	--	--	--	--	--	208	.28	179	34	1.0	298	--
May 11-20.....	1,410	--	1.30	.41	.65	--	--	--	--	--	--	--	183	.25	352	28	.7	243	--
May 21-31.....	1,130	--	1.35	.40	.70	--	--	--	--	--	--	--	197	.27	305	29	.7	248	--
June 1-10	583	--	1.65	.49	1.22	--	--	--	--	--	--	--	213	.29	169	36	1.2	336	--
June 11-20	383	--	1.85	.51	1.30	--	--	--	--	--	--	--	255	.35	134	36	1.2	364	--
June 21-30	215	--	2.00	.64	2.00	--	--	--	--	--	--	--	320	.44	95	43	1.7	459	--
July 1-10	207	36	2.00	.82	2.13	.18	3.24	1.48	.37	.05	.01	.24	318	.43	89	42	1.8	482	7.5
July 11-20.....	241	--	1.95	.80	1.96	--	--	--	--	--	--	--	312	.42	101	42	1.7	456	--
July 21-31	325	--	2.00	.82	2.22	--	--	--	--	--	--	--	337	.46	150	44	1.9	488	--
Aug. 1-10.....	245	--	1.70	.82	2.83	--	--	--	--	--	--	--	359	.49	120	53	2.5	520	--
Aug. 11-20.....	414	--	1.80	.74	1.91	--	--	--	--	--	--	--	300	.41	170	43	1.7	439	--
Aug. 21-31	144	--	1.75	.78	2.13	--	--	--	--	--	--	--	311	.42	60	46	1.9	456	--
Sept. 1-10	876	--	1.80	.62	1.57	--	--	--	--	--	--	--	268	.36	315	39	1.4	391	--
Sept. 11-20.....	605	--	1.60	.64	1.17	--	--	--	--	--	--	--	236	.32	194	34	1.1	336	--
Sept. 21-30	863	--	1.45	.59	1.13	--	--	--	--	--	--	--	226	.31	268	36	1.1	318	--
Total or weighted average	71,570	--	1.65	0.57	1.00	--	--	--	--	--	--	--	225	0.34	24,330	31	0.9	318	--

RIO GRANDE BASIN--Continued

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

LOCATION.--At gaging station on downstream side of pier of former railway bridge (now removed), 400 feet downstream from bridge on State Highway 4, 1 3/4 miles southwest of San Ildefonso Pueblo, San Ildefonso Grant, 2 1/2 miles downstream from Rio Pojoaque, and 7 miles west of Pojoaque, Santa Fe County.
DRAINAGE AREA.--14,300 square miles, approximately (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1954.
Water temperatures: October 1948 to September 1954.
Sediment records: October 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 852 micromhos Sept. 14; minimum observed, 234 micromhos June 9.
Percent sodium: Maximum, 34 Jan. 21 to Feb. 10; minimum, 16 May 21-31.
EXTREMES, 1946-54.--Specific conductance: Maximum observed, 1,230 micromhos Aug. 26, 1951; minimum observed, 165 micromhos June 13, 1952.
Percent sodium: Maximum, 34 Jan. 21 to Feb. 10, 1954; minimum, 14 June 11-20, 1949, May 11-20, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953..	4,070	30	1.90	0.67	1.17	--	2.88	0.79	0.28		0.01		239	0.33	1,340	31	1.0	368	7.4
Oct. 11-20	5,100	30	1.95	.71	1.30	--	2.87	.96	.34		.01		252	.34	1,730	33	1.1	389	7.5
Oct. 21-31	8,320	32	2.59	.82	1.61	--	3.08	1.56	.39		.02		313	.43	3,580	32	1.2	491	7.8
Nov. 1-10	9,150	33	2.45	.82	1.52	--	3.05	1.52	.34		.01		304	.41	3,750	32	1.2	462	8.0
Nov. 11-20	8,600	29	2.40	.82	1.48	--	3.00	1.56	.37		.01		300	.41	3,530	31	1.2	459	7.7
Nov. 21-30	9,880	29	2.35	.82	1.43	--	2.95	1.50	.39		.01		294	.40	3,950	31	1.1	447	7.7
Dec. 1-10	10,480	28	1.95	.68	1.09	--	2.59	1.04	.31		.02		240	.33	3,460	29	1.0	370	7.8
Dec. 11-20.....	10,370	30	2.05	.70	1.13	--	2.65	.96	.28		.01		242	.33	3,420	29	1.0	380	7.7
Dec. 21-31.....	10,870	29	1.90	.66	1.04	--	2.56	.92	.27		.01		230	.31	3,370	29	.9	356	7.7
Jan. 1-10, 1954..	9,370	29	1.90	.67	1.09	--	2.62	.92	.28		.01		234	.32	3,000	30	.9	363	7.7
Jan. 11-20	9,790	30	1.85	.58	1.09	0.09	2.52	.85	.27		.01		230	.31	3,030	30	1.0	349	7.4
Jan. 21-31	11,480	38	1.70	.62	1.22	.08	2.43	.87	.27		.01		236	.32	3,670	34	1.1	338	7.6
Feb. 1-10.....	11,790	43	1.60	..68	1.22	.08	2.43	.90	.25		.01		242	.33	3,890	34	1.1	335	8.0
Feb. 11-20.....	15,390	27	2.20	.72	1.22	.09	2.47	1.48	.27		.01		267	.36	5,540	29	1.0	401	7.4
Feb. 21-28	11,080	27	2.20	.76	1.13	--	2.51	1.48	.24		.01		262	.36	3,990	28	.9	411	7.3
Mar. 1-10	9,420	30	2.05	.71	1.22	--	2.67	1.19	.27		.00		254	.35	3,300	31	1.0	398	7.4
Mar. 11	1,970	20	4.19	1.64	2.67		a2.87	5.18	.45		.00		536	.73	1,440	31	1.6	789	8.5

a Includes 0.67 equivalent per million of carbonate (CO_3).

Mar. 12-20, 1954	10,270	27	2.25	.76	1.17	--	2.72	1.35	.24		.01		264	.36	3,700	28	1.0	412	7.7
Mar. 21-31.....	15,090	23	2.64	.90	1.65	--	2.90	2.10	.25		.01		322	.44	6,640	32	1.2	511	7.7
Apr. 1-10.....	15,550	23	2.69	.82	1.13	--	2.77	1.67	.21		.01		284	.39	6,060	24	.9	456	7.6
Apr. 11-20	20,220	19	2.20	.57	.65	--	2.49	.92	.14		.03		211	.29	7,600	19	.6	340	7.6
Apr. 21-30	13,540	23	1.95	.51	.87	0.08	2.36	.87	.20		.01		212	.29	3,930	26	.8	327	7.5
May 1-10	25,520	17	2.20	.35	.52	.07	2.46	.60	.14		.01		189	.26	6,640	17	.5	307	7.4
May 11-20	33,430	18	2.00	.37	.52	.06	2.26	.62	.13		.01		180	.24	8,020	18	.5	289	7.6
May 21-31	36,410	18	1.85	.33	.43	.07	2.05	.56	.11		.01		164	.22	8,010	16	.4	261	7.5
June 1-10	19,590	18	1.65	.35	.48	.07	1.87	.58	.12		.00		157	.21	4,110	19	.5	246	7.3
June 11-20	13,190	20	1.75	.45	.65	--	2.10	.75	.13		.00		179	.24	3,170	23	.6	281	7.2
June 21-30	4,470	24	1.95	.61	1.09	--	2.62	.94	.20		.01		227	.31	1,390	30	1.0	352	7.4
July 1-9	6,010	29	2.15	.68	1.09	--	2.85	1.00	.33		.01		248	.34	2,040	28	.9	372	7.5
July 10	2,600	23	3.74	.90	1.30	--	2.69	3.21	.06		.02		378	.51	1,330	22	.9	542	7.2
July 11-18, 20 ..	14,370	24	2.25	.90	.61	--	2.46	.81	.10		.01		205	.28	4,020	19	.5	325	7.4
July 19	1,470	20	3.04	.70	1.13	--	3.18	1.77	.08		.00		299	.41	603	23	.8	467	7.0
July 21-31	12,190	26	2.10	.53	.96	--	2.51	.94	.18		.01		224	.30	3,660	27	.8	364	7.4
Aug. 1-10.....	5,760	33	2.94	.70	1.09	--	3.57	.92	.20		.02		285	.39	2,250	23	.8	440	7.5
Aug. 11-20	6,270	29	2.99	.70	1.35	--	3.38	1.38	.28		.03		308	.42	2,630	27	1.0	476	7.6
Aug. 21-31.....	4,740	31	2.69	.70	1.30	--	3.23	1.17	.27		.02		287	.39	1,850	28	1.0	442	7.6
Sept. 1-10.....	10,480	25	3.19	.74	1.13	--	3.33	1.58	.21		.01		308	.42	4,400	22	.8	476	7.4
Sept. 11-12, 16-20	6,350	25	2.79	.82	1.22	--	2.97	1.69	.21		.02		298	.41	2,600	25	.9	458	7.6
Sept. 13-15	4,510	21	4.14	1.32	2.13	--	3.29	4.04	.25		.02		472	.64	2,890	28	1.3	682	7.7
Sept. 21-30	5,280	29	2.40	.82	1.35	--	2.98	1.33	.31		.01		283	.38	2,010	30	1.1	437	7.5
Total or weighted average	450,600	25	2.20	0.61	0.96	--	2.57	1.10	0.21		0.01		237	0.32	144,200	25	0.8	369	--

RIO GRANDE BASIN--Continued

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

LOCATION.--At water-stage recorder at Atchison, Topeka and Santa Fe Railway bridge over Tiffany Channel, 3 miles northeast of San Marcial, Socorro County. Tiffany Channel is a bypass channel carrying water around the main channel gaging station at San Marcial.
RECORDS AVAILABLE.--Chemical analyses: April 1950 to April 1954.
Water temperatures: October 1950 to April 1954.
Sediment records: April 1950 to April 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 2,400 micromhos Feb. 15; minimum observed, 675 micromhos Apr. 19.
Percent sodium: Maximum, 64 Feb. 11-20; minimum, 43 Nov. 21-30.
EXTREMES, 1950-54.--Specific conductance: Maximum observed, 2,990 micromhos June 19, 1953; minimum observed, 294 micromhos June 12, 1952.
Percent sodium: Maximum, 64 Feb. 11-20, 1954; minimum, 29 June 11-20, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at albuquerque, N. Mex. Extremes and weighted average analysis for period October 1953 to April 1954 probably related to conveyance channel construction and operation. Weighted average analysis not included for period October 1953 to April 1954. Records of discharge for water year October 1953 to September 1954 furnished by the Santa Fe district office of Surface Water Branch; records for composite discharge of Rio Grande Tiffany Channel and Rio Grande Floodway given under Rio Grande at San Marcial in WSP 1342. Quality of Water records for Rio Grande Floodway at San Marcial given on page 104.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ...	151	38	4.49	1.64	7.61	0.18	4.65	5.39	3.89	0.03	0.01	0.25	864	1.18	178	55	4.4	1,320	7.7
Oct. 11-20.....	145	--	4.49	1.64	7.22	--	--	--	--	--	--	--	819	1.11	161	54	4.1	1,270	--
Oct. 21-31.....	178	--	4.79	1.81	8.35	--	--	--	--	--	--	--	915	1.24	221	56	4.6	1,410	--
Nov. 1-10.....	131	--	4.79	1.81	8.52	--	--	--	--	--	--	--	917	1.25	164	56	4.7	1,430	--
Nov. 11-20.....	240	--	6.19	2.30	9.39	--	--	--	--	--	--	--	1,110	1.51	362	53	4.6	1,650	--
Nov. 21-30.....	1,260	--	4.39	1.48	4.35	--	--	--	--	--	--	--	628	.85	1,070	43	2.5	938	--
Dec. 1-4.....	1,360	--	3.74	1.15	4.00	--	--	--	--	--	--	--	529	.72	979	45	2.6	809	--
Dec. 5-10.....	295	--	5.14	1.97	8.91	--	--	--	--	--	--	--	948	1.29	381	56	4.7	1,490	--
Dec. 11-20.....	587	--	5.09	2.06	8.52	--	--	--	--	--	--	--	994	1.35	792	54	4.5	1,550	--
Dec. 21-31.....	599	--	5.89	2.63	10.87	--	--	--	--	--	--	--	1,130	1.54	922	56	5.3	1,830	--
Jan. 1-10, 1954 ...	474	33	6.54	2.30	11.91	.24	4.46	8.91	7.95	.03	.05	.31	1,350	1.84	872	57	5.7	2,040	7.6
Jan. 11-20.....	805	--	5.54	2.55	12.05	--	--	--	--	--	--	--	1,280	1.74	1,400	60	6.0	1,950	--
Jan. 21-31.....	823	--	5.14	2.38	11.52	--	--	--	--	--	--	--	1,190	1.62	1,330	61	5.9	1,840	--

Feb. 1-10, 1954 ...	839	--	5.09	2.38	12.52	--	--	--	--	--	--	--	1,260	1.71	1,430	63	6.5	1,950	--
Feb. 11-20.....	1,580	--	5.69	2.55	14.44	--	--	--	--	--	--	--	1,430	1.94	3,070	64	7.1	2,220	--
Feb. 21-28.....	1,270	--	5.54	2.30	11.78	--	--	--	--	--	--	--	1,230	1.67	2,120	60	6.0	1,900	--
Mar. 1-10	1,440	--	4.99	1.97	8.83	--	--	--	--	--	--	--	1,000	1.36	1,960	56	4.7	1,530	--
Mar. 11-20	4,350	--	4.39	1.48	5.48	--	--	--	--	--	--	--	716	.97	4,220	48	3.2	1,090	--
Mar. 21-31	3,050	--	4.49	1.64	6.52	--	--	--	--	--	--	--	800	1.09	3,320	52	3.7	1,220	--
Apr. 1-10	2,500	28	4.34	1.23	5.52	.19	3.93	4.54	2.71	.03	.01	.05	722	.98	2,450	49	3.3	1,100	7.8
Apr. 11-14	1,010	--	4.59	1.81	7.70	--	--	--	--	--	--	--	887	1.21	1,220	55	4.3	1,360	--
Apr. 15-22	7,930	--	3.29	1.15	3.57	--	--	--	--	--	--	--	514	.70	5,550	45	2.4	789	--
Apr. 23-30	2,200	--	4.39	1.73	6.44	--	--	--	--	--	--	--	801	1.09	2,400	51	3.7	1,220	--
Total	33,200	--	--	--	--	--	--	--	--	--	--	--	--	--	36,520	--	--	--	--

RIO GRANDE BASIN--Continued

RIO GRANDE FLOODWAY AT SAN MARCIAL, N. MEX.

LOCATION.--At gaging station at Atchison, Topeka & Santa Fe Railway bridge, 1.1 miles downstream from former site of San Marcial, Socorro County, and 18½ miles (revised) southwest of San Antonio.
DRAINAGE AREA.--27,700 square miles, approximately, (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: July 1946 to September 1954.
Water temperatures: January 1949 to September 1954.
Sediment records: July 1946 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 2,690 micromhos Oct. 17; minimum observed 581 micromhos May 28.
Percent sodium: Maximum, 54 Oct. 27-31, Nov. 1, 6-8; minimum, 31 Aug. 3-10.
EXTREMES, 1946-54.--Specific conductance: Maximum observed, 2,730 micromhos Apr. 8, 1953; minimum observed, 311 micromhos June 14, 1952.
Percent sodium: Maximum, 65 May 1-10, 1951; minimum, 22 Nov. 21-22, 28-30, 1947, June 21-30, 1949.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of chemical analyses and sediment loads for years prior to 1946 have been published in Water Bulletins of International Boundary and Water Commission. Record of discharge for water year October 1953 to September 1954 furnished by Santa Fe district office of Surface Water Branch. Records of discharge for Rio Grande at San Marcial for water year October 1953 to September 1954 given in WSP 1342 are a composite of floodway, formerly named main channel, and Tiffany Channel through February 1954. Thereafter they are a composite of floodway and Conveyance Channel at San Marcial. Quality of Water records for Tiffany Channel given on page 102 and for Conveyance Channel at San Marcial on page 106.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 4-6, 1953 [a]	2.6		8.48	7.15	12.96								1,570	2.14	6	45	4.6	2,380	
Oct. 14-15, 17-19	4.0		9.98	6.58	15.48								1,870	2.54	10	48	5.4	2,680	
Oct. 27-31, Nov. 1, 6-8	7.3		6.29	6.17	14.70								1,640	2.23	16	54	5.9	2,370	
Dec. 5-10	2,240		4.19	1.48	4.09								579	.79	1,770	42	2.4	901	
Dec. 11-20	5,290		3.89	1.23	3.17								496	.67	3,540	38	2.0	762	
Dec. 21-31	5,600		3.69	1.15	3.09								469	.64	3,580	39	2.0	710	
Jan. 1-10, 1954	6,440	27	3.64	.99	2.87	0.12	3.61	3.02	0.90	0.04	0.03		476	.65	4,190	38	1.9	719	7.5
Jan. 11-20	7,890		3.49	.99	2.74								475	.65	5,130	38	1.8	707	
Jan. 21-31	8,870		3.64	.99	2.74								473	.64	5,680	37	1.8	712	

a No flow Oct. 1-3, 7-13, 16, 20-26, Nov. 2-5, 9-Dec. 4, Mar. 20-Apr. 18, Apr. 22-May 26, June 6-July 25, Aug. 1-2, Sept. 2-11, 23.

Feb. 1-10, 1954...	8,380		3.44	.90	2.70								469	.64	5,360	38	1.8	695
Feb. 11-20.....	10,140		3.54	.99	2.61								466	.63	6,390	37	1.7	698
Feb. 21-28	8,840		3.34	1.07	2.57								447	.61	5,390	37	1.7	671
Mar. 1-10	6,370		3.69	1.23	3.09								527	.72	4,590	39	2.0	779
Mar. 11-19	50		4.24	1.15	4.52								682	.93	46	46	2.8	1,010
May 27-31	3,330		2.99	.90	2.17								392	.53	1,760	36	1.6	597
June 1-5	865		3.84	1.23	2.57								484	.66	571	34	1.6	726
July 26-31	2,970		10.18	4.03	9.57								1,550	2.11	6,270	40	3.6	2,000
Aug. 3-10	1,600		14.97	5.18	9.09								1,950	2.65	4,240	31	2.9	2,360
Aug. 11-20.....	6,060		11.88	3.62	8.70								1,620	2.20	13,330	36	3.1	2,020
Aug. 21-31.....	3,930		10.38	3.95	8.48								1,520	2.07	8,140	37	3.2	1,910
Sept. 1	4		7.93	3.29	8.83								1,330	1.81	1	44	3.7	1,790
Sept. 12-13	793		5.89	2.38	5.00								817	1.11	880	38	2.5	1,160
Sept. 14-20.....	2,990		11.08	4.28	9.83								1,680	2.28	6,820	39	3.5	2,100
Sept. 21-22, 24, 26-30.....	10,760		10.18	3.70	8.70								1,520	2.07	22,270	39	3.3	1,940
Sept. 25	407		4.79	1.81	5.09								724	.98	399	44	2.8	1,070
Total or weighted average [b]	103,900		5.59	1.81	4.48								781	1.06	110,200	38	2.3	1,070

b Represents more than 99 percent of the runoff for water year October 1953 to September 1954.

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RIO GRANDE BASIN--Continued

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

LOCATION.--At gaging station 440 feet downstream from grade control at outlet of San Marcial Lake, 150 feet downstream from mouth of drain entering from left side, 1,800 feet west of San Marcial gage on railway bridge, about 18½ miles southwest of San Antonio, and about 1 mile south of the former site of San Marcial, Socorro County.
RECORDS AVAILABLE.--Chemical analyses: March 1954 to September 1954.
Sediment records: March 1954 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 2,320 micromhos June 24; minimum observed, 622 micromhos May 28.
Percent sodium: Maximum, 59 Mar. 11-18; minimum, 40 Aug. 11-31.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Gaging station established February 27, 1954. Records of discharge for water year October 1953 to September 1954 furnished by Santa Fe district office of Surface Water Branch; records of composite discharge for Rio Grande Conveyance Channel at San Marcial and Rio Grande Floodway at San Marcial given under Rio Grande at San Marcial in WSP 1342. Chemical analyses for Rio Grande Floodway given on page 104.

Chemical analyses, March to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 11-18, 1954	3,170	--	5.64	1.64	10.52	--	--	--	--	--	--	--	1,150	1.56	4,950	59	5.5	1,720	--
Mar. 19-31	4,020	--	4.24	1.40	6.00	--	--	--	--	--	--	--	728	.99	3,980	52	3.6	1,130	--
Apr. 1-10	2,970	27	4.19	1.40	5.87	0.19	3.88	5.08	2.88	0.04	0.00	0.06	747	1.02	3,030	50	3.5	1,160	8.0
Apr. 11-20	7,320	--	3.74	1.40	5.17	--	--	--	--	--	--	--	674	.92	6,730	50	3.2	1,010	--
Apr. 21-30	3,790	--	3.29	1.32	4.04	--	--	--	--	--	--	--	570	.78	2,960	47	2.7	857	--
May 1-10	4,400	--	3.99	1.48	6.13	--	--	--	--	--	--	--	768	1.04	4,580	53	3.7	1,150	--
May 11-20	9,350	--	3.94	1.48	5.91	--	--	--	--	--	--	--	751	1.02	9,540	52	3.6	1,120	--
May 21-31, June 1-2	19,690	--	3.34	1.23	3.61	--	--	--	--	--	--	--	534	.73	14,370	44	2.4	788	--
June 3-10	1,350	--	3.79	1.40	5.13	--	--	--	--	--	--	--	678	.92	1,240	50	3.2	1,010	--
June 11-20	331	--	6.44	3.45	10.31	--	--	--	--	--	--	--	1,410	1.92	636	51	4.6	1,870	--
June 21-30	27	--	7.39	4.28	12.05	--	--	--	--	--	--	--	1,520	2.07	56	51	5.0	2,160	--
July 1 10	31	26	7.34	3.78	11.65	.24	6.33	11.18	5.25	.04	.04	.38	1,450	1.97	61	51	4.9	2,050	7.7
July 11-20	26	--	6.14	3.95	11.65	--	--	--	--	--	--	--	1,380	1.88	49	54	5.2	1,980	--
July 21-31	5,120	--	8.28	3.12	10.26	--	--	--	--	--	--	--	1,420	1.93	9,880	47	4.3	1,960	--

Aug. 1-10, 1954...	1,320	--	9.33	2.71	9.35	--	--	--	--	--	--	--	1,450	1.97	2,600	4	3.8	1,900	--
Aug. 11-20	5,660	--	10.48	2.63	8.57	--	--	--	--	--	--	--	1,500	2.04	11,550	40	3.3	1,920	--
Aug. 21-31	3,340		10.08	3.04	9.35	--	--	--	--	--	--	--	1,500	2.04	6,810	40	3.3	1,950	--
Sept. 1-10	309	--	8.78	3.37	10.87	--	--	--	--	--	--	--	1,510	2.05	633	47	4.4	2,030	--
Sept. 11-20	3,220	--	9.28	3.12	9.87	--	--	--	--	--	--	--	1,500	2.04	6,570	44	4.0	1,980	--
Sept. 21-25, 27-30	6,310	--	8.93	2.63	8.04	--	--	--	--	--	--	--	1,330	1.81	11,420	41	3.3	1,760	--
Sept. 26	569	--	3.54	.90	3.44	--	--	--	--	--	--	--	528	.72	410	44	2.3	787	--
Total or weighted average	82,320	--	5.54	1.81	6.39	--	--	--	--	--	--	--	911	1.24	102,100	47	3.3	1,280	--

RIO GRANDE BASIN--Continued

RIO GRANDE BELOW ELEPHANT BUTTE OUTLET, N. MEX.

LOCATION.--At gaging station 1.0 mile downstream from dam, 1½ miles upstream from Cuchillo Negro River, and in Pedro Armendaris Grant, N. Mex.
DRAINAGE AREA.--28,900 square miles, approximately (includes 2,940 square miles in closed basin in San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses, 1933 to 1954.
REMARKS.--Chemical analyses by the U. S. Dept. Agriculture, Agricultural Research Service, U. S. Salintiy Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953	20	302	--	4.01	1.66	5.45	--	a 2.63	5.96	2.55	--	0.01	0.17	757	1.03	311	49	3.2	1,100	8.0
November ..	25	375	--	4.08	1.24	5.90	--	b 2.43	6.19	2.75	--	k	.17	771	1.05	394	53	3.6	1,130	8.0
December ..	20	417	--	4.09	1.73	5.90	--	c 2.40	6.39	3.20	--	k	.15	786	1.07	446	50	3.5	1,160	7.9
January 1954	25	621	28	4.11	1.57	6.00	0.20	d 2.37	6.42	3.10	0.05	k	.19	810	1.10	683	51	3.6	1,180	8.2
February ...	20	289	--	3.80	1.76	6.05	--	e 2.35	6.25	3.15	--	k	.17	781	1.06	306	52	3.6	1,170	8.2
March	20	45,500	--	3.84	1.67	6.12	--	2.43	6.08	3.25	--	k	.12	776	1.06	48,230	53	3.7	1,160	8.1
April	20	67,200	--	3.64	1.43	5.90	--	f 2.55	5.25	3.25	--	.02	.08	766	1.04	69,890	54	3.7	1,100	8.2
May.....	25	32,100	--	3.04	1.55	5.80	--	2.28	4.89	3.30	--	k	.20	706	.96	30,820	56	3.8	1,060	8.1
June	20	34.900	--	2.84	1.48	6.10	--	e 2.10	5.00	3.55	--	k	.21	735	1.00	34,900	59	4.2	1,080	8.3
July	25	54,000	31	3.11	1.51	6.34	.22	e 2.30	4.97	3.85	.05	k	.20	713	.97	52,380	57	4.2	1,120	8.1
August	20	9,530	--	4.49	1.97	8.74	--	g 1.00	9.91	4.45	--	.01	.19	1,078	1.47	14,010	58	4.8	1,540	8.0
September ..	20	163	--	4.84	1.93	8.30	--	e 1.85	9.98	3.45	--	.02	.24	1,056	1.44	235	55	4.5	1,490	8.2

a Includes 0.10 equivalent per million of carbonate (CO_3).
b Includes 0.12 equivalent per million of carbonate (CO_3).
c Includes 0.22 equivalent per million of carbonate (CO_3).
d Includes 0.16 equivalent per million of carbonate (CO_3).
e Includes 0.20 equivalent per million of carbonate (CO_3).
f Includes 0.24 equivalent per million of carbonate (CO_3).
g Includes 0.10 equivalent per million of carbonate (CO_3).
k Less than 0.01 equivalent per million.

RIO GRANDE NEAR EL PASO, TEX.

LOCATION.--At gaging station 5 miles northwest of El Paso, Texas, 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 1954.
REMARKS.--Chemical analyses by the U. S. Dept. Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in International Boundary and Water Commission Water Bulletin Numbers 23 and 24.

Chemical analyses water year October 1953 to September 1954

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953	31	5,530	--	5.35	2.05	12.80	--	4.95	8.38	7.30	--	0.01	0.33	1327	1.80	9,950	63	6.7	1990	8.0
November ..	30	4,290	--	5.35	2.08	14.00	--	4.65	8.63	8.25	--	.02	.34	1376	1.87	8,020	65	7.3	2100	8.0
December ..	31	3,690	--	5.61	2.23	15.40	--	[a]5.00	9.03	9.30	--	.01	.34	1529	2.08	7,680	66	7.8	2290	8.0
January 1954	31	3,250	30	5.59	2.25	15.40	0.40	4.75	9.48	9.50	0.06	.01	.34	1528	2.08	6,760	65	7.8	2310	7.7
February...	28	2,010	--	5.01	2.17	16.40	--	4.75	10.12	8.95	--	.01	.43	1523	2.07	4,160	70	8.6	2320	8.0
March.....	31	5,470	--	5.19	2.00	9.75	--	[b]3.45	7.24	6.50	--	.03	.24	1087	1.48	8,100	58	5.1	1690	8.1
April	30	22,700	--	4.76	1.71	7.68	--	3.20	6.45	4.75	--	.02	.21	921	1.25	28,380	54	4.3	1420	8.0
May.....	30	12,700	--	4.26	1.75	8.15	--	3.25	6.29	4.80	--	.01	.22	967	1.32	16,760	58	4.7	1430	8.1
June	30	12,500	--	4.41	1.65	8.19	--	[c]3.20	6.27	4.92	--	e	.07	932	1.27	15,880	57	4.7	1440	8.1
July	20	16,200	30	4.18	1.66	7.80	.28	3.23	5.99	4.70	.05	e	.22	904	1.23	19,930	56	4.6	1380	7.8
August	31	11,700	--	3.60	1.18	5.80	--	[d]3.00	4.46	3.50	--	e	.22	683	.93	10,880	55	3.7	1090	8.3
September..	30	2,430	--	5.16	1.98	13.00	--	3.70	8.65	8.05	--	e	.40	1277	1.74	4,230	65	6.9	2010	8.2

a Includes 0.20 equivalent per million carbonate (CO_3).
b Includes 0.10 equivalent per million carbonate (CO_3).
c Includes 0.22 equivalent per million carbonate (CO_3).
d Includes 0.40 equivalent per million carbonate (CO_3).
e Less than 0.01 equivalent per million.

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 1954.
REMARKS.--Chemical analyses by the U. S. Dept. Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in International Boundary and Water Commission Water Bulletin Numbers 23 and 24.

Chemical analyses, water year October 1953 to September 1954

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953..	4	51.6	--	39.60	20.90	82.50	--	2.60	29.60	111.5	--	a	0.68	9121	12.40	640	58	15	12,800	7.8
November	4	143	--	24.55	12.25	61.00	--	4.00	23.99	70.22	--	.01	.69	5989	8.15	1,170	62	14	9,060	7.8
December	5	131	--	30.82	15.18	70.00	--	4.00	27.16	84.75	--	.01	.68	7584	10.31	1,350	60	15	10,600	8.0
January 1954..	4	165	24	30.55	15.69	75.00	0.92	[b] 3.90	29.20	89.12	0.05	a	.84	7834	10.65	1,760	61	16	11,100	7.9
February	4	164	--	27.12	13.78	75.50	--	3.50	30.00	83.38	--	.02	.93	7330	9.97	1,640	65	17	10,600	7.8
March.....	5	140	--	29.02	15.62	85.00	--	3.27	34.28	92.40	--	a	1.02	8204	11.16	1,560	66	18	11,700	8.0
April.....	5	124	--	15.75	8.25	44.40	--	3.75	17.93	47.10	--	.03	.64	4293	5.84	724	65	13	6,540	7.9
May.....	5	1,650	--	9.18	3.52	17.00	--	2.65	6.66	20.55	--	.04	.22	2030	2.76	4,550	57	6.7	3,040	7.9
June	3	584	--	8.19	2.54	18.10	--	2.80	7.75	18.48	--	.04	.29	1857	2.53	1,480	63	7.8	2,960	8.0
July.....	6	1,240	35	6.29	2.08	10.40	.25	3.33	5.19	10.55	.04	.02	.20	1216	1.65	2,050	55	5.1	1,920	7.9
August	7	8,570	--	2.98	1.16	5.44	--	2.80	2.86	4.05	--	.04	.23	603	.82	7,030	57	3.8	1,010	8.1
September	5	108	--	26.75	14.30	53.80	--	3.00	20.58	71.38	--	.01	.51	5894	8.02	866	57	12	8,760	7.9

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

RIO GRANDE AT UPPER PRESIDIO, TEX.

LOCATION.--At gaging station 7.8 river miles above the junction of the Rio Conchos, and about 10 miles northwest of the towns of Presidio, Tex. and Ojinaga, Chihuahua, 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 1954.
REMARKS.--Chemical analyses by the U. S. Dept. Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in International Boundary and Water Commission Water Bulletin Numbers 23 and 24.

Chemical analyses water year October 1953 to September 1954

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953	1	159	--	3.95		3.50	--	2.20	--	1.15	--	--	--	526	0.72	114	47	2.5	745	--
November	--	(a)	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	--	(a)	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January 1954	--	(a)	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	(a)	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	(a)	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
April	1	289	20	2.76	0.34	2.30	0.13	2.75	1.66	1.00	0.04	0.07	0.03	354	.48	139	42	1.8	550	8.0
May	7	1,650	--	5.77		2.55	--	2.75	--	.70	--	--	--	598	.81	1,340	31	1.5	813	--
June	8	6,360	--	5.64		3.03	--	2.75	--	1.15	--	--	--	618	.84	5,340	35	1.8	862	--
July	3	3,650	28	6.40	.78	4.00	.20	2.80	7.03	1.60	.04	.01	.17	785	1.07	3,910	35	2.1	1,070	8.0
August	15	24,100	--	4.28		2.14	--	2.50	--	.75	--	--	--	400	.54	13,010	33	1.5	627	--
September	6	3,960	--	10.84		10.26	--	[b]3.40	--	11.10	--	--	--	1,334	1.81	7,170	49	4.4	2,100	--

a No flow.
b Includes 0.20 equivalent per million of carbonate (CO_3).

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 1954.
REMARKS.--Chemical analyses by the U. S. Dept. Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in International Boundary and Water Commission Water Bulletin Numbers 23 and 24.

Chemical analyses, water year October 1953 to September 1954

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953	7	23,200	--	3.38	1.69	2.95	--	3.00	3.56	1.50	--	0.04	0.15	528	0.72	16,700	37	1.8	773	7.8
November	8	22,600	--	3.85	1.47	3.45	--	3.10	4.06	1.65	--	.07	.13	578	.79	17,850	39	2.1	856	7.9
December	10	24,800	--	4.10	1.84	3.92	--	a 3.20	4.77	1.90	--	.05	.20	666	.91	22,570	40	2.3	962	8.0
January 1954	10	27,300	22	4.21	1.90	4.20	0.14	a 3.05	5.18	2.10	0.07	.04	.18	669	.91	24,840	40	2.4	980	8.1
February	11	25,000	--	3.85	1.87	4.52	--	a 2.90	5.30	2.05	--	.03	.21	680	.92	23,000	44	2.7	1,000	8.0
March	12	23,300	--	3.88	1.54	4.20	--	a 2.87	4.94	1.88	--	.04	.16	626	.85	19,800	44	2.6	938	8.0
April	b	112,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	11	74,200	--	3.80	.51	1.27	--	c 3.23	1.84	.50	--	.05	.14	382	.52	38,580	23	.9	542	8.1
June	16	258,000	--	3.76	.38	1.17	--	3.20	1.61	.60	--	.06	.03	345	.47	121,300	22	.8	524	8.0
July	8	46,000	36	4.28	.94	2.62	18	d 3.10	3.79	1.10	.04	.10	.14	538	.73	33,600	33	1.6	766	8.1
August	15	217,000	--	4.94	.74	2.00	--	c 3.00	4.23	.55	--	0	.25	481	.67	145,400	26	1.2	736	8.1
September	6	99,200	--	4.59	.88	3.36	--	c 3.10	4.33	1.55	--	.02	.17	564	.77	76,380	38	2.0	861	8.2

a Includes 0.12 equivalent per million of carbonate (CO_3).
b Samples broken in transit.
c Includes 0.20 equivalent per million of carbonate (CO_3).
d Includes 0.10 equivalent per million of carbonate (CO_3).

RIO GRANDE AT EAGLE PASS, TEX.

LOCATION.--At gaging station 0.5 mile above the international highway bridge between Eagle Pass, Tex. and Piedras Negras, Coahuila, 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 1954.
REMARKS.--Chemical analyses by the U. S. Dept. Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in International Boundary and Water Commission, Water Bulletin Numbers 23 and 24.

Chemical analyses, water year October 1953 to September 1954

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953	26	59,370	--	4.66		2.85	--	2.80	--	2.55	--	--	--	477	0.65	38,590	38	1.9	762	--
November	25	40,790	--	5.37		3.55	--	3.15	--	2.90	--	--	--	579	.79	32,220	40	2.2	891	--
December	0	[a] 46,820	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January 1954	26	46,990	17	4.06	1.85	4.55	0.12	3.13	3.65	3.75	0.04	0.04	0.15	653	.89	41,820	43	2.6	1,050	8.0
February	24	41,470	--	5.97		5.12	--	[b] 2.93	--	4.15	--	--	--	710	.97	40,220	46	3.0	1,130	--
March	27	26,970	--	5.97		5.40	--	[c] 2.77	--	4.40	--	--	--	730	.99	26,700	47	3.1	1,150	--
April	25	219,000	--	4.82		2.65	--	2.95	--	2.15	--	--	--	471	.64	140,200	35	1.7	740	--
May	27	209,500	--	4.08		2.18	--	2.70	--	1.75	--	--	--	436	.59	123,600	35	1.5	634	--
June	[d] 24	2,794,000	--	4.08		2.10	--	2.47	--	1.75	--	--	--	396	.54	1,509,000	34	1.5	629	--
July	[e] 7	277,900	20	4.40	1.97	4.53	16	[f] 2.80	3.57	4.60	.02	.09	.14	699	.95	264,000	41	2.5	1,120	8.2
August	24	262,200	--	5.04		2.96	--	2.90	--	2.20	--	--	--	501	.68	178,300	37	1.9	808	--
September	23	178,000	--	5.27		3.10	--	2.85	--	2.15	--	--	--	552	.75	133,500	37	1.9	837	--

a No samples obtained.
b Includes 0.10 equivalent per million of carbonate (CO_3).
c Includes 0.12 equivalent per million of carbonate (CO_3).
d For period June 1-26 inclusive.
e For period July 24-31 inclusive.
f Includes 0.30 equivalent 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.
DRAINGAE 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 1954.
REMARKS.--Chemical analyses by the U. S. Department Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in International Boundary and Water Commission Water Bulletin Numbers 23 and 24.

Chemical analyses, water year October 1953 to September 1954

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953	30	189,000	--	2.59	0.45	1.02	--	2.10	1.17	0.70	--	0.12	0.06	265	0.36	68,040	25	0.8	405	7.9
November...	28	76,520	--	2.84	.66	1.50	--	2.35	1.69	1.10	--	.09	.13	331	.45	34,430	30	1.1	503	7.8
December ..	29	77,350	--	2.90	.64	1.62	--	2.30	1.63	1.20	--	.04	.12	324	.44	34,030	31	1.2	512	7 8
January 1954	30	196,400	6	2.84	.60	1.62	0.11	a 2.40	1.62	1.20	0.02	.04	.11	330	.45	88,380	31	1.2	523	8.2
February...	19	295,500	--	2.89	.71	1.90	--	b 2.52	1.85	1.25	--	.05	.13	358	.49	144,800	35	1.4	561	8.0
March	4	271,100	--	3.28	1.17	2.92	--	2.70	2.41	2.30	--	.04	.2	452	.61	165,400	40	2.0	743	8.0
April	5	141,600	--	3.60	1.13	3.25	--	2.85	2.72	2.55	--	.03	.3	515	.70	99,120	41	2.1	813	8.1
May	4	303,500	--	3.65	1.06	3.27	--	2.65	2.78	2.60	--	.04	.19	536	.73	221,600	41	2.1	803	8.0
June	5	346,900	--	2.94	.96	2.32	--	2.40	2.08	1.95	--	.04	.10	409	.56	194,300	37	1.7	653	8.0
July	4	98,370	16	2.59	.51	.99	.11	2.30	1.03	.75	.02	.16	.10	282	.38	37,380	24	.8	415	7.8
August	4	144,400	--	2.68	.60	1.20	--	2.35	1.15	.95	--	.05	.09	271	.37	53,430	27	.9	450	8.0
September..	5	104,200	--	2.92	.76	1.60	--	2.51	1.47	1.35	--	.05	.11	325	.44	45,850	30	1.2	530	8.1

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

PECOS RIVER BELOW ALAMOGORDO DAM, N. MEX.

LOCATION.--At gaging station, 1,200 feet downstream from Alamogordo Dam, 1½ miles downstream from Alamogordo Creek, and 4½ miles northeast of Guadalupe, De Baca County.
DRAINAGE AREA.--4,390 square miles, approximately, (contributing area).
RECORDS AVAILABLE.--Chemical analyses: June 1937 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 3,160 micromhos May 12; minimum observed, 1,500 micromhos Sept. 10.
Percent sodium; Maximum, 14 Jan. 1-10, 21-31; minimum, 8 Apr. 1-10, Aug. 21-31.
EXTREMES, 1937-54.--Specific conductance: Maximum observed, 3,200 micromhos Jan. 14, 1948; minimum observed, 513 micromhos July 22, 1937.
Percent sodium: Maximum, 19 July 1, 3-10, 1947; minimum, 1 Feb. 21-28, 1950.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	1,340	17	23.25	5.10	3.00		2.69	26.02	2.71		0.02		2,040	2.77	3,710	10	0.8	2,360	7.5
Oct. 11-20	1,320	14	24.55	5.26	3.30		2.72	27.48	2.90		.01		2,150	2.92	3,850	10	.9	2,460	7.5
Oct. 21-31	1,430	16	25.75	5.67	3.65		2.49	29.35	3.27		.01		2,290	3.11	4,450	10	.9	2,600	7.7
Nov. 1-5 [a]	1.0	14	21.86	6.00	3.78		2.34	26.02	3.05		.01		2,040	2.77	3	12	1.0	2,390	7.6
Nov. 12-20 [a]	3.8	17	21.86	6.09	3.87		2.69	25.82	3.13		.01		2,050	2.79	11	12	1.0	2,400	7.6
Nov. 21-30	9.5	17	22.41	5.67	3.91		2.54	27.06	2.88		.01		2,100	2.86	27	12	1.0	2,480	7.5
Dec. 1, 5-10 [a]	2.8	17	22.41	5.67	4.00		2.54	26.65	3.16		.01		2,100	2.86	8	12	1.1	2,470	7.5
Dec. 11-20	8.9	19	21.41	5.43	4.04		2.82	25.61	3.05		.01		2,030	2.76	25	13	1.1	2,410	7.5
Dec. 21-31	12	20	22.21	5.67	4.22		2.62	26.65	3.27		.01		2,110	2.87	34	13	1.1	2,490	7.5
Jan. 1-10, 1954	4.0	19	21.61	6.09	4.35		2.54	26.23	3.30		.01		2,080	2.83	11	14	1.2	2,480	7.5
Jan. 11-20	4.4	16	22.41	6.17	4.30		2.92	26.86	3.38		.01		2,140	2.91	13	13	1.1	2,550	7.6
Jan. 21-31	4.2	18	21.01	6.09	4.26		2.82	25.19	3.27		.00		2,020	2.75	12	14	1.2	2,450	7.4
Feb. 1-10	3.0	18	21.21	6.58	4.22		2.74	25.82	3.36		.01		2,060	2.80	8	13	1.1	2,460	7.4
Feb. 11-20	5.6	17	20.71	7.07	4.26		2.80	25.61	3.38		.01		2,050	2.79	16	13	1.1	2,460	7.6
Feb. 21-28	3.8	18	22.21	5.84	4.26		2.84	26.65	3.44		.00		2,120	2.88	11	13	1.1	2,550	7.3

a No flow Nov. 6-11, and Dec. 2-4.

RIO GRANDE BASIN--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1954 ..	76	17	22.21	5.67	4.26		2.85	26.44	3.44		0.01		2,110	2.87	218	13	1.1	2,520	7.7
Mar. 11-20	1,900	15	29.54	4.85	4.35		2.39	32.89	3.95		.00		2,560	3.48	6,610	11	1.0	2,900	7.7
Mar. 21-31	1,640	18	29.74	6.58	3.39		2.51	33.52	4.06		.02		2,600	3.54	5,810	9	.8	2,930	7.4
Apr. 1-10	15,920	18	30.24	6.66	3.39		2.51	34.14	4.06		.02		2,640	3.59	57,150	8	.8	2,950	7.6
Apr. 11-20	7,690	17	30.94	6.74	3.52		2.62	34.56	4.26		.02		2,690	3.66	28,150	9	.8	3,000	7.4
Apr. 21-30	1,340	19	30.64	6.91	3.65		2.39	34.14	4.29		.02		2,670	3.63	4,860	9	.8	3,020	7.4
May 1-10	1,240	19	30.89	7.32	3.96		2.41	34.77	4.48		.02		2,720	3.70	4,590	9	.9	3,110	7.4
May 11-20	1,270	23	31.29	6.41	4.35		2.56	34.77	4.37		.00		2,730	3.71	4,710	10	1.0	3,050	7.4
May 21-31	2,040	19	20.81	3.54	3.17		2.11	22.48	2.71		.02		1,790	2.43	4,960	12	.9	2,190	7.0
June 1-10.....	1,830	19	19.61	3.87	3.00		2.33	21.44	2.57		.01		1,720	2.34	4,280	11	.9	2,130	7.1
June 11-20.....	1,080	23	21.41	4.44	3.35		2.43	24.15	2.85		.01		1,920	2.61	2,820	11	.9	2,300	7.2
June 21-30.....	1,030	20	22.60	4.44	3.61		2.36	24.77	3.13		.01		1,980	2.69	2,770	12	1.0	2,450	7.2
July 1-10	1,230	22	25.15	4.28	3.96		2.34	28.31	3.30		.01		2,220	3.02	3,710	12	1.0	2,580	6.8
July 11-20	1,860	19	23.00	4.44	3.65		2.36	26.02	3.10		.02		2,050	2.79	5,190	12	1.0	2,450	7.0
July 21-31	2,100	19	22.41	4.28	3.57		2.28	25.40	2.93		.01		1,990	2.71	5,690	12	.9	2,360	7.2
Aug. 1-10.....	2,240	17	22.01	4.44	3.48		2.31	25.19	2.96		.01		1,980	2.69	6,030	12	1.0	2,350	6.8
Aug. 11-20	10,790	19	19.41	5.10	3.17		2.62	22.07	2.65		.05		1,780	2.42	26,110	11	.9	2,150	7.5
Aug. 21-31	2,180	17	14.77	3.62	1.65		2.80	16.28	.93		.07		1,300	1.77	3,860	8	.5	1,610	7.3
Sept. 1-10	1,960	14	13.97	3.21	1.87		2.08	15.82	1.24		.05		1,240	1.69	3,310	10	.6	1,570	7.3
Sept. 11-20	1,640	16	15.07	3.04	1.78		2.06	16.97	1.27		.04		1,320	1.80	2,950	9	.6	1,620	7.5
Sept. 21-30	1,280	13	14.37	3.12	1.78		2.26	15.64	1.38		.03		1,250	1.70	2,180	9	.6	1,580	7.2
Total or weighted average	66,500	18	24.85	5.43	3.26		2.47	27.90	3.27		0.03		2,190	2.98	198,100	10	0.8	2,530	--

PECOS RIVER NEAR ARTESIA, N. MEX.

LOCATION.--At gaging station at bridge on State Highway 83, 4.3 miles east of Artesia, Eddy County, 7.0 miles north of mouth of Rio Penasco, and 17 miles north of McMillan Dam.
DRAINAGE AREA.--15,300 square miles, approximately, (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1954.
Water temperatures: April 1949 to September 1954.
Sediment records: January 1949 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 14,600 micromhos June 18; minimum observed, 877 micromhos Aug. 25.
Percent sodium: Maximum, 62 Aug. 2; minimum, 21 Apr. 11-20.
EXTREMES, 1937-54.--Specific conductance: Maximum observed, 17,200 micromhos Aug. 20, 1945; minimum observed, 877 micromhos Aug. 25, 1954.
Percent sodium: Maximum, 71 May 16, 1950; minimum, 12 Mar. 25-31, 1951.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1342.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	240	19	36.23	24.51	67.40		2.46	51.63	73.61		--		7,760	10.6	2,540	53	12	10,800	7.5
Oct. 11-20.....	405	17	32.53	22.29	58.70		2.46	46.01	66.28		--		6,920	9.41	3,810	52	11	9,920	7.4
Oct 21-31.....	746	17	28.64	19.08	50.88		a2.49	41.64	55.56		0.05		6,040	8.21	6,120	52	10	8,560	--
Nov. 1-10.....	982	15	27.74	15.71	42.61		2.26	37.27	45.69		.05		5,220	7.10	6,970	50	9.1	7,440	7.6
Nov. 11-20	1,060	17	28.14	16.53	43.05		2.72	39.14	46.82		.07		5,400	7.34	7,780	49	9.1	7,580	7.6
Nov. 21-30	1,350	18	26.85	16.69	40.01		3.21	36.85	44.84		.10		5,140	6.99	9,440	48	8.6	7,300	7.6
Dec. 1-10.....	1,360	16	26.55	16.37	39.66		3.31	35.81	44.56		.10		5,060	6.88	9,360	48	8.6	7,190	7.6
Dec. 11-20.....	1,080	18	28.14	17.43	44.35		3.64	37.47	49.36		.11		5,480	7.45	8,050	49	9.3	7,800	7.6
Dec. 21-31.....	1,160	18	29.04	17.93	52.62		3.47	40.18	58.10		.08		6,130	8.34	9,670	53	11	8,880	7.6

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

RIO GRANDE BASIN--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Jan. 1-10, 1954 ..	1,120	17	28.64	18.26	53.92		3.21	41.22	58.10		0.07		6,190	8.42	9,430	53	11	8,820	7.5
Jan. 11-20.....	1,040	18	26.45	18.09	53.05		3.05	39.97	55.84		.04		5,980	8.13	8,460	54	11	8,630	7.7
Jan. 21-31.....	1,040	16	26.95	17.02	57.83		2.93	41.22	59.23		--		6,260	8.51	8,850	57	12	9,090	7.6
Feb. 1-10.....	950	17	27.94	19.33	53.92		2.79	40.39	58.94		.12		6,170	8.39	7,970	53	11	8,870	7.4
Feb. 11-20.....	746	16	28.94	19.16	57.40		2.85	42.47	60.64		--		6,420	8.73	6,510	54	12	9,070	7.4
Feb. 21-28.....	682	14	28.54	19.00	56.09		2.75	42.89	60.07		--		6,380	8.68	5,920	54	12	9,050	7.3
Mar. 1-10.....	882	14	28.54	19.57	56.09		2.84	43.30	59.23		--		6,380	8.68	7,660	54	11	9,000	7.4
Mar. 11-20.....	793	16	30.09	19.00	58.27		2.90	44.55	59.79		--		6,540	8.89	7,050	54	12	9,160	7.1
Mar. 21-31.....	754	11	31.59	20.48	67.40		2.61	47.68	67.41		--		7,200	9.79	7,380	56	13	10,100	7.3
Apr. 1-7.....	252	13	33.73	22.20	76.10		2.65	52.05	76.43		--		8,000	10.9	2,750	58	14	11,300	7.2
Apr. 8-10.....	3,240	27	31.49	8.80	16.09		2.97	38.31	14.10		.02		3,560	4.84	15,680	29	3.6	4,400	7.4
Apr. 11-20.....	11,080	18	30.89	7.81	10.44		2.69	36.64	9.59		.04		3,160	4.30	47,640	21	2.4	3,740	7.4
Apr. 21-30.....	1,100	18	32.88	12.34	33.40		2.11	43.10	32.72		.02		4,890	6.65	7,320	42	7.0	6,460	7.1
May 1-10.....	510	18	30.69	18.75	51.31		2.67	45.80	51.61		.02		6,150	8.36	4,260	51	10	8,460	7.2
May 11-17.....	307	17	34.73	17.93	68.70		2.52	51.21	69.66		--		7,520	10.2	3,130	57	13	10,400	6.7
May 18.....	472	21	31.89	14.88	46.53		2.74	44.55	47.10		.04		5,810	7.90	3,730	50	9.7	8,020	6.9
May 19-23.....	16,180	17	21.21	4.28	12.52		2.43	23.94	11.99		.08		2,430	3.30	53,390	33	3.5	3,260	7.5
May 24-31.....	1,690	24	29.34	10.12	33.48		2.61	36.43	33.84		.06		4,540	6.17	10,430	46	7.5	6,210	7.4

June 1-10, 1954	520	23	32.29	17.43	53.05	2.77	45.18	54.71	.35	6,320	8.60	4,470	52	11	8,740	7.4
June 11-20	361	21	37.87	18.67	80.45	2.90	54.34	79.82	--	8,380	11.4	4,120	58	15	11,700	7.2
June 21-30	110	24	37.87	19.82	79.14	2.75	54.55	81.51	--	8,440	11.5	1,270	58	15	11,600	--
July 1-10	44	22	37.03	19.49	73.49	2.15	54.96	74.46	--	8,040	10.9	480	57	14	11,000	7.4
July 11-13[b]	3.2	16	40.92	21.38	87.40	1.56	59.96	89.12	--	9,190	12.5	40	58	16	12,700	7.1
Aug. 2	15	34	40.92	19.41	98.71	2.18	59.33	98.15	--	9,760	13.3	206	62	18	13,400	7.1
Aug. 3, 10	553	14	10.58	1.97	7.91	1.54	11.62	7.47	.04	1,300	1.77	979	39	3.2	1,870	7.4
Aug. 4, 8, 9[b]	2,440	17	19.21	5.26	26.09	2.23	23.53	25.38	.04	3,170	4.31	10,520	52	7.5	4,570	7.2
Aug. 11-14, 16-23	4,340	26	23.95	4.85	10.44	1.92	28.31	9.45	.04	2,560	3.48	15,100	27	2.8	3,190	7.4
Aug. 15	950	26	28.14	7.24	26.26	2.38	34.14	25.66	.03	3,910	5.32	5,050	43	6.2	5,200	7.1
Aug. 24, 26-28	6,010	19	11.58	3.04	6.09	2.47	13.57	5.05	.04	1,340	1.82	10,940	29	2.3	1,870	7.3
Aug. 25	4,620	18	5.94	.67	2.61	3.21	4.06	1.95	.02	566	.77	3,560	28	1.4	877	7.3
Aug. 29-31	920	16	15.47	4.28	11.35	2.16	18.84	10.44	.06	1,980	2.69	2,470	36	3.6	2,760	7.3
Sept. 1-10	1,280	20	21.01	7.65	23.74	2.25	27.48	22.42	.06	3,270	4.45	5,700	45	6.3	4,590	7.3
Sept. 11-13	133	20	25.75	13.49	43.92	2.08	37.89	44.28	.09	5,170	7.03	935	53	9.9	7,290	7.2
Sept. 14-20	290	21	33.18	19.49	70.01	2.33	47.68	73.61	--	7,500	10.2	2,960	57	14	10,600	7.5
Sept. 21-30	347	21	34.33	21.38	75.66	2.44	50.80	79.25	--	8,030	10.9	3,780	58	14	11,300	7.1
Total or weighted average	74,180	19	23.85	8.80	23.44	2.62	29.98	23.78	--	3,510	4.77	353,800	42	5.8	4,760	--

b No flow July 14-Aug. 1, Aug. 5-7.

RIO GRANDE BASIN--Continued

PECOS RIVER BELOW RED BLUFF DAM NEAR ORLA, TEX.

LOCATION.--Just below dam, 3 miles upstream from Salt (Screwbean) Draw, 5 miles northwest of Orla, Reeves County, and 14 miles upstream from gaging station near Orla.
DRAINAGE AREA.--21,300 square miles, approximately (contributing area), above gaging station.
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1954.
Water temperatures: March 1953 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 23,900 micromhos Oct. 1; minimum daily, 5,010 micromhos Sept. 13.
Percent sodium: Maximum, 73 Oct 1-16; minimum, 63 July 1-31, Aug. 1-31.
EXTREMES, 1937-54.--Specific conductance: Maximum daily, 24,200 micromhos Sept. 28, 30, 1953; minimum daily, 1,610 micromhos June 2, 1948.
Percent sodium: Maximum, 74 Sept. 17-30, 1953; minimum, 9 Aug. 17-19, 1944.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for gaging station near Orla for water year October 1953 to September 1954 given in WSP 1342. Mean discharges values reported are adjusted to reflect inflow from Salt (Screwbean) Draw which enters Pecos River between sampling point and gaging station.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-16, 1953 ..	384	15	39.17	29.52	186.65	1.80	62.04	191.50					15,200	20.7	7,950	73	32	21,900	7.4
Oct. 17-31	407	13	36.78	25.33	127.38	1.59	57.04	130.86					11,500	15.6	6,350	67	23	16,400	7.1
Nov. 1-30	855	11	34.18	22.86	108.96	1.44	52.88	111.68					10,000	13.6	11,630	66	20	14,500	7.1
Dec. 1-31	867	11	28.34	19.24	89.07	1.34	43.93	91.38					8,250	11.2	9,710	65	18	12,200	7.0
Jan. 1-31, 1954 ..	629	10	26.95	18.34	101.54	1.97	41.64	103.22					8,830	12.0	7,550	69	21	12,800	7.9
Feb. 1-28	1,300	8.8	26.85	17.93	97.59	1.74	41.64	98.99					8,570	11.7	15,210	69	21	12,500	7.6
Mar. 1-31	14,140	7.8	27.54	18.50	101.26	1.75	42.89	102.66					8,870	12.1	171,100	69	21	12,800	7.7
Apr. 1-30	1,010	9.6	28.24	18.75	96.94	1.84	43.10	98.99					8,670	11.8	11,920	67	20	12,800	7.6
May 1-19, 28-31..	482	11	28.44	18.59	94.85	1.97	42.89	97.02					8,550	11.6	5,590	67	20	12,700	7.9
May 20-27	4,880	8.2	27.00	14.88	75.82	1.70	38.72	77.28					7,120	9.68	47,240	64	17	10,500	7.5
June 1-7	359	17	27.15	17.60	90.56	2.29	41.64	91.38					8,160	11.1	3,980	67	19	12,100	7.7
June 8-30	8,210	11	24.55	12.75	66.33	1.74	34.77	67.12					6,290	8.55	70,200	64	15	9,300	7.8
July 1-31	12,820	12	23.25	11.43	60.11	1.69	33.31	59.79					5,770	7.85	100,600	63	14	8,530	7.7
Aug. 1-31	8,820	12	25.35	11.35	62.24	1.75	33.73	63.46					6,010	8.17	72,060	63	15	8,900	7.4
Sept. 1-30	8,810	14	17.76	7.48	45.22	1.74	22.90	45.69			0.13		4,280	5.82	51,270	64	13	6,620	7.4
Total or weighted average	63,970	11	24.85	13.73	73.92	1.74	35.81	74.74					6,790	9.25	591,700	66	17	10,000	--

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. Station at Comstock destroyed during flood of June-July 1954. Sampling site changed to "Near Mouth" (0.8 mile above mouth.)
RECORDS AVAILABLE.--Chemical analyses, 1936 to 1954.
REMARKS.--Chemical analyses by the U. S. Dept. of Agriculture, Agricultural Research Service, U. S. Salinity Laboratory, Riverside, Calif. Records of discharge for water year October 1953 to September 1954 given in International Boundary and Water Commission Water Bulletin Numbers 23 and 24.

Chemical analyses water year October 1953 to September 1954

Month	Number of Samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1953	14	13,600	--	5.54	3.60	11.20	--	2.75	5.81	11.90	--	0.07	0.19	1,288	1.75	23,800	55	5.3	2,070	7.7
November	14	9,000	--	5.79	4.53	13.60	--	2.85	6.87	14.20	--	.05	.21	1,478	2.01	18,090	57	6.0	2,400	7.9
December	16	9,300	--	7.18	5.42	15.80	--	2.97	8.35	17.20	--	.04	.20	1,802	2.45	22,780	56	6.3	2,870	7.8
January 1954	6	9,210	20	8.10	6.56	19.80	0.34	2.85	10.32	21.50	0.05	.02	.17	2,149	2.92	26,890	57	7.3	3,420	8.0
February	4	7,800	--	7.85	6.92	21.00	--	[a] 2.40	10.94	22.65	--	.02	.22	2,258	3.07	23,950	59	7.7	3,570	8.0
March	9	8,710	--	7.85	6.84	20.80	--	2.10	10.84	22.80	--	.01	.18	2,282	3.10	27,000	59	7.7	3,540	7.9
April	[b]	73,500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	5	46,400	--	7.22	3.60	14.40	--	[c] 2.75	7.58	15.15	--	.06	.19	1,618	2.20	102,100	57	6.2	2,580	8.1
June	8	1,756,000	--	3.30	.55	1.22	--	[d] 2.55	1.11	1.40	--	.06	.11	322	.44	772,600	24	.9	518	8.2
July	[f] 5	48,500	17	7.86	4.72	13.80	.20	[e] 3.00	7.79	15.55	.04	.15	.24	1,655	2.25	109,100	52	5.5	2,650	8.1
August	4	22,200	--	6.70	4.64	12.60	--	2.63	7.26	14.45	--	.09	.27	1,484	2.02	44,840	53	5.3	2,480	7.9
September	6	15,100	--	5.98	4.37	11.90	--	2.73	6.50	13.10	--	.05	.22	1,395	1.90	28,690	53	5.2	2,250	8.1

a Includes 0.10 equivalent per million carbonate (CO_3).
b Samples broken in transit.
c Includes 0.22 equivalent per million carbonate (CO_3).
d Includes 0.20 equivalent per million carbonate (CO_3).
e Includes 0.24 equivalent per million carbonate (CO_3).
f See relocation of station under Location above.

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PART 9. COLORADO RIVER BASIN

COLORADO RIVER MAIN STEM

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLO.

LOCATION.--At Shoshone power plant, 6 miles upstream from gaging station at Glenwood Springs, Garfield County, which is half a mile upstream from Roaring Fork.
DRAINAGE AREA.--4,560 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1941 to September 1954.
Water temperatures: May 1949 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,160 micromhos Dec. 26; minimum daily, 304 micromhos May 22.
Percent sodium: Maximum, 51 Mar. 16; minimum, 19 Sept. 27.
EXTREMES, 1941-54.--Specific conductance: Maximum daily, 2,260 micromhos Aug. 10, 1947; minimum daily, 153 micromhos May 24, 1948.
Percent sodium: Maximum, 51 Mar. 21-31, 1944, Mar. 16, 1954; minimum, 13 June 11-20, 1949, June 1-10, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Discharge records for gaging station at Glenwood Springs for water year October 1953 to September 1954 given in WSP 1343. No appreciable inflow between Shoshone power plant and gaging station except during periods of local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	21,860	--	2.94	0.90	3.00	--	--	--	--	--	--	--	426	0.58	12,680	44	2.2	726	--
Oct. 11-20.....	21,720	12	3.04	1.23	3.04	0.07	2.13	2.33	2.88	0.01	0.01	0.04	442	.60	13,030	41	2.1	743	7.8
Oct. 21-31.....	20,390	--	4.04	1.15	3.13	--	--	--	--	--	--	--	532	.72	14,680	38	1.9	852	--
Nov. 1-10.....	16,170	--	4.39	1.32	3.91	--	--	--	--	--	--	--	610	.83	13,420	41	2.3	991	--
Nov. 11-18.....	13,580	--	4.29	1.48	3.87	--	--	--	--	--	--	--	610	.83	11,270	40	2.3	991	--
Nov. 19-20.....	5,100	--	2.99	.90	2.61	--	--	--	--	--	--	--	394	.54	2,750	40	1.9	653	--
Nov. 21-30.....	19,740	--	3.69	.99	3.35	--	--	--	--	--	--	--	503	.68	13,420	42	2.2	825	--
Dec. 1-10.....	18,960	--	3.54	1.07	3.30	--	--	--	--	--	--	--	494	.67	12,700	42	2.2	821	--
Dec. 11-13, 16-20	17,670	--	2.99	.82	2.65	--	--	--	--	--	--	--	402	.55	9,720	41	1.9	674	--
Dec. 14-15.....	3,080	--	4.14	1.15	4.65	--	--	--	--	--	--	--	605	.82	2,530	47	2.9	1,030	--
Dec. 21-25.....	9,430	--	3.09	.90	2.96	--	--	--	--	--	--	--	428	.58	5,470	43	2.1	723	--
Dec. 26-31.....	8,800	--	4.19	1.15	5.09	--	--	--	--	--	--	--	626	.85	7,480	49	3.1	1,070	--

Jan. 1 8, 10, 1954	16,590	--	3.44	.99	3.83	--	--	--	--	--	--	--	510	.69	11,450	46	2.6	870	--
Jan. 9	2,860	--	2.30	.65	1.91	--	--	--	--	--	--	--	298	.41	1,170	39	1.6	516	--
Jan. 11-19.....	15,140	13	3.29	1.23	3.87	.07	2.29	2.42	3.67	.01	.01	.04	503	.68	10,300	46	2.6	858	8.0
Jan. 20a	2,480	--	2.84		--	--	1.84	1.39	1.41	--	--	--	--	--	--	--	--	474	8.0
Jan. 21-22.....	6,050	--	2.10	.57	1.87	--	--	--	--	--	--	--	280	.38	2,300	41	1.6	485	--
Jan. 23-31.....	18,640	--	2.74	.75	2.74	--	--	--	--	--	--	--	390	.53	9,880	44	2.1	665	--
Feb. 1, 3-10.....	15,530	--	3.09	.90	3.39	--	--	--	--	--	--	--	456	.62	9,630	46	2.4	774	--
Feb. 2.....	1,200	--	3.99	1.15	4.91	--	--	--	--	--	--	--	617	.84	1,010	49	3.1	1,060	--
Feb. 11-20.....	16,770	--	2.99	.99	3.48	--	--	--	--	--	--	--	456	.62	10,400	47	2.6	799	--
Feb. 21-25, 27-28	12,900	--	2.74	.81	3.00	--	--	--	--	--	--	--	404	.55	7,100	46	2.3	699	--
Feb. 26	1,940	--	3.54	1.15	4.78	--	--	--	--	--	--	--	585	.80	1,550	50	3.1	1,010	--
Mar. 1-2	2,920	--	3.49	1.32	4.83	--	--	--	--	--	--	--	598	.81	2,370	50	3.1	1,020	--
Mar. 3-10.....	20,800	--	2.40	.80	2.65	--	--	--	--	--	--	--	376	.51	10,610	45	2.1	643	--
Mar. 11-15, 17-20	16,920	--	2.69	.90	3.00	--	--	--	--	--	--	--	414	.56	9,480	46	2.2	704	--
Mar. 16	1,320	--	3.44	1.23	4.83	--	--	--	--	--	--	--	595	.81	1,070	51	3.2	1,020	--
Mar. 21-31	20,520	--	2.79	.90	3.13	--	--	--	--	--	--	--	438	.60	12,310	46	2.3	751	--
Apr. 1-7, 9-10...	24,180	--	2.54	.76	2.61	--	--	--	--	--	--	--	358	.49	11,850	44	2.0	621	--
Apr. 8	4,440	--	1.95	.52	1.30	--	--	--	--	--	--	--	219	.30	1,330	34	1.2	392	--
Apr. 11-20.....	28,070	12	2.30	.90	2.30	.05	1.97	1.48	2.03	.02	.09	.04	337	.46	12,910	41	1.8	575	7.5
Apr. 21-30.....	29,570	--	2.20	.60	2.09	--	--	--	--	--	--	--	294	.40	11,830	43	1.8	524	--
May 1-10	29,810	--	2.25	.54	2.09	--	--	--	--	--	--	--	308	.42	12,520	43	1.8	518	--
May 11-20	56,730	--	1.85	.57	1.09	--	--	--	--	--	--	--	234	.32	18,150	31	1.0	374	--
May 21-31	59,480	--	2.10	.63	1.39	--	--	--	--	--	--	--	260	.35	20,820	34	1.2	429	--

a Not included for computation of weighted averages.

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR GLENWOOD SPRINGS, COLO.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 1-10, 1954 ..	31,280	--	2.69	0.82	2.30	--	--	--	--	--	--	---	373	0.51	15,950	40	1.7	603	--
June 11-20	29,120	--	2.84	.82	2.44	--	--	--	--	--	--	---	387	.53	15,430	40	1.8	628	--
June 21-30	28,150	--	2.89	.73	2.70	--	--	--	--	--	--	---	398	.54	15,200	43	2.0	656	--
July 1-10	26,360	--	2.99	.77	2.48	--	--	--	--	--	--	---	386	.52	13,710	40	1.8	658	--
July 11-20	27,610	--	3.24	.82	2.48	--	--	--	--	--	--	---	403	.55	15,190	38	1.7	674	--
July 21-31	29,100	13	3.19	1.32	2.52	0.07	2.39	2.14	2.59	0.02	0.01	0.05	426	.58	16,880	35	1.7	720	7.7
Aug. 1-10	23,670	--	2.99	.76	3.04	--	--	--	--	--	--	--	420	.57	13,490	45	2.2	718	--
Aug. 11-20	25,940	--	3.19	.79	2.74	--	--	--	--	--	--	--	420	.57	14,790	41	1.9	703	--
Aug. 21-31.....	24,500	--	3.19	.90	3.17	--	--	--	--	--	--	--	445	.61	14,940	44	2.2	755	--
Sept. 1-10	21,820	--	3.14	.99	3.13	--	--	--	--	--	--	--	442	.60	13,090	43	2.2	751	--
Sept. 11-20	17,490	--	3.44	.99	3.17	--	--	--	--	--	--	--	468	.64	11,190	42	2.1	786	--
Sept. 21-26, 28-30	17,230	--	3.94	.99	2.91	--	--	--	--	--	--	--	480	.65	11,200	37	1.9	821	--
Sept. 27	2,260	--	3.84	1.07	1.17	--	--	--	--	--	--	--	339	.46	1,040	19	.7	552	--
Total or weighted average	b883,400	--	2.89	0.90	2.65	--	--	--	--	--	--	--	401	0.55	485,900	41	1.9	673	--

b Represents 99.7 percent of runoff for water year October October 1953 to September 1954.

COLORADO RIVER NEAR CISCO, UTAH

LOCATION.--At gaging station, 1 mile downstream from Dolores River, 11 miles south of Cisco, Grand County.
DRAINAGE AREA.--24,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1954.
Water temperatures: May 1949 to September 1954.
Sediment records: May 1930 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 2,610 micromhos Sept. 7; minimum daily, 643 micromhos May 23.
Percent sodium: Maximum, 50 Jan. 18, 20-21, 24, Feb. 2, 5, 8, 10, 12, 15; minimum, 32 May 21-30.
EXTREMES, 1941-52, 1953-54.--Specific conductance: Maximum daily, 4,100 micromhos Sept. 30, 1946; minimum daily, 310 micromhos June 15, 1952.
Percent sodium (1950-52, 1953-54): Maximum, 50 Jan. 18, 20-21, 24, Feb. 2, 5, 8, 10, 12, 15, 1954; minimum, 19 May 1-10, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah; Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-7, 9, 15, 1953	34,670	14	9.28	6.83	10.04	0.20	3.51	16.61	5.50		0.23	--	1,630	2.22	76,970	38	3.5	2,300	7.8
Oct. 19, 21, 23, 28, 30	40,900	15	8.88	5.92	8.13	.22	3.44	15.70	3.95		.18	--	1,470	2.00	81,800	35	3.0	2,010	7.9
Nov. 2, 4, 6, 9, 12-13	41,690	15	7.63	5.35	8.17	.21	3.61	12.82	4.79		.19	--	1,340	1.82	75,880	38	3.2	1,910	7.9
Nov. 16, 18, 20, 23, 30	34,290	17	6.79	4.61	8.83	.19	3.21	11.66	5.30		.19	--	1,280	1.74	59,660	43	3.7	1,880	8.1
Dec. 2, 4, 8, 11, 14	28,050	17	5.79	4.77	9.44	.19	2.79	11.08	5.92		.19	0.16	1,250	1.70	47,680	47	4.1	1,890	8.1
Dec. 16-17, 19, 21, 23, 28, 30	39,590	17	6.64	4.77	10.04	.21	3.56	10.95	6.66		.21	--	1,330	1.81	71,660	46	4.2	2,010	7.8
Jan. 4, 6, 8, 11, 13, 15, 1954	31,700	15	6.64	4.52	10.39	.23	3.65	10.35	7.30		.21	.14	1,330	1.81	57,380	48	4.4	2,030	7.6
Jan. 18, 20-21, 24	23,700	15	5.94	4.19	10.39	.23	3.34	9.78	7.25		.21	--	1,270	1.73	41,000	50	4.6	1,960	7.7
Feb. 2, 5, 8, 10, 12, 15	31,580	12	5.69	4.28	10.35	.21	3.23	9.78	6.97		.19	.13	1,250	1.70	53,690	50	4.6	1,930	7.6

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR CISCO, UTAH--Continued

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

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 17, 19, 23, 26, 1954	20,030	13	5.44	4.28	9.09	0.19	2.88	9.72	6.09		0.21	0.09	1,170	1.59	31,850	48	4.1	1,810	8.0
Mar. 1-10	52,130	12	5.44	3.95	8.52	.17	3.15	8.54	5.92		.16	--	1,100	1.50	78,200	47	3.9	1,690	7.8
Mar. 11-20	51,510	11	5.14	3.70	7.96	.17	2.98	8.33	5.36		.16	.11	1,040	1.41	72,630	47	3.8	1,620	7.4
Mar. 21-31	56,990	12	5.39	4.36	8.31	.18	3.15	8.87	5.75		.16	--	1,110	1.51	86,050	46	3.8	1,720	7.5
Apr. 1-7	35,400	9.9	5.49	3.87	8.57	.18	3.05	8.89	5.81		.18	--	1,110	1.51	53,510	47	4.0	1,710	7.5
Apr. 9-10	16,900	10	4.34	2.55	5.09	.14	2.85	5.54	3.44		.09	--	730	.99	16,730	42	2.7	1,170	7.4
Apr. 11-20	72,540	17	4.19	2.47	4.48	.12	2.84	5.39	2.71		.09	.09	684	.93	67,460	40	2.4	1,080	7.7
Apr. 21-30	88,220	16	3.79	2.14	3.70	.10	2.62	4.91	2.14		.08	--	603	.82	72,340	38	2.2	949	7.6
May 1-11	89,630	16	4.94	2.96	4.78	.10	2.88	6.95	2.68		.09	--	786	1.07	95,900	37	2.4	1,200	7.4
May 12-20	143,800	14	3.49	1.81	2.65	.08	2.43	3.96	1.52		.06	.09	491	.67	96,350	33	1.6	779	7.6
May 21-30	190,900	11	3.29	1.73	2.35	.07	2.26	3.75	1.30		.06	--	452	.61	116,400	32	1.5	718	7.6
May 31, June 1-10	98,920	12	4.69	2.88	4.35	.09	2.57	6.85	2.26		.07	--	735	1.00	98,920	36	2.2	1,110	7.5
June 11-20	61,880	9.1	5.94	3.95	6.13	.14	2.82	9.68	3.30		.09	.14	995	1.35	83,540	38	2.8	1,460	7.6
June 21-30	67,520	8.6	5.69	3.62	5.22	.13	2.69	8.68	2.96		.09	--	900	1.22	82,370	36	2.4	1,340	7.4
July 1-10	48,930	12	7.14	4.61	7.00	.16	3.02	11.72	3.72		.16	--	1,170	1.59	77,800	37	2.9	1,680	7.4
July 11-20	42,900	12	7.88	5.43	7.70	.17	3.18	13.43	4.23		.18	.17	1,320	1.80	77,220	36	3.0	1,890	7.4
July 21-31	58,120	13	7.88	4.85	6.83	.17	3.31	12.70	3.30		.18	--	1,230	1.67	97,060	35	2.7	1,730	7.4
Aug. 1-10	25,430	13	9.53	7.32	10.22	.18	3.06	19.20	4.51		.23	--	1,720	2.34	59,510	38	3.5	2,270	7.7
Aug. 11-20	39,870	14	9.68	6.66	9.74	.21	3.41	17.97	4.57		.18	.23	1,660	2.26	90,110	37	3.4	2,220	7.7
Aug. 21-31	33,180	13	9.88	6.99	9.61	.20	3.43	18.45	4.37		.23	--	1,680	2.28	75,650	36	3.3	2,250	7.6
Sept. 1-10	42,290	12	10.48	7.24	10.83	.21	3.57	19.69	5.02		.18	--	1,810	2.46	104,000	38	3.6	2,390	7.3
Sept. 11-20	66,450	15	8.83	5.35	7.65	.17	3.61	14.86	3.38		.15	.21	1,390	1.89	125,600	35	2.9	1,900	7.6
Sept. 21-30	62,580	14	9.88	5.35	8.70	.21	3.75	15.91	4.23		.10	--	1,520	2.07	129,500	36	3.2	2,100	7.6
Total or weighted average	a1,772,000	13	5.99	3.87	6.44	0.15	2.97	9.51	3.67		0.13	--	1,020	1.39	2,463,000	39	2.9	1,490	--

a Represents 76 percent of runoff for water year October 1953 to September 1954.

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, approximately.
RECORDS AVAILABLE.--Chemical analyses: January to July 1926, October 1926 to June 1927, October 1928 to September 1930, October 1942 to October 1945, October 1947 to September 1954.
Water temperatures: July 1949 to September 1954.
Sediment records: October 1928 to December 1933, November 1942 to September 1944, October 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 2,040 micromhos Oct. 17, 28; minimum observed, 510 micromhos May 29.
Percent sodium: Maximum, 44 Apr. 1-10; minimum, 28 May 21-31.
EXTREMES, 1928-30, 1942-45, 1947-54.--Specific conductance (1942-45, 1947-54): Maximum observed, 2,280 micromhos Oct. 15, 1945; minimum observed, 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.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ...	63,650	11	7.09	5.26	8.26	0.20	3.29	13.57	3.75	0.03	0.08	0.24	1,300	1.77	112,700	40	3.3	1,830	8.0
Oct. 11-20	79,860	11	7.78	5.02	8.44	.20	3.41	14.18	3.72	.03	.10	.25	1,350	1.84	146,900	39	3.3	1,890	7.8
Oct. 21-31	177,100	13	7.78	4.28	7.96	.20	3.38	13.22	3.33	.03	.13	.22	1,270	1.73	306,400	39	3.2	1,780	7.7
Nov. 1-10.....	132,300	12	7.19	4.11	6.91	.18	3.61	12.28	2.62	.03	.10	.19	1,170	1.59	210,400	38	2.9	1,640	7.6
Nov. 11-20.....	141,100	12	6.34	3.95	6.74	.17	3.67	10.56	3.02	.02	.09	.19	1,080	1.47	207,400	39	3.0	1,550	7.8
Nov. 21-30.....	140,500	12	6.09	4.03	6.83	.16	3.69	9.99	3.16	.02	.08	.19	1,050	1.43	200,900	40	3.0	1,540	7.9
Dec. 1-10.....	131,900	13	5.89	3.87	6.61	.17	3.69	9.87	3.05	.02	.09	.22	1,040	1.41	186,000	40	3.0	1,520	7.9
Dec. 11-20.....	95,720	14	5.89	3.95	6.87	.15	3.93	9.62	3.24	.02	.09	.21	1,040	1.41	135,000	41	3.1	1,540	7.8
Dec. 21-31.....	113,200	15	6.04	4.19	7.74	.17	3.85	10.31	3.98	.02	.11	.20	1,130	1.54	174,300	43	3.4	1,670	7.7
Jan. 1-10, 1954 ...	84,080	14	6.09	4.11	7.44	.16	4.16	9.95	3.78	.02	.10	.21	1,110	1.51	127,000	42	3.3	1,640	7.8
Jan. 11-20	99,740	14	6.04	4.52	8.00	.17	4.15	10.18	4.17	.02	.15	.24	1,150	1.56	155,600	43	3.5	1,700	7.8
Jan. 21-31	134,600	13	5.34	3.73	6.70	.16	3.83	8.54	3.64	.02	.09	.21	986	1.34	180,400	42	3.1	1,490	7.6

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER AT LEES FERRY, ARIZ.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)			Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954...	117,100	13	4.84	3.62	6.26	0.16	3.52	8.16	3.22	0.02	0.09	0.18		922	1.25	146,400	42	3.0	1,400	7.7
Feb. 11-20.....	123,800	14	5.59	3.45	6.78	.14	3.70	8.97	3.41	.02	.07	.21		997	1.36	168,400	42	3.2	1,490	7.6
Feb. 21-28.....	100,900	12	5.29	3.45	6.35	.15	3.75	8.35	2.99	.02	.06	.23		936	1.27	128,100	42	3.0	1,410	7.5
Mar. 1-10.....	117,810	12	5.24	3.45	6.48	.16	3.61	8.45	3.24	.02	.05	.20		947	1.29	152,000	42	3.1	1,410	7.6
Mar. 11-20.....	116,200	12	5.14	3.21	6.44	.18	3.64	8.12	3.41	.03	.05	.22		933	1.27	147,600	43	3.1	1,420	7.5
Mar. 21-31.....	158,600	12	4.89	2.96	5.91	.16	3.54	7.56	2.93	.02	.06	.20		865	1.18	187,100	42	3.0	1,310	7.4
Apr. 1-10.....	127,700	13	4.89	3.21	6.52	.15	3.51	8.20	3.07	.03	.05	.19		917	1.25	159,600	44	3.2	1,380	7.5
Apr. 11-20.....	186,100	11	4.54	2.88	5.57	.15	3.33	7.08	2.74	.03	.05	.19		812	1.10	204,700	42	2.9	1,230	7.6
Apr. 21-30.....	232,400	13	3.64	1.89	3.61	.13	2.85	4.83	1.55	.03	.03	.18		573	.78	181,300	39	2.2	883	7.7
May 1-10.....	274,100	14	3.34	1.81	2.87	.14	3.02	3.98	1.02	.02	.03	.18		490	.67	183,600	35	1.8	780	7.7
May 11-20.....	351,000	14	3.24	1.64	2.70	.12	2.74	3.71	1.07	.02	.03	.22		466	.63	221,100	35	1.7	731	7.6
May 21-31.....	651,400	11	2.79	1.32	1.65	.12	2.65	2.52	.68	.02	.04	.17		353	.48	312,700	28	1.2	563	7.7
June 1-10.....	379,500	14	3.04	1.23	1.74	.09	2.82	2.64	.71	.02	.02	.10		372	.51	193,500	29	1.2	593	7.6
June 11-20.....	218,900	14	3.64	1.73	2.74	.11	2.85	4.14	1.24	.02	.02	.12		506	.69	151,000	33	1.7	780	7.6
June 21-30.....	193,300	12	3.89	2.06	3.44	.12	2.84	5.08	1.69	.02	.03	.13		590	.80	154,600	36	2.0	910	7.5
July 1-10.....	238,500	14	4.24	1.89	3.22	.12	3.05	5.00	1.38	.02	.05	.14		584	.79	188,400	34	1.8	898	7.6
July 11-20.....	183,300	14	3.94	1.73	3.04	.11	2.93	4.56	1.35	.02	.05	.12		547	.74	135,600	34	1.8	843	7.7
July 21-31.....	225,500	17	5.64	2.06	4.57	.15	3.79	7.02	1.66	.02	.05	.17		780	1.06	239,000	37	2.3	1,150	7.4
Aug. 1-10.....	127,200	18	5.19	2.30	4.22	.16	3.44	6.79	1.72	.02	.10	.16		750	1.02	129,700	36	2.3	1,110	7.5
Aug. 11-20.....	89,690	15	5.89	2.71	5.09	.17	3.44	8.20	2.17	.02	.08	.16		869	1.18	105,800	37	2.5	1,270	7.4
Aug. 21-31.....	104,100	15	6.74	3.21	6.31	.19	3.54	10.01	2.71	.02	.09	.17		1,030	1.40	145,700	38	2.8	1,480	7.5
Sept. 1-10.....	65,100	14	6.49	4.03	6.48	.18	3.31	10.60	2.90	.02	.10	.19		1,070	1.46	95,050	38	2.8	1,520	7.5
Sept. 11-20.....	167,900	14	8.73	4.28	6.96	.22	4.21	12.87	2.74	.03	.07	.19		1,260	1.71	287,100	34	2.7	1,720	7.5
Sept. 21-30.....	155,700	16	9.63	3.62	6.26	.23	4.06	13.30	2.14	.03	.09	.18		1,250	1.70	264,700	32	2.4	1,690	7.6
Total or weighted average	6,101,000	13	4.89	2.71	4.74	0.15	3.29	7.01	2.12	0.02	0.06	0.18		774	1.05	6,406,000	38	2.4	1,150	--

COLORADO RIVER NEAR GRAND CANYON, ARIZ.

LOCATION.--At gaging station at Kaibab Bridge, a quarter of a mile upstream from Bright Angel Creek, 11 miles by trail northeast of Grand Canyon, Coconino County, 26 miles downstream from Little Colorado River, and 267 miles upstream from Hoover Dam.
DRAINAGE AREA.--137,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1925 to November 1942, September 1943 to September 1954.
Water temperatures: October 1936 to October 1942, September 1943 to September 1954.
Sediment records: October 1925 to November 1942, September 1943 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 2,180 micromhos Oct. 23; minimum observed, 591 micromhos June 1.
Percent sodium: Maximum, 48 Apr. 1-10; minimum, 29 May 21-31.
EXTREMES, 1937-42, 1943-54.--Specific conductance: Maximum observed, 2,900 micromhos Sept. 6, 1940; minimum observed, 341 micromhos June 15, 1942.
Percent sodium (1941-42, 1943-54): Maximum, 48 Sept. 11-20, 1942; Apr. 1-10, 1954; minimum, 16 June 11-20, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	69,760	11	7.19	4.85	9.74	0.25	4.10	12.20	5.78	0.02	0.07	0.26	1,370	1.86	129,800	44	4.0	2,020	6.9
Oct. 11-20	82,410	12	7.53	5.02	9.65	.28	4.26	12.68	5.58	.02	.06	.29	1,400	1.90	156,600	43	3.8	2,060	7.4
Oct. 21-31	172,800	14	8.18	4.44	9.13	.26	4.26	13.16	4.60	.02	.08	.28	1,380	1.88	324,900	41	3.6	1,990	7.8
Nov. 1-10	136,700	14	7.83	4.44	8.00	.23	4.23	12.49	4.00	.02	.10	.29	1,290	1.75	239,200	39	3.2	1,880	7.9
Nov. 11-20	144,800	14	6.99	4.19	7.83	.25	4.52	10.58	4.12	.02	.09	.27	1,190	1.62	234,600	41	3.3	1,760	7.9
Nov. 21-30	146,800	13	6.44	4.11	7.48	.21	4.29	9.85	3.98	.02	.08	.27	1,120	1.52	223,100	41	3.2	1,670	7.5
Dec. 1-10	135,040	14	5.89	4.11	7.83	.17	3.95	9.58	4.29	.02	.11	.27	1,110	1.51	203,900	44	3.5	1,660	7.9
Dec. 11-20	104,000	15	5.79	4.11	7.91	.17	4.05	9.31	4.63	.02	.07	.27	1,110	1.51	157,000	44	3.6	1,680	7.8
Dec. 21-31	120,300	14	6.39	4.28	8.78	.19	4.29	9.97	5.42	.02	.09	.24	1,210	1.65	198,500	45	3.8	1,830	7.8
Jan. 1-10, 1954	88,460	14	5.89	4.36	8.61	.19	4.44	9.31	5.27	.02	.12	.26	1,170	1.59	140,700	45	3.8	1,770	7.9
Jan. 11-20	106,000	15	6.59	4.19	9.39	.18	4.57	10.16	5.70	.02	.12	.24	1,260	1.71	181,300	46	4.0	1,890	7.7
Jan. 21-31	138,400	14	5.79	3.78	7.91	.17	4.15	8.74	4.82	.02	.12	.21	1,090	1.48	204,800	45	3.6	1,660	7.7
Feb. 1-10	123,500	14	5.24	3.45	7.57	.16	3.80	8.10	4.60	.02	.11	.21	1,010	1.37	169,200	46	3.6	1,570	7.8
Feb. 11-20	124,400	13	5.29	3.78	7.96	.16	3.87	8.66	4.63	.02	.10	.21	1,060	1.44	179,100	46	3.7	1,620	7.8
Feb. 21-28	104,800	13	5.14	3.70	7.74	.17	3.87	8.62	4.32	.02	.09	.21	1,030	1.40	146,700	46	3.7	1,580	7.8
Mar. 1-10	124,400	14	5.49	3.54	7.57	.16	3.97	8.29	4.29	.02	.08	.25	1,020	1.39	172,900	45	3.6	1,560	7.5
Mar. 11-20	122,700	15	5.29	3.45	7.78	.17	3.82	7.85	4.74	.02	.08	.23	1,010	1.37	168,100	47	3.7	1,580	7.6
Mar. 21-31	176,200	12	5.24	2.96	7.09	.16	4.05	7.41	3.98	.02	.07	.20	945	1.29	227,300	46	3.5	1,450	7.4

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-10, 1954...	145,700	13	5.19	2.88	7.48	0.16	4.08	7.49	4.12	0.02	0.07	0.20	963	1.31	190,900	48	3.7	1,480	7.4
Apr. 11-20.....	189,600	13	4.94	2.88	6.52	.17	3.90	7.00	3.55	.02	.07	.19	887	1.21	229,400	45	3.3	1,370	7.4
Apr. 21-30	230,400	13	4.14	2.14	4.48	.13	3.51	4.89	2.37	.03	.06	.16	659	.90	207,400	41	2.5	1,040	7.5
May 1-10	272,300	16	3.94	1.81	3.48	.11	3.57	3.98	1.81	.02	.06	.15	567	.77	209,700	37	2.0	895	7.6
May 11-20	325,000	17	3.94	1.81	3.44	.12	3.43	4.04	1.81	.02	.06	.13	566	.77	250,200	37	2.0	890	7.6
May 21-31	613,500	16	3.59	1.56	2.17	.10	3.52	2.77	1.07	.02	.04	.12	441	.60	368,100	29	1.3	703	7.5
June 1-10.....	384,700	14	3.29	1.23	2.13	.09	2.97	2.56	1.13	.01	.04	.13	402	.55	211,600	32	1.4	649	7.6
June 11-20.....	224,600	13	3.74	1.64	3.39	.11	2.93	3.91	1.97	.02	.04	.12	539	.73	164,000	38	2.1	857	7.4
June 21-30.....	188,000	13	4.34	2.06	4.30	.13	3.06	5.18	2.45	.02	.05	.14	660	.90	169,200	40	2.4	1,040	7.4
July 1-10	223,800	13	4.44	2.06	4.00	.14	3.43	5.00	2.23	.02	.06	.14	651	.89	199,200	38	2.2	1,000	7.7
July 11-20	188,200	13	4.09	1.81	3.74	.15	3.28	4.35	2.14	.02	.07	.14	597	.81	152,400	38	2.2	931	7.7
July 21-31	255,600	16	5.14	1.89	5.96	.16	4.00	6.54	2.62	.02	.02	.19	814	1.11	283,700	45	3.2	1,220	7.6
Aug. 1-10.....	141,700	16	6.04	2.47	5.78	.19	4.02	7.35	2.88	.02	.11	.16	890	1.21	171,500	40	2.8	1,320	7.4
Aug. 11-20	92,270	14	5.49	2.63	6.26	.18	3.79	6.93	3.69	.02	.08	.17	891	1.21	111,600	43	3.1	1,370	7.4
Aug. 21-31.....	115,100	15	7.14	3.29	7.78	.21	3.95	10.18	4.06	.03	.14	.18	1,150	1.56	179,600	42	3.4	1,680	7.5
Sept. 1-10.....	72,620	16	6.74	3.54	8.48	.23	4.23	9.35	5.05	.03	.18	.21	1,160	1.58	114,700	45	3.7	1,740	7.4
Sept. 11-20	172,600	17	8.53	4.11	7.83	.23	4.20	12.41	3.75	.02	.03	.23	1,280	1.74	300,300	38	3.1	1,800	7.5
Sept. 21-30	169,800	18	8.23	3.45	7.48	.24	4.49	11.39	3.22	.02	.01	.22	1,200	1.63	276,800	39	3.1	1,690	7.5
Total or weighted average	6,229,000	14	5.24	2.80	5.74	0.16	3.79	6.97	3.13	0.02	0.07	0.19	856	1.16	7,226,000	41	2.9	1,300	--

COLORADO RIVER BELOW HOOVER DAM, ARIZ.-NEV.

LOCATION.--At Hoover Dam, Ariz.-Nev. state line between Mohave County, Ariz., and Clark County, Nev., about 1 mile upstream from gaging station.
DRAINAGE AREA.--167,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1939 to September 1954.
Water temperatures: October 1941 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,090 micromhos Mar. 15-17; minimum daily, 903 micromhos Dec. 23.
Percent sodium: Maximum, 39 Mar. 11-20, 21-31; minimum, 33 July 11-20.
EXTREMES, 1939-54.--Specific conductance: Maximum daily, 1,250 micromhos Mar. 2, 1941; minimum daily, 712 micromhos Nov. 25-26, 1952.
Percent sodium (1941-44, 1950-54): Maximum, 41 during several periods in 1951 and 1952; minimum, 32 Jan. 21-22, 25-29, 31, June 12-17, 19-20, 1944.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954.

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	253,400	--	4.24	1.89	3.52	--	--	--	--	--	--	--	630	0.86	217,900	36	2.0	939	--
Oct. 11-20	248,800	--	4.29	1.81	3.57	--	--	--	--	--	--	--	633	.86	214,000	37	2.0	941	--
Oct. 21-31	299,600	12	4.04	2.14	3.48	0.10	2.65	5.33	1.75	0.02	0.03	0.14	628	.85	254,700	36	2.0	932	7.9
Nov. 1-10	251,600	--	4.19	1.89	3.57	--	--	--	--	--	--	--	634	.86	216,400	37	2.0	939	--
Nov. 11-20	268,100	--	4.24	1.89	3.57	--	--	--	--	--	--	--	630	.86	230,600	37	2.0	936	--
Nov. 21-30	229,000	--	4.29	1.81	3.61	--	--	--	--	--	--	--	636	.86	196,900	37	2.1	947	--
Dec. 1-10	288,100	--	4.19	1.89	3.61	--	--	--	--	--	--	--	630	.86	247,800	37	2.1	940	--
Dec. 11-20	249,700	--	4.14	1.81	3.52	--	--	--	--	--	--	--	619	.84	209,700	37	2.0	927	--
Dec. 21-31	275,800	--	4.14	1.81	3.52	--	--	--	--	--	--	--	616	.84	231,700	37	2.0	927	--
Jan. 1-10, 1954	243,500	--	4.04	2.06	3.35	--	--	--	--	--	--	--	638	.87	211,800	35	1.9	940	--
Jan. 11-20	296,400	12	4.04	2.22	3.57	.12	2.64	5.33	1.97	.02	.03	.13	630	.86	254,900	36	2.0	945	7.7
Jan. 21-31	296,000	--	4.14	2.14	3.70	--	--	--	--	--	--	--	664	.90	266,400	37	2.1	963	--
Feb. 1-10	252,800	--	4.14	2.14	3.83	--	--	--	--	--	--	--	674	.92	232,600	38	2.2	984	--
Feb. 11-20	267,000	--	4.39	2.06	3.65	--	--	--	--	--	--	--	690	.94	251,000	36	2.0	1,010	--

COLORADO RIVER MAIN STEM--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 21-28, 1954	201,500	--	4.34	2.30	3.96	--	--	--	--	--	--	--	702	0.95	191,400	37	2.2	1,040	--
Mar. 1-10	316,200	--	4.44	2.30	3.96	--	--	--	--	--	--	--	717	.98	309,900	37	2.2	1,060	--
Mar. 11-20	290,200	--	4.59	2.14	4.26	--	--	--	--	--	--	--	693	.94	272,800	39	2.3	1,070	--
Mar. 21-31	304,500	--	4.59	2.06	4.17	--	--	--	--	--	--	--	687	.93	283,200	39	2.3	1,060	--
Apr. 1-10	295,300	--	4.64	2.06	4.17	--	--	--	--	--	--	--	699	.95	280,500	38	2.3	1,060	--
Apr. 11-20	330,000	12	4.29	2.55	4.13	0.14	2.84	5.95	2.20	0.02	0.04	0.14	690	.94	310,200	37	2.2	1,060	7.7
Apr. 21-30	349,300	--	4.54	2.14	4.13	--	--	--	--	--	--	--	693	.94	328,300	38	2.3	1,050	--
May 1-10	325,400	--	4.49	2.22	4.04	--	--	--	--	--	--	--	689	.94	305,900	38	2.2	1,050	--
May 11-20	394,300	--	4.64	1.97	4.04	--	--	--	--	--	--	--	692	.94	370,600	38	2.2	1,050	--
May 21-31	381,000	--	4.59	1.97	4.00	--	--	--	--	--	--	--	676	.92	350,500	38	2.2	1,030	--
June 1-10	308,300	--	4.54	2.06	4.09	--	--	--	--	--	--	--	683	.93	286,700	38	2.3	1,040	--
June 11-20	288,900	--	4.49	2.14	4.09	--	--	--	--	--	--	--	683	.93	268,700	38	2.3	1,040	--
June 21-30	332,200	--	4.34	2.30	4.09	--	--	--	--	--	--	--	700	.95	315,600	38	2.3	1,040	--
July 1-10	310,500	--	4.59	2.06	4.09	--	--	--	--	--	--	--	676	.92	285,700	38	2.3	1,030	--
July 11-20	350,100	13	4.39	2.96	3.74	.10	2.75	6.14	2.14	.02	.04	.16	681	.93	325,600	33	1.9	1,030	7.8
July 21-31	366,600	--	4.54	2.06	4.09	--	--	--	--	--	--	--	706	.96	351,900	38	2.3	1,050	--
Aug. 1-10	283,300	--	4.64	1.97	4.09	--	--	--	--	--	--	--	712	.97	274,800	38	2.3	1,040	--
Aug. 11-20	290,700	--	4.54	2.14	4.09	--	--	--	--	--	--	--	711	.97	282,000	38	2.2	1,040	--
Aug. 21-31	313,900	--	4.59	2.06	4.04	--	--	--	--	--	--	--	707	.96	301,300	38	2.2	1,040	--
Sept. 1-10	321,000	--	4.64	1.97	4.04	--	--	--	--	--	--	--	710	.97	311,400	38	2.2	1,040	--
Sept. 11-20	305,900	--	4.64	1.97	4.09	--	--	--	--	--	--	--	712	.97	296,700	38	2.3	1,040	--
Sept. 21-30	306,200	--	4.59	2.06	4.04	--	--	--	--	--	--	--	714	.97	297,000	38	2.2	1,040	--
Total or weighted average	10,680,000	--	4.39	2.06	3.92	--	--	--	--	--	--	--	677	0.92	9,826,000	38	2.2	1,010	--

DIVERSIONS AND RETURN FLOW AT AND BELOW IMPERIAL DAM

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

LOCATION.--At gaging station on Yuma Main Canal below Colorado River siphon on Arizona side of river, 3½ miles downstream from siphon drop power plant and a quarter of a mile downstream from highway bridge over Colorado River at Yuma, Yuma County.
RECORDS AVAILABLE.--Chemical analyses: September 1926 to September 1928, October 1942 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 1,210 micromhos Aug. 26-27; minimum observed, 960 micromhos Mar. 30.
Percent sodium: Maximum, 46 Nov. 21-30; minimum, 39 Jan. 11 to Feb. 20, Mar. 1-20, May 1-20.
EXTREMES, 1943-54.--Specific conductance: Maximum observed, 1,210 micromhos Aug. 26-27, 1954; minimum observed, 795 micromhos Jan. 5, 1953.
Percent sodium: Maximum, 46 Nov. 21-30, 1953; minimum, 32 several periods in 1945, 1946, 1948, and 1949.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Samples collected prior to February 1943 were from gaging station on the Colorado River at Yuma. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953...	8,930	13	4.14	2.14	4.44	0.11	2.79	5.77	2.34	0.02	0.02	0.13	697	0.95	8,480	41	2.5	1,040	7.7
Oct. 11-20.....	10,040	13	4.19	2.06	4.44	.11	2.75	5.81	2.37	.02	.02	.15	707	.96	9,640	41	2.5	1,050	7.7
Oct. 21-31.....	7,910	13	4.14	2.14	4.52	.11	2.82	5.83	2.40	.02	.02	.14	705	.96	7,590	41	2.5	1,050	7.7
Nov. 1-10	7,840	14	4.29	2.14	4.44	.11	2.80	5.81	2.43	.02	.02	.16	706	.96	7,530	40	2.5	1,060	7.7
Nov. 11-20.....	5,240	34	3.74	2.14	4.65	.11	2.57	5.75	2.40	.02	.02	.21	711	.97	5,080	44	2.7	1,030	7.9
Nov. 21-30.....	6,350	57	3.34	2.14	4.78	.12	a 2.33	5.77	2.37	.02	.02	.27	713	.97	6,160	46	2.9	1,020	--
Dec. 1-10	4,280	22	4.14	2.06	4.61	.11	2.70	5.85	2.37	.02	.02	.18	697	.95	4,070	42	2.6	1,040	7.8
Dec. 11-20.....	4,980	13	4.34	2.06	4.35	.11	2.84	5.77	2.34	.02	.02	.15	700	.95	4,730	40	2.4	1,040	7.7
Dec. 21-31.....	5,810	25	3.94	2.22	4.30	.11	2.69	5.75	2.26	.02	.02	.17	693	.94	5,460	41	2.4	1,020	7.8
Jan. 1-10, 1954 ..	4,640	12	4.24	2.06	4.22	.11	2.79	5.64	2.20	.02	.02	.15	689	.94	4,360	40	2.4	1,020	7.7
Jan. 11-20.....	4,570	14	4.14	2.14	4.13	.10	2.80	5.70	2.17	.02	.02	.15	691	.94	4,300	39	2.3	1,020	8.0
Jan. 21-31.....	7,350	15	4.09	2.22	4.09	.10	2.84	5.66	2.14	.02	.02	.16	691	.94	6,910	39	2.3	1,010	8.0
Feb. 1-10.....	7,770	13	4.14	2.14	4.09	.10	2.80	5.62	2.14	.02	.02	.15	689	.94	7,300	39	2.3	1,010	8.0
Feb. 11-20.....	7,880	13	4.09	2.22	4.09	.10	2.79	5.66	2.20	.02	.02	.15	693	.94	7,410	39	2.3	1,020	8.1
Feb. 21-28.....	8,210	15	4.14	2.14	4.22	.10	2.82	5.68	2.23	.02	.02	.20	702	.95	7,800	40	2.4	1,040	8.2

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

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

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1954..	11,720	13	4.34	2.14	4.22	0.10	2.84	5.66	2.26	0.02	0.02	0.14	694	0.94	11,020	39	2.3	1,030	7.9
Mar. 11-20.....	10,350	11	4.29	2.14	4.26	.10	2.87	5.68	2.26	.02	.02	.17	697	.95	9,830	39	2.4	1,030	7.8
Mar. 21-31.....	8,960	13	4.19	2.14	4.22	.10	2.80	5.54	2.26	.02	.02	.14	685	.93	8,330	40	2.4	1,010	7.8
Apr. 1-10.....	9,160	12	4.14	2.14	4.17	.10	2.79	5.45	2.23	.02	.02	.15	670	.91	8,340	40	2.3	1,000	7.8
Apr. 11-20.....	10,870	12	4.24	2.22	4.30	.10	2.85	5.66	2.31	.02	.02	.17	691	.94	10,220	40	2.4	1,030	7.9
Apr. 21-30.....	11,040	12	4.29	2.30	4.29	.11	2.90	5.87	2.37	.02	.02	.18	714	.97	10,710	40	2.4	1,060	7.9
May 1-10.....	8,910	13	4.49	2.38	4.52	.12	2.92	6.06	2.45	.02	.02	.25	761	1.03	9,180	39	2.4	1,080	8.0
May 11-20.....	10,360	12	4.54	2.47	4.57	.12	2.90	6.12	2.48	.01	.02	.22	772	1.05	10,890	39	2.4	1,090	8.1
May 21-31.....	11,880	13	4.54	2.38	4.61	.12	2.93	6.06	2.54	.02	.02	.23	784	1.07	12,710	40	2.5	1,110	8.0
June 1-10.....	11,330	15	4.49	2.38	4.65	.12	2.92	6.22	2.59	.01	.03	.19	757	1.03	11,670	40	2.5	1,120	7.9
June 11-20.....	10,710	14	4.44	2.38	4.78	.12	2.90	6.29	2.68	.01	.02	.17	757	1.03	11,030	41	2.6	1,130	7.8
June 21-30.....	11,020	17	4.44	2.47	4.70	.12	2.87	6.27	2.62	.01	.02	.18	752	1.02	11,240	40	2.5	1,120	7.9
July 1-10.....	9,670	14	4.39	2.38	4.61	.12	2.80	6.20	2.59	.01	.02	.18	744	1.01	9,770	40	2.5	1,110	7.9
July 11-20.....	11,900	16	4.39	2.38	4.61	.12	2.82	6.22	2.59	.01	.02	.17	745	1.01	12,020	40	2.5	1,110	7.9
July 21-31.....	15,400	16	4.39	2.30	4.87	.12	2.80	6.25	2.65	.02	.03	.18	743	1.01	15,600	42	2.7	1,110	7.8
Aug. 1-10.....	12,760	19	4.39	2.30	4.87	.13	2.80	6.22	2.59	.02	.03	.18	751	1.02	13,020	42	2.7	1,110	7.8
Aug. 11-20.....	12,010	19	4.44	2.30	4.78	.12	2.80	6.27	2.65	.02	.02	.18	749	1.02	12,250	41	2.6	1,110	7.9
Aug. 21-31.....	10,930	19	4.39	2.38	5.09	.13	2.74	6.54	2.74	.02	.03	.20	770	1.05	11,480	42	2.8	1,140	7.9
Sept. 1-10.....	10,790	14	4.44	2.38	4.91	.12	2.75	6.25	2.71	.01	.03	.18	753	1.02	11,010	41	2.7	1,120	7.9
Sept. 11-20.....	12,600	14	4.34	2.55	4.83	.13	2.77	6.33	2.68	.01	.02	.18	740	1.01	12,730	41	2.6	1,120	7.9
Sept. 21-30.....	13,980	15	4.24	2.71	4.87	.13	2.82	6.31	2.71	.01	.02	.20	747	1.02	14,260	41	2.6	1,120	8.0
Total or weighted average	338,200	16	4.29	2.30	4.57	0.12	2.80	5.98	2.45	0.02	0.02	0.18	726	0.99	334,800	41	2.5	1,070	--

GUNNISON RIVER BASIN

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

LOCATION.--At road bridge about half a mile downstream from gaging station, 1 mile downstream from point of diversion of Redlands power canal, and 1½ miles upstream from mouth and Grand Junction, Mesa County.
DRAINAGE AREA.--8,020 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1931 to September 1954.
Water temperatures: April 1949 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 2,640 micromhos Aug. 31; minimum daily, 558 micromhos Apr. 22.
Percent sodium: Maximum, 33 during several periods from January to July. Minimum, 25 July 18, 20-23, 25-31.
EXTREMES, 1941-54.--Specific conductance: Maximum daily, 2,680 micromhos Nov. 5, 1950; minimum daily, 280 micromhos May 23, 1948.
Percent sodium (1950-54): Maximum, 34 Feb. 1-10, 1951, June 21-31, Feb. 2-29, 1952; minimum, 10 June 2-5, 10, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	12,600	--	12.28	6.66	8.31	--	--	--	--	--	--	--	1,960	2.67	33,640	30	2.7	2,250	--
Oct. 11-20.....	13,070	20	12.38	8.55	8.83	0.20	3.97	24.77	0.76	0.03	0.16	0.23	a1,930	2.62	34,240	29	2.7	2,340	7.7
Oct. 21-31.....	31,990	--	11.33	5.02	6.96	--	--	--	--	--	--	--	1,630	2.22	71,020	30	2.4	1,940	--
Nov. 1-10.....	25,030	--	9.58	4.77	5.96	--	--	--	--	--	--	--	1,410	1.92	48,060	29	2.2	1,710	--
Nov. 11-20.....	24,930	--	8.68	7.32	5.78	--	--	--	--	--	--	--	1,290	1.75	43,630	27	2.0	1,600	--
Nov. 21-30.....	23,580	--	9.33	3.29	5.96	--	--	--	--	--	--	--	1,270	1.73	40,790	32	2.4	1,580	--
Dec. 1-10.....	19,050	--	8.43	4.52	5.96	--	--	--	--	--	--	--	1,340	1.82	34,670	32	2.3	1,650	--
Dec. 11-20.....	17,260	--	8.43	4.85	5.96	--	--	--	--	--	--	--	1,340	1.82	31,410	31	2.3	1,650	--
Dec. 21-31.....	15,270	--	8.53	5.35	6.26	--	--	--	--	--	--	--	1,400	1.90	29,010	31	2.4	1,730	--
Jan. 1-10, 1954 ..	13,590	--	7.98	5.18	5.91	--	--	--	--	--	--	--	1,320	1.80	24,460	31	2.3	1,640	--
Jan. 11-20.....	16,170	18	7.29	5.43	5.83	.13	3.80	14.34	.59	.03	.18	.18	a1,210	1.65	26,680	31	2.3	1,600	7.7
Jan. 21-31.....	18,670	--	7.44	4.93	6.13	--	--	--	--	--	--	--	1,280	1.74	32,490	33	2.5	1,610	--

a Sum of determined constituents.

GUNNISON RIVER BASIN--Continued

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954..	16,120	--	7.24	4.85	5.78	--	--	--	--	--	--	--	1,230	1.67	26,920	32	2.4	1,560	--
Feb. 11-20	16,190	--	6.74	4.44	5.61	--	--	--	--	--	--	--	1,160	1.58	25,580	33	2.4	1,480	--
Feb. 21-28	12,850	--	6.39	4.28	5.35	--	--	--	--	--	--	--	1,090	1.48	19,020	33	2.3	1,420	--
Mar. 1-10	14,010	--	6.54	4.28	5.44	--	--	--	--	--	--	--	1,110	1.51	21,160	33	2.3	1,430	--
Mar. 11-20	15,310	--	6.04	4.03	4.65	--	--	--	--	--	--	--	1,040	1.41	21,590	32	2.1	1,340	--
Mar. 21-31	15,590	--	6.39	4.28	5.13	--	--	--	--	--	--	--	1,140	1.55	24.160	32	2.2	1,450	--
Apr. 1-9.....	13,330	--	5.24	3.62	4.17	--	--	--	--	--	--	--	911	1.24	16,530	32	2.0	1,200	--
Apr. 10-20.....	26,160	15	3.89	2.30	2.70	0.09	2.59	5.87	0.28	0.01	0.01	0.09	590	.80	20,930	30	1.5	824	7.9
Apr. 21-30.....	30,190	--	3.89	1.56	2.17	--	--	--	--	--	--	--	514	.70	21,130	28	1.3	733	--
May 1 10	23,800	--	5.24	2.47	3.35	--	--	--	--	--	--	--	725	.99	23,560	30	1.7	1,020	--
May 11-20.....	38 400	--	4.34	1.64	2.22	--	--	--	--	--	--	--	560	.76	29,180	27	1.3	789	--
May 22-24, 26-27	26,540	--	4.24	1.56	2.13	--	--	--	--	--	--	--	531	.72	19,110	27	1.3	745	--
May 30-31	5,080	--	6.34	2.80	--	--	--	--	--	--	--	--	854	1.16	5,890	--	--	1,140	--
June 1-10.....	19,530	--	7.44	3.87	4.61	--	--	--	--	--	--	--	1,110	1.51	29,490	29	1.9	1,370	--
June 11-20.....	10,840	--	10.08	5.51	7.22	--	--	--	--	--	--	--	1,620	2.20	23,850	32	2.6	1,900	--
June 21-30.....	8,940	--	11.38	5.92	8.35	--	--	--	--	--	--	--	1,810	2.46	21,990	33	2.8	2,110	--
July 1-10	7,320	--	12.03	6.33	8.87	--	--	--	--	--	--	--	1,930	2.62	19,180	33	2.9	2.250	--
July 18, 20-23, 25-31	23,100	20	9.08	5.35	4.91	.16	3.57	15.55	.48	.03	.11	.27	a1,260	1.71	39,500	25	1.8	1,620	7.6
July 19, 24 b	4,290		20.60		--	--	4.29	24.36	.62	--	.18	--	--	--	--	--	--	2,280	7.6

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

Aug. 1-10, 1954..	9,050	--	10.43	5.59	7.48	--	--	--	--	--	--	--	1,590	2.16	19,550	32	2.6	1,950	--
Aug. 11-20.....	11,160	--	12.52	5.92	8.35	--	--	--	--	--	--	--	1,900	2.58	28,790	31	2.8	2,200	--
Aug. 21-31.....	11,080	--	14.12	7.24	9.48	--	--	--	--	--	--	--	2,220	3.02	33,460	31	2.9	2,450	--
Sept. 1-10	13,680	--	13.37	6.50	8.70	--	--	--	--	--	--	--	2,060	2.80	38,300	30	2.8	2,310	--
Sept. 11-20	20,320	--	11.73	5.51	7.17	--	--	--	--	--	--	--	1,750	2.38	48,360	29	2.4	1,990	--
Sept. 21-30	17,530	--	11.68	5.76	7.61	--	--	--	--	--	--	--	1,800	2.45	42,950	30	2.6	2,040	--
Total or weighted average	c 637,300	--	8.08	4.44	5.48	--	--	--	--	--	--	--	1,240	1.69	1,077,000	30	2.2	1,530	--

c Represents 96 percent of runoff for water year October 1953 to September 1954.

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 approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1954.
Water temperatures: April 1949 to September 1954.
Sediment records: May 1930 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,840 micromhos Oct. 13; minimum daily, 333 micromhos May 27.
Percent sodium: Maximum, 46 Oct. 11-12, 14-20; minimum, 26 May 21-31.
EXTREMES, 1941-54.--Specific conductance: Maximum daily, 2,420 micromhos Sept. 29, 1943; minimum daily, 321 micromhos May 30, 1948.
Percent sodium (1950-54): Maximum, 46 Oct. 11-12, 14-20, 1953; minimum, 21 June 1-10, 1951, June 11-20, 1952, June 21-30, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	22,000	--	4.19	3.12	5.70	--	--	--	--	--	--	--	844	1.15	25,300	44	3.0	1,220	--
Oct. 11-12, 14-20	23,820	9.2	4.09	3.87	6.78	0.13	3.70	9.24	1.64	0.02	0.02	--	932	1.27	30,250	46	3.4	1,340	7.6
Oct. 13a	2,860	--	11.84		--	--	5.24	--	--	--	--	--	--	--	--	--	--	1,840	7.1
Oct. 21, 23-24, 26	12,650	--	4.39	3.21	5.83	--	--	--	--	--	--	--	861	1.17	14,800	43	3.0	1,230	--
Nov. 11-20	43,500	--	4.34	3.12	5.48	--	--	--	--	--	--	--	830	1.13	49,160	42	2.8	1,190	--
Nov. 21-30	43,500	--	4.54	3.29	5.61	--	--	--	--	--	--	--	872	1.19	51,760	42	2.8	1,230	--
Dec. 1-10	44,770	--	4.44	2.96	4.74	--	--	--	--	--	--	--	786	1.07	47,900	39	2.5	1,130	--
Dec. 13-16, 18, 20	15,370	--	5.39	3.78	6.04	--	--	--	--	--	--	--	1,000	1.36	20,900	40	2.8	1,400	--
Dec. 21-31	34,510	--	4.99	3.45	5.31	--	--	--	--	--	--	--	862	1.17	40,380	39	2.6	1,260	7.6
Jan. 1-10, 1954	29,950	--	5.24	3.78	5.57	--	--	--	--	--	--	--	930	1.26	37,740	38	2.6	1,330	8.0
Jan. 11-20	34,710	13	4.44	3.54	4.87	.10	4.42	6.83	1.49	.02	.04	0.25	795	1.08	37,490	38	2.4	1,160	7.7
Jan. 21-31	42,600	--	4.19	2.71	4.13	--	--	--	--	--	--	--	709	.96	40,900	37	2.2	1,040	7.9
Feb. 1-10	41,790	--	4.04	3.04	4.70	--	--	--	--	--	--	--	768	1.04	43,460	40	2.5	1,110	8.1
Feb. 11-20	53,850	--	4.04	3.12	4.70	--	--	--	--	--	--	--	770	1.05	56,540	40	2.5	1,110	7.9
Feb. 21-28	42,470	--	3.99	2.80	4.39	--	--	--	--	--	--	--	724	.98	41,620	39	2.4	1,050	8.0

aNot included for computation of weighted averages.

Mar. 1-10, 1954...	46,610	--	4.04	2.96	4.52	--	--	--	--	--	--	--	740	1.01	47,080	39	2.4	1,080	7.9
Mar. 11-20	55,400	--	4.14	3.12	4.57	--	--	--	--	--	--	--	772	1.05	58,170	39	2.4	1,100	8.3
Mar. 21-31	67,180	--	3.84	2.88	4.48	--	--	--	--	--	--	--	750	1.02	68,520	40	2.4	1,080	7.9
Apr. 1-10.....	60,630	--	4.39	2.63	4.52	--	--	--	--	--	--	--	730	.99	60,020	39	2.4	1,100	7.9
Apr. 11-20.....	90,880	12	3.69	2.30	3.61	.12	3.90	4.81	.90	.03	.05	.14	599	.81	73,610	37	2.1	907	7.8
Apr. 21-30.....	118,500	--	3.04	1.48	2.39	--	--	--	--	--	--	--	426	.58	68,730	35	1.6	674	7.8
May 1-10	129,700	--	2.84	1.15	1.83	--	--	--	--	--	--	--	361	.49	63,550	31	1.3	570	7.8
May 14-20	131,800	--	2.45	.99	1.30	--	--	--	--	--	--	--	294	.40	52,720	27	1.0	470	7.9
May 21-31	333,400	--	2.10	.80	1.04	--	--	--	--	--	--	--	237	.32	106,700	26	.9	389	7.9
June 1-10.....	171,700	--	2.50	.99	1.30	--	--	--	--	--	--	--	300	.41	70,400	27	1.0	472	8.0
June 11-20.....	105,200	--	2.54	1.32	1.87	--	--	--	--	--	--	--	353	.48	50,500	33	1.3	557	8.1
June 21-30, July 1.	113,000	--	2.59	1.23	2.00	--	--	--	--	--	--	--	368	.50	56,500	34	1.4	571	8.0
July 2-10	145,600	--	2.35	.78	1.17	--	--	--	--	--	--	--	266	.36	52,420	27	.9	427	8.0
July 13-18	54,860	--	2.54	1.15	1.52	--	--	--	--	--	--	--	323	.44	24,140	29	1.1	512	--
July 19-20	20,230	--	3.64	1.64	2.87	--	--	--	--	--	--	--	517	.70	14,160	35	1.8	777	--
July 21-31	89,100	13	3.19	1.89	2.26	.09	3.51	3.48	.56	.02	.04	.14	440	.60	53,460	30	1.4	687	7.7
Aug. 1-10.....	48,300	--	2.94	1.40	2.39	--	--	--	--	--	--	--	412	.56	27,050	36	1.6	648	--
Aug. 11-20.....	38,900	--	3.54	1.81	3.22	--	--	--	--	--	--	--	541	.74	28,790	38	2.0	821	--
Aug. 21-31.....	32,470	--	3.44	1.73	3.04	--	--	--	--	--	--	--	510	.69	22,400	37	1.9	781	--
Sept. 1-10	39,390	--	4.49	1.97	3.91	--	--	--	--	--	--	--	699	.95	37,420	38	2.2	985	--
Sept. 11-20	44,370	--	5.29	2.30	4.78	--	--	--	--	--	--	--	796	1.08	47,920	39	2.5	1,150	--
Sept. 21-30	50,320	--	4.74	2.22	4.74	--	--	--	--	--	--	--	754	1.03	51,830	41	2.5	1,080	--
Total or weighted average	b2,473,000	--	3.24	1.81	2.83	--	--	--	--	--	--	--	498	0.68	1,682,000	36	1.8	749	--

bRepresents 94 percent of runoff for water year October 1953 to September 1954.

SAN JUAN RIVER BASIN

SAN JUAN RIVER NEAR BLANCO, N. MEX.

LOCATION.--At highway bridge, half a mile downstream from gaging station which is 1 mile upstream from Canyon Largo and 1½ miles east of Blanco, San Juan County.
DRAINAGE AREA.--3,560 square miles, approximately, (at gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1954.
Water temperatures: March 1949 to September 1954.
Sediment records: March 1949 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 1,170 micromhos Sept. 25; minimum observed, 146 micromhos May 29.
Percent sodium: Maximum, 39 Feb. 1-10; minimum, 17 Apr. 5-10, Sept. 25.
EXTREMES, 1945-54.--Specific conductance: Maximum observed, 1,420 micromhos Aug. 16, 1947; minimum observed, 107 micromhos June 20, 1952.
Percent sodium (1945-49, 50-53): Maximum, 52 July 11-16, 18, 20, 1947; minimum, 13 Apr. 11-20, June 4, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. No appreciable inflow between gaging station and sampling point. Stage discharge relation affected by ice Dec. 9 to Jan. 28. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	1,940	10	2.54	0.81	2.00	0.10	2.80	2.44	0.28	0.02	0.01	0.10	335	0.46	892	37	1.5	521	7.4
Oct. 11-20	6,130	--	2.59	.78	1.91	--	--	--	--	--	--	--	334	.45	2,760	36	1.5	531	--
Oct. 21-31	10,240	--	2.50	.82	1.48	--	--	--	--	--	--	--	306	.42	4,300	31	1.1	477	--
Nov. 1-7	4,880	--	2.35	.58	1.70	--	--	--	--	--	--	--	293	.40	1,952	37	1.4	465	--
Nov. 8-Dec. 3 ...	14,210	--	2.40	.58	1.65	--	--	--	--	--	--	--	292	.40	5,680	36	1.4	462	--
Dec. 4-10	2,580	--	2.59	.75	2.09	--	--	--	--	--	--	--	347	.47	1,210	38	1.6	534	--
Dec. 11-20	3,930	--	3.09	.78	2.17	--	--	--	--	--	--	--	385	.52	2,040	36	1.6	594	--
Dec. 21-31	4,010	--	3.04	.58	2.13	--	--	--	--	--	--	--	362	.49	1,960	37	1.6	561	--
Jan. 1-10, 1954 ..	3,230	17	2.94	.81	2.00	.09	2.80	2.81	.25	.02	.00	.10	368	.50	1,620	34	1.5	558	7.7
Jan. 11-20	3,550	--	2.64	.74	1.96	--	--	--	--	--	--	--	341	.46	1,630	37	1.5	531	--
Jan. 21-31	4,080	--	2.59	.66	1.96	--	--	--	--	--	--	--	334	.45	1,840	38	1.5	517	--
Feb. 1-10	6,200	--	2.50	.62	1.96	--	--	--	--	--	--	--	328	.45	2,790	39	1.6	517	--
Feb. 11-20	7,870	--	2.50	.82	1.87	--	--	--	--	--	--	--	342	.47	3,700	36	1.5	518	--
Feb. 21-28	5,790	--	2.50	.90	1.74	--	--	--	--	--	--	--	332	.45	2,610	34	1.3	507	--
Mar. 1-10	6,030	--	2.59	.76	1.48	--	--	--	--	--	--	--	316	.43	2,590	31	1.1	477	--
Mar. 11-20	7,720	--	2.45	.68	1.35	--	--	--	--	--	--	--	300	.41	3,170	30	1.1	447	--
Mar. 21-31	15,550	--	2.84	1.15	1.57	--	--	--	--	--	--	--	361	.49	7,620	28	1.1	538	--

Apr. 1-4, 1954 ...	3,740	16	2.64	.99	1.04	.09	2.57	2.00	.16	.02	.02	--	297	.40	1,500	22	.8	455	7.2
Apr. 5-10.....	15,410	--	1.85	.62	.52	--	1.97	--	--	--	--	--	196	.27	4,160	17	.5	294	7.2
Apr. 11-20.....	31,910	--	1.30	.35	.43	--	--	--	--	--	--	--	146	.20	6,380	21	.5	215	--
Apr. 21-30.....	35,670	--	1.15	.27	.40	--	--	--	--	--	--	--	133	.18	6,420	22	.5	192	--
May 1-10	36,210	--	1.20	.31	.48	--	--	--	--	--	--	--	149	.20	7,240	24	.6	213	--
May 11-20	50,840	--	1.05	.25	.33	--	--	--	--	--	--	--	135	.18	9,150	20	.4	178	--
May 21-31	53,920	--	.95	.17	.37	--	--	--	--	--	--	--	112	.15	8,090	25	.5	157	--
June 1-10	30,460	--	1.05	.12	.43	--	--	--	--	--	--	--	124	.17	5,180	27	.6	179	--
June 11-20	18,420	--	1.30	.30	.70	--	--	--	--	--	--	--	155	.21	3,870	30	.8	237	--
June 21-30	12,220	--	1.65	.37	.91	--	--	--	--	--	--	--	191	.26	3,180	31	.9	300	--
July 1, 4-10.....	10,190	14	1.90	.61	1.00	.08	2.21	1.17	.16	.02	.01	--	222	.30	3,060	28	.9	340	7.4
July 2-3	2,320	--	2.89	.45	2.00	--	2.59	--	--	--	--	--	357	.49	1,140	37	1.5	527	7.7
July 11-19	8,100	--	2.10	.47	1.09	--	--	--	--	--	--	--	231	.31	2,510	30	1.0	362	--
July 20-24	11,130	--	4.49	1.48	1.74	--	--	--	--	--	--	--	476	.65	7,230	23	1.0	706	--
July 25-31	11,920	--	2.15	.66	1.00	--	--	--	--	--	--	--	239	.33	3,930	26	.8	372	--
Aug. 1-10	10,980	--	2.10	.76	1.04	--	--	--	--	--	--	--	235	.32	3,510	27	.9	374	--
Aug. 11-20.....	16,960	--	1.75	.41	.83	--	--	--	--	--	--	--	191	.26	4,410	28	.8	297	--
Aug. 21-31.....	11,620	--	1.95	.47	1.13	--	--	--	--	--	--	--	225	.31	3,600	32	1.0	353	--
Sept. 1-10	7,410	--	2.10	.49	1.30	--	--	--	--	--	--	--	247	.34	2,520	33	1.1	390	--
Sept. 11, 14-20...	8,050	--	1.85	.41	.96	--	--	--	--	--	--	--	211	.29	2,330	30	.9	327	--
Sept. 12-13	2,730	--	3.09	.49	1.26	--	--	--	--	--	--	--	304	.41	1,120	26	.9	472	--
Sept. 21-24, 26, 28-30	10,090	--	1.95	.43	1.00	--	--	--	--	--	--	--	222	.30	3,030	30	.9	339	--
Sept. 25	3,770	--	9.33	1.73	2.30	--	--	--	--	--	--	--	922	1.25	4,710	17	1.0	1,170	--
Sept. 27	2,120	--	3.34	.67	1.61	--	--	--	--	--	--	--	361	.49	1,040	29	1.1	539	--
Total or weighted average	514,200	--	1.80	0.47	0.87	--	--	--	--	--	--	--	211	0.29	149,100	28	0.8	316	--

SAN JUAN RIVER BASIN--Continued

SAN JUAN RIVER NEAR BLUFF, UTAH

LOCATION.--At bridge on State Highway 47, 1,800 feet downstream from gaging station and 20 miles southwest of Bluff, San Juan County.
DRAINAGE AREA.--23,000 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: February to June 1927, October 1929 to September 1954.
Water temperatures: May 1944 to September 1954.
Sediment records: August to September 1928, July 1929 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 2,110 micromhos Aug. 13; minimum daily, 370 micromhos May 31.
Percent sodium: Maximum, 58 Sept. 10; minimum, 23 May 21-31.
EXTREMES, 1929-54.--Specific conductance (1941-54): Maximum daily, 2,110 micromhos Aug. 13, 1954; minimum daily, 208 micromhos June 17, 1952.
Percent sodium: Maximum, 58 Sept. 10, 1954; minimum, 11 May 21, 23-27, 29-31, July 1-10, 1944.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	3,550	12	6.34	3.45	7.00	0.13	2.85	12.60	1.24		0.04	--	1,130	1.54	5,470	41	3.2	1,520	7.7
Oct. 11-20	12,390	13	7.19	3.12	6.31	.14	3.21	12.16	.99		.07	0.13	1,100	1.50	18,580	38	2.8	1,470	7.6
Oct. 21-23, 25-31	30,050	16	6.89	2.38	4.91	.14	3.28	10.01	.68		.06	--	936	1.27	38,160	34	2.3	1,260	7.6
Oct. 24a	7,870	--	4.68		--	--	3.15	5.33	.48		--	--	--	--	--	--	--	855	7.8
Nov. 1-10	22,040	15	5.74	2.55	4.44	.12	3.23	8.68	.68		.06	--	828	1.13	24,910	35	2.2	1,150	7.6
Nov. 11-20	17,040	13	5.79	2.63	4.22	.11	3.20	8.60	.71		.06	--	823	1.12	19,080	33	2.1	1,140	7.6
Nov. 21-30	15,850	12	5.79	2.88	4.13	.10	3.13	8.76	.73		.05	--	840	1.14	18,070	32	2.0	1,160	7.7
Dec. 1-10	13,230	11	6.09	3.21	4.22	.08	3.28	9.35	.85		.04	.11	889	1.21	16,010	31	2.0	1,210	7.8
Dec. 11-20	10,040	13	7.39	3.87	5.57	.09	3.80	11.72	1.04		.06	.09	1,090	1.48	14,860	33	2.3	1,440	7.7
Dec.21-22, 27-29,31	6,020	12	7.04	3.62	4.83	.09	3.64	10.74	1.02		.05	.13	1,030	1.40	8,430	31	2.1	1,370	7.8
Jan. 1-10, 1954	8,880	11	6.99	3.62	5.48	.09	3.61	11.10	1.10		.05	.12	1,050	1.43	12,700	34	2.4	1,390	7.8
Jan. 11-20	10,510	10	6.24	3.29	4.61	.09	3.31	9.81	.96		.05	.09	935	1.27	13,350	32	2.1	1,250	8.0
Jan. 21-31	12,920	12	6.29	3.37	4.91	.07	3.21	10.31	.93		.08	--	942	1.28	16,540	34	2.2	1,290	7.8
Feb. 1-10	12,390	11	6.04	3.54	4.70	.08	3.18	10.37	.90		.05	--	938	1.28	15,860	33	2.1	1,280	8.0
Feb. 11-15	7,200	11	5.54	2.88	4.13	.09	3.11	8.58	.79		.05	.11	800	1.09	7,850	33	2.0	1,130	7.8
Feb. 21-28	9,160	11	5.94	3.12	4.39	.09	3.10	9.64	.90		.07	--	880	1.20	10,990	32	2.1	1,210	7.8
Mar. 1-10	11,950	9.7	5.49	2.88	3.91	.09	2.98	8.62	.79		.05	--	796	1.08	12,910	32	1.9	1,120	7.8
Mar. 11-20	13,150	8.9	5.19	2.71	4.00	.08	2.82	8.27	.79		.04	.09	750	1.02	13,410	33	2.0	1,070	7.8
Mar. 21-31	22,890	14	4.94	2.38	4.35	.12	3.08	7.77	.71		.06	--	749	1.02	23,350	37	2.3	1,060	7.7

a Not included for computation of weighted averages.

Apr. 1-10, 1954...	21,960	15	4.59	2.14	3.30	.10	2.98	6.52	.56	.06	--	648	.88	19,320	33	1.8	932	8.0
Apr. 11-20.....	39,170	15	3.09	1.07	1.43	.07	2.47	2.94	.25	.05	.40	354	.48	18,800	25	1.0	543	7.8
Apr. 21-30.....	51,650	14	2.64	.90	1.17	.06	2.15	2.42	.24	.04	--	300	.41	21,180	25	.9	463	7.8
May 1-10	46,750	13	2.74	1.15	1.57	.06	2.00	3.21	.28	.04	--	350	.48	22,440	28	1.1	533	7.9
May 11-20	77,000	14	2.69	.79	1.09	.05	2.33	1.98	.17	.03	.05	284	.39	30,030	24	.8	434	7.6
May 21-31	94,120	13	2.50	.76	.96	.04	2.06	1.94	.19	.02	--	265	.36	33,880	23	.8	412	7.5
June 1-10.....	55,080	14	2.40	.79	1.09	.04	1.80	2.21	.20	.01	--	268	.36	19,830	25	.9	414	7.5
June 11-20.....	34,270	13	2.69	.90	1.57	.06	1.93	2.89	.31	.01	.06	330	.45	15,420	30	1.2	505	7.4
June 21-27.....	21,520	11	2.69	.90	1.57	.06	1.97	2.87	.34	.00	--	326	.44	9,470	30	1.2	507	7.4
June 28-30.....	9,020	15	8.93	2.71	3.78	.15	3.08	11.62	.73	.01	--	1,030	1.40	12,630	24	1.6	1,330	7.3
July 1-3, 5, 9-10..	15,270	17	4.04	1.23	3.00	.13	2.93	4.98	.51	.03	.08	538	.73	11,150	36	1.8	784	8.1
July 6-8	9,100	19	5.29	3.37	3.30	.16	3.56	7.74	.82	.03	.09	759	1.03	9,370	27	1.6	1,070	8.0
July 11-20	21,160	14	4.19	2.06	3.26	.12	2.92	4.98	1.75	.05	.08	602	.82	17,350	34	1.9	915	7.6
July 21-23, 26, 28-31	31,610	16	3.64	.99	3.26	.11	2.95	4.50	.48	.04	.10	510	.69	21,810	41	2.1	754	7.7
July 24-25, 27.....	40,320	22	7.29	3.54	6.48	.13	4.59	12.20	.51	.01	.11	1,120	1.52	61,290	37	2.8	1,380	7.3
Aug. 1-9.....	17,490	14	4.09	1.32	2.61	.09	2.67	4.71	.54	.05	.06	504	.69	12,070	32	1.6	740	7.8
Aug. 10a	1,760	15	--	--	4.17	.11	3.39	7.22	.68	.08	--	--	--	--	--	--	1,040	7.4
Aug. 11, 15-19....	16,960	17	4.39	1.40	3.22	.12	3.18	5.16	.51	.06	.12	574	.78	13,230	35	1.9	837	7.9
Aug. 12-14	5,660	16	11.58	3.04	4.96	.21	2.79	16.16	.85	.07	--	1,360	1.85	10,470	25	1.8	1,640	7.7
Aug. 20a	2,640	--	8.48	.90	3.27		4.54	7.54	.54	.03	--	--	--	--	26	1.5	1,140	7.9
Aug. 21-23, 25-31.	18,770	18	4.04	1.07	3.61	.11	3.26	5.12	.51	.04	--	566	.77	14,450	41	2.3	822	7.6
Aug. 24.....	2,600	15	5.49	1.32	5.66		4.51	7.56	.39	.01	--	b784	1.07	2,780	45	3.1	1,110	7.4

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

SAN JUAN RIVER BASIN--Continued

SAN JUAN RIVER NEAR BLUFF, UTAH--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Sept. 1-5, 1954....	3,430	17	4.69	1.64	3.78	0.12	2.84	6.52	0.73		0.07	--	661	0.90	3,090	37	2.1	935	7.7
Sept. 6-9	4,850	16	7.29	2.96	6.13	.14	3.77	11.64	.85		.08	--	1,070	1.46	7,080	37	2.7	1,420	7.4
Sept. 10	857	16	8.08	2.06	13.80		5.23	18.07	.62		.02	--	b1,570	2.14	1,830	58	6.1	2,070	7.2
Sept. 11, 14.....	7,290	16	6.69	2.55	6.40		4.29	10.66	.68		.01	--	b994	1.35	9,840	41	3.0	1,370	7.5
Sept. 16-20	10,630	15	3.69	1.07	3.30	.12	2.79	4.77	.51		.04	0.11	516	.70	7,440	40	2.1	755	7.7
Sept. 21-24, 30....	14,130	14	4.39	1.40	3.13	.12	2.95	5.35	.56		.03	--	564	.77	10,880	35	1.8	818	7.7
Sept. 25-29.....	38,460	18	7.63	2.14	5.87	.16	3.79	11.24	.59		.01	--	1,010	1.37	52,690	37	2.7	1,350	7.4
Total or weighted average	c948,400	14	4.39	1.73	3.00	0.09	2.77	5.83	0.51		0.04	--	589	0.80	758,700	33	1.7	830	--

b Sum of determined constituents.
c Represents 96 percent of runoff for water year October 1953 to September 1954.

LITTLE COLORADO RIVER AT CAMERON, ARIZ.

LOCATION.--At bridge on U. S. Highway 89 at Cameron, Coconino County, 12 miles upstream from gaging station which is 9.5 miles downstream from Moenkopi Wash.
DRAINAGE AREA.--26,500 square miles, approximately, (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: April 1951 to September 1954.
Water temperatures: October 1952 to September 1954.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Appreciable inflow between sampling site and gaging station during periods of storm runoff from Moenkopi Wash and several small arroyos. Records of discharge for station near Cameron (below Moeknopi Wash) for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, March to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 25, 1954 ...		16	3.99	1.07	8.22		6.24	2.33	4.82	0.03	0.04		771	1.05		62	5.1	1,290	7.4
Mar. 26-31		20	1.70	.57	5.44		3.57	1.48	2.65	.03	.01		459	.62		71	5.1	775	7.7
Apr. 1-4, 6-7, 10 .		17	1.50	.37	4.04		3.06	.90	1.89	.03	.02		348	.47		68	4.2	592	7.9
June 26.....		21	2.56		2.13		3.77	.56	.42	.04	.00		--	--		45	1.9	436	7.8
July 9		30	.40		5.74		a4.43	1.21	.71	--	.03		--	--		93	13	576	8.5
July 17-18, 21-22.		30	.26	.02	6.22		b4.77	1.08	.68	.11	.04		402	.55		96	17	611	8.6
July 23-31		25	2.10	.71	9.39		4.92	3.75	3.44	.05	.01		743	1.01		77	7.9	1,190	7.8
Aug. 1-3, 5-9....		27	2.54	.90	10.00		4.56	4.98	3.75	.05	.01		829	1.13		74	7.6	1,310	7.7
Aug. 10-13.....		22	1.75	.41	6.87		4.61	2.27	2.14	.04	.00		544	.74		76	6.6	883	7.8
Aug. 15-16.....		22	9.08	3.29	7.48		7.72	10.89	1.61	.06	.01		1,230	1.67		38	3.0	1,730	7.3
Aug. 23-26.....		21	1.90	.54	9.39		5.41	3.12	3.10	.04	.01		705	.96		79	8.5	1,130	7.9
Sept. 4		27	1.65	.47	9.35		4.85	3.60	2.88	.08	.02		704	.96		82	9.1	1,100	8.1
Sept. 5, 8-11....		18	1.55	.44	6.91		4.10	2.54	2.26	.03	.02		540	.73		78	6.9	875	7.9
Sept. 12-13		27	2.20	.66	5.96		4.16	3.75	.93	--	.04		556	.76		68	5.0	--	8.0
Sept. 14-18, 20 ..		22	2.50	.90	8.91		5.95	3.44	2.96	.03	.03		739	1.01		72	6.8	1,180	7.7
Sept. 21, 25, 29-30		20	1.80	.67	8.87		5.51	3.14	2.54	.04	.03		676	.92		78	8.0	1,070	7.8
Sept. 23-24		29	.24	.17	5.91		c 4.08	1.69	.51	.06	.02		395	.54		94	13	567	8.5

a Includes 0.53 equivalents per million of carbonate (CO_3).
b Includes 0.67 equivalents per million of carbonate (CO_3).
c Includes 0.47 equivalents per million of carbonate (CO_3).

VIRGIN RIVER BASIN

VIRGIN RIVER AT LITTLEFIELD, ARIZ.

LOCATION.--At gaging station, three-eighths of a mile downstream from Beaverdam Wash and three-eighths of a mile upstream from Littlefield, Mohave County.
DRAINAGE.--5,090 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: July 1949 to September 1954.
Water temperatures: October 1947 to September 1954.
Sediment records: October 1947 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 3,960 micromhos July 14; minimum daily, 1,320 micromhos Mar. 24.
Percent sodium: Maximum, 34 during several periods December to March; minimum, 21 Jan. 26-27.
EXTREMES, 1949-54:--Specific conductance: Maximum daily, 3,960 micromhos July 14, 1954; minimum daily, 734 micromhos Apr. 28, 1952.
Percent sodium (1949-50, 1953-54): Maximum, 36 Feb. 1-10, 1950; minimum, 21 Jan. 26-27, 1954.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 a	1,280	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	3,260	--
Oct. 11-20	1,540	24	18.81	8.80	12.48	--	4.56	24.77	11.34		0.03	--	2,530	3.44	5,300	31	3.4	3,440	7.6
Oct. 21-31 a	4,340	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	3,190	--
Nov. 1-10 a	2,950	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	3,110	--
Nov. 11-20	3,270	22	15.47	7.65	11.48	0.61	4.79	20.30	10.58		.03	0.76	2,210	3.01	9,840	33	3.4	3,040	7.8
Nov. 21-30 a	3,240	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	3,030	--
Dec. 1-10	3,580	21	14.87	7.65	11.65	.59	4.98	19.49	10.58		.03	.74	2,170	2.95	10,560	34	3.5	2,990	7.7
Dec. 11-20	3,650	21	14.47	7.07	11.22	.59	5.34	17.86	10.01		.03	.69	2,050	2.79	10,180	34	3.4	2,850	7.6
Dec. 21-31	3,790	21	14.17	6.91	11.04	.56	5.47	17.74	9.65		.04	.72	2,030	2.76	10,460	34	3.4	2,820	7.7
Jan. 1-10, 1954	3,360	19	13.92	6.83	10.78	.56	5.44	17.28	9.53		.04	.71	1,990	2.71	9,110	34	3.3	2,770	7.6
Jan. 11-20	3,530	19	13.72	6.99	10.87	.56	5.38	17.24	9.81		.03	.66	1,990	2.71	9,570	34	3.4	2,800	7.5
Jan. 21-25, 28-31	5,310	17	13.32	6.09	9.91	.49	4.98	16.13	8.74		.04	.53	1,840	2.50	13,280	33	3.2	2,590	7.7
Jan. 26-27	2,620	12	13.47	3.37	4.44	.28	3.05	14.84	3.72		.02	.35	1,370	1.86	4,870	21	1.5	1,830	7.5

aNot included for computation of weighted averages.

Feb. 1-10, 1954...	4,220	20	12.57	6.50	9.22	0.54	4.92	15.30	8.52		.04	--	1,770	2.41	10,170	32	3.0	2,520	7.9
Feb. 11-20	5,230	19	12.08	6.17	8.87	.49	4.72	14.78	7.90		.04	.62	1,690	2.30	12,030	32	2.9	2,420	7.8
Feb. 21-28	3,010	19	12.28	6.58	9.39	.54	4.90	15.16	8.60		.04	--	1,760	2.39	7,190	33	3.1	2,530	7.9
Mar. 1-10	2,920	20	13.37	7.48	10.87	.59	4.95	17.22	9.59		.05	.84	1,970	2.68	7,830	34	3.4	2,770	7.7
Mar. 11-22	3,100	22	15.07	8.31	11.13	.64	5.33	19.28	9.87		.05	.90	2,150	2.92	9,050	32	3.3	2,970	7.6
Mar. 23-31	10,760	20	8.43	3.78	5.70	.31	3.93	9.45	4.65		.04	.38	1,120	1.52	16,360	31	2.3	1,660	7.7
Apr. 1-10.....	6,730	18	9.78	5.10	6.91	.38	4.69	11.10	5.98		.05	.47	1,340	1.82	12,250	31	2.5	1,980	7.6
Apr. 11-18.....	4,700	17	10.78	5.59	7.65	.43	4.74	12.55	6.77		.06	.53	1,480	2.01	9,450	31	2.7	2,140	7.7
Apr. 19-30.....	12,000	13	8.13	3.62	5.00	.28	3.95	8.58	4.29		.06	.42	1,030	1.40	16,800	29	2.1	1,550	7.7
May 1-10.....	5,620	16	9.53	5.26	7.00	.41	4.34	11.39	6.43		.03	.54	1,360	1.85	10,400	32	2.6	1,960	7.8
May 11-20	2,350	18	14.77	8.31	10.44	.59	4.74	19.32	9.45		.04	.88	2,090	2.84	6,670	31	3.1	2,790	7.7
May 21-31	1,690	19	17.66	10.12	11.31	.69	5.26	23.53	10.58		.02	1.0	2,450	3.33	5,630	28	3.0	3,180	7.6
June 1-10.....	1,360	20	16.97	10.12	11.61	.67	4.21	24.15	10.58		.02	1.0	2,440	3.32	4,520	29	3.2	3,150	7.7
June 11-20.....	1,270	19	17.66	10.20	11.44	.67	4.67	24.15	10.44		.02	1.0	2,460	3.35	4,250	29	3.1	3,190	7.5
June 21-30.....	2,820	18	18.96	9.29	11.13	.64	5.00	24.77	10.01		.02	.99	2,490	3.39	9,560	28	3.0	3,160	7.5
July 1-10	1,410	25	17.51	9.46	11.57	.72	4.29	24.57	9.93		.02	.49	2,450	3.33	4,700	29	3.1	3,240	7.6
July 11-16, 18-20..	1,780	24	20.66	8.96	11.09	.69	3.93	27.48	9.59		.03	.45	2,610	3.55	6,320	27	2.9	3,360	7.7
July 17	448	22	11.83	5.67	7.31	.38	5.49	14.30	5.42		.02	.15	1,560	2.12	950	29	2.5	2,140	8.0
July 21-31	3,900	20	21.76	8.22	10.52	.64	5.08	27.27	8.97		.02	.40	2,600	3.54	13,810	26	2.7	3,340	7.5
Aug. 1-10.....	6,400	22	21.76	8.88	10.22	.67	4.69	28.11	8.46		.03	.41	2,620	3.56	22,780	25	2.6	3,320	7.3
Aug. 11-12, 14-20.	1,580	22	19.11	9.29	10.87	.69	5.21	24.98	9.36		.02	.44	2,480	3.37	5,320	27	2.9	3,280	7.3
Aug. 13.....	359	36	14.22	4.77	6.96	.41	14.85	6.58	5.42		.02	.37	1,510	2.05	736	26	2.3	2,260	7.3
Aug. 21-31.....	1,480	21	17.17	9.87	11.31	.74	4.65	24.15	10.29		.02	.48	2,440	3.32	4,910	29	3.1	3,280	7.4
Sept. 1-10	1,710	23	19.61	9.21	11.57	.67	4.75	26.02	9.73		.03	1.0	2,560	3.48	5,950	28	3.0	3,270	7.4
Sept. 11-20	5,880	21	23.80	7.89	9.78	.54	4.83	28.73	8.32		.03	.85	2,660	3.62	21,290	23	2.5	3,270	7.3
Sept. 21-30	1,290	23	17.66	9.87	11.74	.64	4.44	24.77	10.29		.02	1.0	2,480	3.37	4,350	29	3.2	3,280	7.5
Total or weighted average	b124,700	19	14.02	6.58	9.00	0.51	4.70	17.38	7.92		0.04	0.60	1,870	2.54	316,700	30	2.8	2,560	--

bRepresents 91 percent of runoff for water year October 1953 to September 1954.

GILA RIVER BASIN

GILA RIVER AT KELVIN, ARIZ.

LOCATION.--Just above mouth of Mineral Creek and 1,200 feet upstream from gaging station at Kelvin, Pinal County, 17 miles downstream from San Pedro River and 19½ miles upstream from Ashurst-Hayden Dam.
DRAINAGE AREA.--18,011 square miles (at gaging station) of which 5,125 square miles is below Coolidge Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 2,660 micromhos Feb. 1; minimum observed, 476 micromhos Sept. 24.
Percent sodium: Maximum, 58 Mar. 1-10; minimum, 15 Oct. 1-31.
EXTREMES, 1950-54.--Specific conductance: Maximum observed, 2,790 micromhos June 12, 1953; minimum observed, 407 micromhos Jan. 20, 1952.
Percent sodium: Maximum, 63 May 21-31, Aug. 5-10, 1953; minimum, 15 Oct. 1-31, 1953.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1343. No appreciable inflow from Mineral Creek between sampling point and gaging station, except during periods of heavy local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	28	42	19.16	7.48	4.61	--	5.06	23.32	2.85	0.03	0.01		2,000	2.72	76	15	1.3	2,430	7.4
Oct. 11-20	26	43	19.01	7.40	4.74	--	5.06	23.11	2.93	.03	.01		1,990	2.71	70	15	1.3	2,420	7.3
Oct. 21-31	28	45	19.11	7.48	4.61	--	4.85	23.32	2.76	.03	.01		1,990	2.71	76	15	1.3	2,420	7.4
Nov. 1-10	30	62	16.87	6.84	6.22	--	4.42	21.44	4.23	.04	.00		1,940	2.64	79	21	1.8	2,420	7.4
Nov. 11-20	63	62	11.78	4.44	9.74	--	3.70	15.16	7.05	.07	.02		1,670	2.27	143	38	3.4	2,320	7.5
Nov. 21-30	93	47	10.68	3.87	10.65	--	4.00	13.93	7.67	.07	.01		1,620	2.20	205	42	3.9	2,310	7.6
Dec. 1-10	130	47	11.28	3.62	10.31	--	3.98	14.91	6.83	.08	.02		1,630	2.22	289	41	3.8	2,290	7.5
Dec. 11-20	155	34	10.58	3.12	10.39	--	4.03	13.51	6.83	.11	.02		1,540	2.09	324	43	4.0	2,220	7.6
Dec. 21-31	223	35	10.08	3.12	10.39	--	4.00	13.20	6.77	.13	.01		1,510	2.05	457	44	4.0	2,180	7.6
Jan. 1-10, 1954	169	33	9.83	3.37	10.63	--	4.18	12.78	7.05	.10	.01		1,510	2.05	346	45	4.2	2,200	7.6
Jan. 11-20	171	36	8.73	3.78	10.26	0.38	3.80	12.82	6.77	.10	.02		1,480	2.01	344	44	4.1	2,160	7.9
Jan. 21-31	229	48	7.78	3.70	10.26	.38	3.57	12.16	6.63	.10	.02		1,430	1.94	444	46	4.3	2,090	7.8
Feb. 1-10	498	59	5.09	3.29	11.04	--	3.80	7.04	8.88	.08	.03		1,230	1.67	832	57	5.4	1,950	7.9
Feb. 11-20	567	44	4.94	2.96	10.35	--	3.79	6.45	8.24	.07	.02		1,120	1.52	862	57	5.2	1,860	8.0
Feb. 21-28	518	25	5.39	3.04	11.13	--	3.83	6.43	9.53	.07	.01		1,200	1.63	844	57	5.4	1,980	7.8
Mar. 1-10	722	27	5.79	2.88	11.96	--	3.67	6.22	10.49	.07	.04		1,240	1.69	1,220	58	5.7	2,060	7.8

Mar. 11-21, 1954..	577	27	5.99	2.96	11.96	--	3.75	6.93	10.15	.07	.03		1,270	1.73	998	57	5.6	2,080	7.9
Mar. 22-25	17,860	27	3.34	.99	1.65	--	3.20	1.75	.99	.04	.04		362	.49	8,750	28	1.1	581	7.6
Mar. 26-28	1,010	30	6.04	2.06	5.96	--	3.77	5.39	4.74	.05	.07		858	1.17	1,180	42	3.0	1,350	8.0
Mar. 29-Apr. 2 ...	571	32	8.23	3.29	9.00	--	4.90	8.27	7.28	.05	.04		1,250	1.70	971	44	3.8	1,920	8.1
Apr. 3-10	3,430	21	2.79	1.07	3.83	--	2.52	2.06	2.99	.04	.07		464	.63	2,160	50	2.8	791	7.8
Apr. 11-20.....	6,280	20	2.74	.90	3.65	--	2.49	1.77	3.05	.04	.06		443	.60	3,770	50	2.7	756	7.7
Apr. 21-30.....	4,640	22	2.89	1.07	3.96	--	2.65	1.73	3.67	.03	.05		480	.65	3,020	50	2.8	858	7.6
May 1-10	2,750	22	3.44	1.15	4.74	--	3.02	2.29	4.09	.03	.03		561	.76	2,090	51	3.1	986	7.5
May 11-20	2,120	22	3.54	1.23	4.91	--	3.03	2.60	4.23	.04	.03		589	.80	1,700	51	3.2	1,010	7.5
May 21-31	3,940	24	3.19	1.48	4.52	--	2.98	2.12	3.98	.05	.02		544	.74	2,920	49	3.0	930	7.6
June 1-10.....	5,100	22	3.04	1.40	4.44	--	3.03	1.87	3.98	.04	.02		526	.72	3,670	50	3.0	911	7.7
June 11-20.....	4,710	12	3.19	1.32	4.78	--	3.21	1.98	4.34	.04	.02		555	.75	3,530	51	3.2	975	7.4
June 21-26.....	3,490	17	3.69	1.48	4.70	--	4.05	1.94	4.17	.04	.01		580	.79	2,760	48	2.9	1,010	7.5
June 27-30.....	615	25	6.04	2.06	6.70	--	5.33	4.46	5.27	.05	.07		891	1.21	744	45	3.3	1,450	7.6
July 1-10	2,370.	22	4.69	1.89	6.39	--	4.80	3.02	5.36	.05	.05		769	1.05	2,490	49	3.5	1,300	7.6
July 11-19	2,600	29	5.94	1.81	3.87	--	6.85	2.04	2.74	.03	.02		662	.90	2,340	33	2.0	1,090	7.4
July 20-27.....	19,350	34	4.14	1.40	2.35	--	6.26	1.04	.56	.04	.02		448	.61	11,800	30	1.4	718	7.4
July 28-31	1,040	31	6.24	1.73	4.87	--	4.39	6.00	2.43	.05	.04		799	1.09	1,130	38	2.4	1,190	7.5
Aug. 1-10.....	52,540	29	4.04	1.32	2.87	--	4.93	2.54	.82	.04	.01		492	.67	35,200	38	2.4	766	7.5
Aug. 11-20.....	18,720	28	3.84	1.23	2.91	--	4.34	2.98	.79	.04	.02		490	.67	12,540	36	1.8	752	7.5
Aug. 21, 23, 27 ...	1,940	28	4.14	1.40	3.91	--	4.18	3.71	1.72	.05	.03		585	.80	1,550	41	2.4	903	7.7
Aug. 22, 24-26, 28-31.....	7,930	27	3.09	.99	2.87	--	3.85	2.06	1.07	.04	.04		423	.58	4,600	41	2.0	670	7.6
Sept. 1-10	6,540	27	3.09	.99	3.57	--	3.88	1.98	1.78	.05	.06		462	.63	4,120	47	2.5	743	7.5
Sept. 11-20	5,420	22	2.74	.99	3.91	--	3.62	2.06	2.03	.05	.04		462	.63	3,410	51	2.9	747	7.5
Sept. 21-23, 25-30.	5,130	26	2.89	.99	4.13	--	3.69	2.08	2.28	.05	.04		486	.66	3,390	52	3.0	787	7.5
Sept. 24	1,870	25	3.04	.99	1.30	--	4.65	.21	.42	--	.01		294	.40	748	24	.9	476	7.2
Total or weighted average	186,200	27	3.79	1.32	3.39	--	4.28	2.37	1.83	0.04	0.03		506	0.69	128,500	40	2.1	813	--

GILA RIVER BASIN--Continued

GILA RIVER BELOW GILLESPIE DAM, ARIZ.

LOCATION.--About 1 mile below gaging station on Gila Bend Canal which is 200 feet below Gillespie Dam, Maricopa County, and 8 miles downstream from Hassayampa River. Gila Bend Canal diverts from left bank and Enterprise Canal diverts from right bank at Gillespie Dam.
DRAINAGE AREA.--49,620 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 9,680 micromhos Nov. 6; minimum observed, 767 micromhos Sept. 28.
Percent sodium: Maximum, 69 June 11 to July 10; minimum, 38 Aug. 5-10.
EXTREMES, 1950-54.--Specific conductance: Maximum observed, 10,200 micromhos Oct. 3, 1951; minimum observed, 420 micromhos Sept.1,1951.
Percent sodium: Maximum, 69 Aug. 6-10, 1951, June 11-20, 1952, June 11 to July 10, 1954; minimum, 36 Jan. 23-24, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Samples from canal are believed to be representative of total flow passing Gillespie Dam including spill and amounts diverted into Gila Bend and Enterprise Canals. Records of separate and combined discharge for the river and canals for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	270	27	18.16	13.40	65.23	0.31	5.49	27.06	65.15	0.14	0.53	3.7	5,880	8.00	2,160	67	16	8,920	7.7
Oct. 11-20.....	268	29	18.46	13.57	66.10	.31	5.72	26.86	65.71	.14	.52	3.9	5,920	8.05	2,160	67	17	9,050	7.8
Oct. 21-31.....	311	36	18.21	13.32	68.70	.28	5.87	26.44	67.12	.15	.53	3.6	6,020	8.19	2,550	68	17	9,220	7.7
Nov. 1-10.....	333	34	19.21	12.66	68.70	.28	6.13	27.48	67.12	.14	.56	3.6	6,090	8.28	2,760	68	17	9,270	7.8
Nov. 11-20	361	34	20.01	12.34	70.88	.31	6.70	27.90	68.53	.15	.60	3.5	6,240	8.49	3,060	68	18	9,470	7.8
Nov. 21-30	383	32	19.81	12.91	69.14	.31	6.56	27.48	67.97	.14	.63	3.5	6,160	8.38	3,210	68	17	9,390	7.7
Dec. 1-10	444	30	19.81	13.08	68.27	.31	6.78	27.27	67.69	.15	.65	3.5	6,120	8.32	3,690	67	17	9,320	7.8
Dec. 11-20.....	480	32	20.41	12.66	69.57	.31	7.06	27.69	67.97	.15	.61	4.2	6,200	8.43	4,050	68	17	9,470	7.8
Dec. 21-31	641	33	19.41	12.09	65.23	.28	6.52	26.86	64.30	.15	.74	3.2	5,890	8.01	5,130	67	16	9,060	7.7
Jan. 1-10, 1954 ..	573	30	20.41	11.92	66.97	.31	6.88	27.06	65.71	.14	.68	3.3	6,020	8.19	4,690	67	17	9,220	7.8
Jan. 11-20.....	593	29	19.61	12.91	67.83	.31	6.88	27.27	67.41	.14	.68	3.5	6,100	8.30	4,920	67	17	9,300	7.9
Jan. 21	169	11	5.49	2.30	12.57	.25	2.23	5.33	12.58	--	.31	.80	1,240	1.69	286	61	6.4	2,140	7.6
Jan. 22-31	803	28	19.21	11.35	62.18	.31	6.39	24.77	62.05	.13	.68	3.2	5,620	7.64	6,130	67	16	8,660	7.8

Feb. 1-10, 1954..	722	29	19.21	12.66	63.92	.28	6.29	26.44	64.30	.14	.68	3.4	5,830	7.93	5,730	67	16	8,840	7.8
Feb. 11-20.....	712	27	19.81	13.08	66.97	.28	6.42	27.27	67.12	.13	.61	3.1	6,060	8.24	5,870	67	17	9,220	7.8
Feb. 21-28.....	559	31	20.01	12.91	66.10	.31	6.47	27.06	66.28	.13	.65	3.1	6,010	8.17	4,570	67	16	9,170	7.8
Mar. 1-10	742	29	18.81	13.49	64.79	.28	6.10	26.65	65.43	.13	.65	2.9	5,900	8.02	5,950	67	16	8,980	7.9
Mar. 11-20	722	49	18.21	13.49	65.66	.31	5.56	26.65	66.00	.13	.63	3.2	5,930	8.06	5,820	67	16	9,030	7.8
Mar. 21-25, 30-31	736	37	17.61	12.09	57.83	.28	5.90	23.94	58.10	.12	.60	3.3	5,300	7.21	5,310	66	15	8,110	7.9
Mar. 26, 29.....	416	21	5.44	2.96	12.44	.17	2.75	6.14	12.07	.05	.19	1.1	1,280	1.74	724	59	6.1	2,190	7.7
Mar. 27-28	670	19	3.69	1.15	4.22	.12	2.80	2.79	3.44	.04	.10	.24	556	.76	509	46	2.7	947	7.8
Apr. 1-10.....	809	46	18.21	13.32	60.44	.28	5.85	24.98	62.05	.13	.65	3.2	5,590	7.60	6,150	66	15	8,560	7.8
Apr. 11-20	726	31	19.61	12.91	64.79	.31	6.39	26.44	64.59	.14	.68	5.0	5,880	8.00	5,810	66	15	8,890	7.7
Apr. 21-30	664	26	19.21	13.08	65.23	.31	6.23	26.65	64.30	.13	.71	4.5	5,880	8.00	5,310	67	16	8,870	7.7
May 1-10	573	47	18.61	13.08	65.66	.31	5.77	26.65	64.59	.14	.69	4.0	5,890	8.01	4,590	67	16	8,850	7.8
May 11-20	539	25	18.21	12.75	62.18	.31	5.90	25.82	60.92	.15	.61	4.0	5,600	7.62	4,110	67	16	8,450	7.7
May 21-31	476	26	18.01	12.09	65.23	.33	5.74	26.23	62.89	.16	.55	3.2	5,750	7.82	3,720	68	17	8,760	7.8
June 1-10.....	389	26	17.42	12.09	64.36	.33	5.57	25.82	61.20	.16	.56	3.1	5,630	7.66	2,980	68	17	8,560	7.7
June 11-20.....	375	48	16.47	12.09	63.05	.33	5.01	25.40	59.79	.16	.53	3.5	5,510	7.49	2,810	69	17	8,350	7.8
June 21-30.....	341	38	16.82	11.92	64.36	.33	5.18	26.02	60.64	.15	.50	3.3	5,600	7.62	2,600	69	17	8,480	7.8
July 1-10.....	321	24	17.02	11.76	63.49	.33	5.15	26.02	60.64	.15	.50	3.3	5,570	7.58	2,430	69	17	8,440	7.7
July 11-23	395	26	16.62	12.09	63.05	.31	5.01	25.82	59.79	.15	.45	3.3	5,510	7.49	2,960	68	17	8,370	7.7
July 24	99	30	11.48	6.41	28.26	.31	7.37	10.60	27.50	.05	.07	1.7	2,710	3.69	365	61	9.4	4,340	7.2
July 25-31	2,740	31	3.94	1.48	4.91	.17	4.80	2.60	2.93	.04	.05	.29	625	.85	2,330	47	3.0	1,030	7.6

GILA RIVER BASIN--Continued

GILA RIVER BELOW GILLESPIE DAM, ARIZ.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 1-4, 1954...	290	38	15.27	9.37	46.53	0.33	5.69	19.99	45.41	0.11	0.60	2.4	4,320	5.88	1,710	65	13	6,650	7.6
Aug. 5-10.....	6,060	32	5.29	1.64	4.35	.19	4.95	4.31	2.20	.06	.01	.24	702	.95	5,760	38	2.3	1,070	7.5
Aug. 11-14, 17-20	10,250	28	4.14	1.23	4.00	.17	4.56	3.08	1.75	.05	.04	.22	575	.78	8,000	42	2.4	894	7.5
Aug. 15-16	1,380	34	5.69	1.97	7.74	.21	4.98	4.27	6.43	.06	.02	.26	943	1.28	1,770	50	3.9	1,520	7.6
Aug. 21, 24-26...	1,080	31	11.28	6.09	29.87	.28	4.39	13.45	29.33	.08	.47	1.3	2,880	3.92	4,230	63	10	4,540	7.6
Aug. 22-23.....	1,740	26	4.19	1.40	5.22	.16	3.83	3.25	3.78	.06	.06	.21	663	.90	1,570	48	3.1	1,100	7.7
Aug. 27-31.....	573	35	18.41	12.50	56.09	.33	5.75	23.32	56.69	.11	.71	2.5	5,210	7.09	4,060	64	14	7,850	7.6
Sept. 1-4, 6-10...	857	26	18.21	12.34	57.83	.33	5.60	23.73	58.38	.13	.74	2.9	5,310	7.22	6,190	65	15	8,010	7.7
Sept. 5	133	32	10.18	4.77	22.79	.28	4.23	10.08	23.41	.06	.44	.98	2,300	3.13	416	60	8.3	3,700	7.6
Sept. 11-20	686	40	18.81	12.66	61.31	.33	5.31	25.40	61.48	.14	.73	2.9	5,600	7.62	5,230	66	15	8,440	7.6
Sept. 21-24, 26, 29-30	684	32	18.01	12.34	59.57	.31	5.34	24.77	59.79	.13	.74	3.0	5,440	7.40	5,060	66	15	8,180	7.6
Sept. 25	139	16	6.74	2.96	13.26	.28	2.79	5.37	14.33	.06	.34	.42	1,380	1.88	261	57	6.0	2,330	7.5
Sept. 27-28	414	19	3.64	1.23	3.83	.15	3.47	2.35	2.85	.04	.06	.19	524	.71	294	43	2.4	872	7.7
Total or weighted average	43,630	31	10.68	6.25	30.31	0.24	5.16	13.22	29.05	0.09	0.31	1.6	2,870	3.90	170,200	64	10	4,380	--

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.--6,230 square miles above gaging station, of which 22 square miles is below Stewart Mountain Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 1,030 micromhos Apr. 1, Aug. 22; minimum observed, 773 micromhos Oct. 3, 18-19.
Percent sodium: Maximum, 66 Apr. 21-May 10; minimum, 56 Oct. 11-20, Nov. 21-30, Jan. 11-31.
EXTREMES, 1950-54.--Specific conductance: Maximum observed, 2,490 micromhos Aug. 20, 1951; minimum observed, 620 micromhos Mar. 28, 1953.
Percent sodium: Maximum, 76 July 21-31, Aug. 11-26, 1951; minimum, 53 Mar. 21-31, Apr. 11-30, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. No inflow between sampling point and gaging station except during periods of heavy local rains. Records of discharge for gaging station below Stewart Mountain Dam for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	14,850	25	2.15	0.99	4.30	--	2.59	0.85	4.15		0.02		455	0.62	9,210	58	3.4	793	7.5
Oct. 11-20	87	17	2.30	.99	4.22	--	2.62	.85	4.12		.03		448	.61	53	56	3.3	796	7.3
Oct. 21-31	9,400	17	2.25	.90	4.26	--	2.64	.85	4.12		.03		445	.61	5,730	57	3.4	791	7.4
Nov. 1-10	7,884	18	2.20	.90	4.13	--	2.52	.75	3.98		.02		452	.61	4,810	57	3.3	789	6.7
Nov. 11-20	5,520	17	2.25	.90	4.13	--	2.61	.77	4.03		.02		459	.62	3,420	57	3.3	789	6.8
Nov. 21-30	5,460	17	2.25	.90	4.13	0.10	2.59	.77	3.98		.01		451	.61	3,330	56	3.3	789	7.1
Dec. 1-10	7,030	32	2.15	.99	4.13	--	2.64	.75	4.03		.01		466	.63	4,430	57	3.3	791	7.4
Dec. 11-20	9,330	15	2.25	.80	4.22	10	2.59	.79	4.03		.02		448	.61	5,690	57	3.4	789	7.2
Dec. 21-31	16,660	13	2.20	.90	4.13	--	2.61	.75	4.03		.01		444	.60	10,000	57	3.3	783	7.3
Jan. 1-10, 1954	4,440	16	2.30	.80	4.13	--	2.56	.77	4.03		.02		450	.61	2,700	57	3.3	784	7.4
Jan. 11-20	3,000	17	2.20	1.07	4.13	--	2.64	.75	4.09		.02		452	.61	1,830	56	3.2	787	7.4
Jan. 21-31	1,380	15	2.20	1.07	4.13	--	2.61	.75	4.13		.01		458	.62	856	56	3.2	807	7.4

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GILA RIVER BASIN--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954...	3,680	14	2.30	0.90	4.83	--	2.59	0.83	4.68		0.04		474	0.64	2,360	60	3.8	854	7.8
Feb. 11-20	9,080	14	2.30	.99	5.39	--	2.59	.87	5.30		.04		514	.70	6,360	62	4.2	931	7.8
Feb. 21-28	7,280	14	2.40	.99	5.87	--	2.64	.90	5.87		.04		546	.74	5,390	63	4.5	992	7.9
Mar. 1-10	17,460	13	2.40	.99	5.91	--	2.64	.90	5.87		.04		546	.74	12,920	64	4.5	992	8.0
Mar. 11-20	21,160	15	2.40	.99	6.00	--	2.72	.92	5.75		.03		559	.76	16,080	64	4.6	1,020	7.1
Mar. 21-31.....	16,230	14	2.54	.90	6.00	--	2.72	.96	5.84		.02		572	.78	12,660	64	4.6	1,010	7.5
Apr. 1-10	8,360	19	2.50	.82	6.09	--	2.74	1.02	5.78		.03		573	.78	6,520	65	4.7	1,010	7.6
Apr. 11-20	19,160	27	2.40	.82	5.83	--	2.69	.92	5.53		.03		549	.75	14,370	64	4.6	976	7.7
Apr. 21-30	19,230	50	2.10	1.07	6.04	--	2.72	.92	5.61		.03		590	.80	15,380	66	4.8	979	8.1
May 1-10	12,820	46	2.10	1.07	6.09	--	a2.83	.92	5.73		.02		578	.79	10,130	66	4.8	991	8.3
May 11-20	12,970	15	2.50	.99	5.96	--	2.67	.92	5.75		.04		547	.74	9,600	63	4.5	994	7.6
May 21-31	18,980	15	2.45	.99	6.00	--	2.69	.92	5.78		.04		554	.75	14,240	64	4.6	997	7.7
June 1-10.....	21,990	17	2.40	.99	5.91	--	2.69	.90	5.64		.03		547	.74	16,270	64	4.5	980	7.8
June 11-20	21,950	13	2.40	.99	5.70	--	2.61	.90	5.53		.01		530	.72	15,800	63	4.4	963	7.6
June 21-30.....	21,300	12	2.40	.90	5.65	--	2.61	.90	5.56		.04		528	.72	15,340	63	4.4	960	7.6
July 1-10	15,720	13	2.40	.90	5.74	--	2.57	.90	5.58		.04		531	.72	11,320	63	4.5	966	7.6
July 11-20	16,560	15	2.40	.99	5.83	--	2.59	.92	5.64		.05		538	.73	12,090	63	4.5	977	7.6
July 21-31	20,210	17	2.40	.99	5.87	--	2.62	.90	5.73		.04		544	.74	14,960	63	4.5	988	7.7
Aug. 1-10.....	26,290	14	2.35	1.32	5.83	--	2.61	.90	5.89		.03		542	.74	19,450	61	4.3	989	7.6
Aug. 11-20	22,310	16	2.35	1.32	6.09	--	2.65	.92	6.06		.04		558	.76	16,960	62	4.5	1,010	7.5
Aug. 21-31.....	29,090	16	2.40	1.15	5.96	--	2.61	.90	6.01		.03		553	.75	21,820	63	4.5	1,000	7.5
Sept. 1-10	21,730	15	2.30	1.07	5.96	--	2.54	.92	5.98		.04		542	.74	16,080	64	4.6	983	7.5
Sept. 11-20	22,360	16	2.35	.99	6.09	--	2.59	.90	6.09		.04		556	.76	16,990	65	4.7	1,010	7.6
Sept. 21-30	14,970	15	2.40	1.07	6.17	--	2.54	.90	6.12		.03		557	.76	11,380	64	4.7	1,010	7.5
Total or weighted average	506,000	18	2.35	0.99	5.44	--	2.62	0.90	5.50		0.03		533	0.72	364,300	62	4.2	954	--

a Includes 0.13 equivalent per million of carbonate (CO_3).

VERDE RIVER BELOW BARTLETT DAM, ARIZ.

LOCATION.--At gaging station 2 1/4 miles downstream from Bartlett Dam, Maricopa County, and 3 1/2 miles upstream from Camp Creek.
DRAINAGE AREA.--6,188 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 701 micromhos Oct. 30, Nov. 3; minimum observed, 289 micromhos June 22, 25-27.
Percent sodium: Maximum 31 Nov. 1-20; minimum, 17 June 21-30.
EXTREMES, 1950-54.--Specific conductance: Maximum observed, 725 micromhos June 28, 1951; minimum observed, 234 micromhos Jan. 13, 15, 1952.
Percent sodium: Maximum, 31 July 21-31, 1951, Nov. 1-20, 1953; minimum, 12 Jan. 4-20, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ...	3,550	29	1.90	2.55	1.65	--	4.05	1.48	0.76		0.01		357	0.49	1,740	27	1.1	581	7.8
Oct. 11-20.....	13,340	23	2.00	2.63	1.70	--	4.15	1.60	.76		.01		365	.50	6,670	27	1.1	600	7.6
Oct. 21-31.....	1,930	24	2.40	3.12	1.96	--	4.92	1.81	.85		.01		425	.58	1,120	26	1.2	689	7.6
Nov. 1-10.....	1,090	47	3.12	3.12	2.26	--	a4.76	1.79	.85		.01		440	.60	654	31	1.4	668	--
Nov. 11-20.....	1,010	39	1.75	3.12	2.22	--	b4.60	1.79	.97		.01		416	.57	576	31	1.4	653	--
Nov. 21-30.....	1,030	23	2.25	3.12	1.96	--	4.83	1.75	.85		.01		409	.56	577	27	1.2	674	7.8
Dec. 1-10.....	1,080	23	2.30	3.21	1.91	--	c4.94	1.71	.82		.01		408	.55	594	26	1.2	673	--
Dec. 11-20.....	1,040	22	2.25	3.12	1.87	--	4.59	1.67	.79		.00		400	.54	562	26	1.1	661	--
Dec. 21-31.....	1,130	23	2.40	3.12	1.91	--	4.97	1.62	.82		.00		407	.55	622	26	1.2	670	7.8
Jan. 1-10, 1954 ...	1,060	21	2.30	3.04	1.83	--	d4.94	1.54	.79		.00		395	.54	572	26	1.1	654	--
Jan. 11-20.....	1,010	29	2.35	2.96	1.91	--	4.85	1.56	.79		.00		403	.55	556	26	1.2	656	8.2
Jan. 21-31.....	1,120	22	2.25	2.88	1.91	--	4.67	1.58	.76		.01		384	.52	582	27	1.2	641	8.2

a Includes 0.43 equivalents per million of carbonate (CO_3).
b Includes 0.50 equivalents per million of carbonate (CO_3).
c Includes 0.37 equivalents per million of carbonate (CO_3).
d Includes 0.33 equivalents per million of carbonate (CO_3).

GILA RIVER BASIN--Continued

VERDE RIVER BELOW BARTLETT DAM, ARIZ.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954...	992	23	2.50	2.80	1.87	--	4.90	1.56	0.76		0.01		396	0.54	536	26	1.1	658	8.2
Feb. 11-20.....	995	23	2.50	2.80	1.87	--	4.88	1.56	.76		.01		395	.54	537	26	1.1	656	8.2
Feb. 21-28.....	791	23	2.45	2.88	1.87	--	4.85	1.54	.76		.01		395	.54	427	26	1.1	649	8.2
Mar. 1-10.....	986	23	2.59	2.80	1.87	--	4.95	1.52	.73		.01		395	.54	532	26	1.1	657	--
Mar. 11-20.....	1,040	25	2.30	3.04	1.87	--	5.05	1.54	.73		.01		408	.55	572	26	1.1	656	7.9
Mar. 21-31.....	3,680	42	2.25	2.96	1.73	--	4.72	1.52	.71		.01		401	.55	2,020	25	1.1	632	7.9
Apr. 1-10.....	35,500	20	1.85	1.89	1.17	--	3.69	.90	.45		.01		281	.38	13,490	24	.9	462	7.1
Apr. 11-20.....	16,340	20	1.65	1.48	.87	--	3.02	.69	.37		.01		259	.35	5,720	22	.7	386	7.6
Apr. 21-30.....	6,920	19	1.60	1.32	.91	--	2.93	.60	.31		.02		e 217	.39	2,700	24	.8	365	7.6
May 1-10.....	3,440	17	1.60	1.40	.78	0.06	2.88	.65	.34		.01		216	.29	998	20	.6	362	7.7
May 11-20	3,490	41	1.75	1.40	1.00	.07	3.23	.58	.37		.01		280	.38	1,330	24	.8	394	7.2
May 21-31	3,760	47	1.70	1.15	1.26	.07	3.15	.62	.39		.00		284	.39	1,470	30	1.1	386	7.7
June 1-10.....	10,200	18	1.60	1.32	.74	.06	2.80	.62	.34		.02		214	.29	2,960	20	.6	352	7.7
June 11-20.....	17,410	18	1.50	1.15	.61	--	2.51	.50	.27		.02		192	.26	4,530	19	.5	316	7.7
June 21-30.....	24,550	19	1.50	.99	.52	--	2.39	.46	.25		.02		184	.25	6,140	17	.5	293	7.7
July 1-10	31,750	20	1.70	1.23	.70	--	2.88	.60	.28		.01		216	.29	9,210	19	.6	351	7.8
July 11-20	22,820	20	2.10	1.89	1.17	--	3.61	1.08	.51		.01		295	.40	9,130	23	.8	487	7.9
July 21-31	12,500	21	2.20	2.22	1.48	--	3.93	1.35	.65		.01		332	.45	5,630	25	1.0	550	8.0
Aug. 1-10.....	11,860	29	2.20	2.22	1.52	--	3.85	1.50	.65		.02		344	.47	5,570	26	1.0	553	7.9
Aug. 11-20.....	13,670	21	2.10	1.97	1.30	--	3.56	1.29	.54		.03		305	.41	5,600	24	.9	500	7.8
Aug. 21-31.....	13,640	21	2.20	1.97	1.30	--	3.65	1.27	.56		.02		308	.42	5,730	24	.9	511	7.8
Sept. 1-10	13,460	24	2.05	2.22	1.52	--	3.80	1.44	.68		.02		332	.45	6,060	26	1.0	545	7.9
Sept. 11-20	13,630	23	2.05	2.22	1.52	--	3.79	1.46	.68		.02		332	.45	6,130	26	1.0	545	7.8
Sept. 21-30	3,410	23	2.25	2.38	1.52	--	4.11	1.46	.68		.02		343	.47	1,600	25	1.0	568	7.8
Total or weighted average	295,300	22	1.90	1.81	1.13	--	3.44	1.00	0.48		0.01		281	0.38	112,200	23	0.8	.457	--

e Sum of determined constituents.

AGUA FRIA RIVER BELOW LAKE PLEASANT DAM, ARIZ.

LOCATION.--At water stage recorder on canal, 1¼ miles downstream from Lake Pleasant Dam on Agua Fria River, 19 miles north of Marinette, Maricopa County, and 23 miles upstream from New River.
DRAINAGE AREA.--1,460 square miles, approximately (above Lake Pleasant).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum observed, 600 micromhos Sept. 26; minimum observed, 370 micromhos July 19.
Percent sodium: Maximum, 29 Sept. 21-30; minimum, 23 July 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum observed, 600 micromhos Sept. 26, 1954; minimum observed, 241 micromhos Jan. 29, 1952.
Percent sodium: Maximum, 29 Sept. 21-30, 1954; minimum, 14 Jan. 29-31, Feb. 1-10, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values shown as extremes relate to canal samples only. Samples collected from canal when there was flow, otherwise from Lake Pleasant at headgates, and are those for which no discharge is shown. Records of discharge furnished by Maricopa Water District through Surface Water Branch, Tucson District for water year October 1953 to September 1954 given in WSP 1343.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 2, 9, 16, 23, 30, 1953	--	--	1.90	1.40	1.52		--	--	--		--		322	--	--	32	1.2	462	--
Nov. 6, 13, 20, 27	--	--	2.20	1.40	1.26		--	--	--		--		295	--	--	26	.9	456	--
Dec. 4, 11, 18, 25	--	--	2.00	1.48	1.48		--	--	--		--		324	--	--	30	1.1	463	--
Jan. 1, 8, 15, 22, 29, 1954	--	--	2.45	1.48	1.13		--	--	--		--		282	--	--	22	.8	467	--
Feb. 5, 12, 19, 26	--	--	2.45	1.48	1.17		--	--	--		--		283	--	--	23	.8	476	--
Mar. 5, 12, 19, 26	--	--	2.54	1.15	1.22		--	--	--		--		288	--	--	25	.9	485	--
Apr. 2, 9, 16	--	--	2.20	1.07	1.04		--	--	--		--		259	--	--	24	.8	429	--
Apr. 19-30	1,140	15	2.15	1.15	1.35	0.12	3.34	0.77	0.62		0.07		281	0.38	433	28	1.1	462	7.3
May 1-10	872	14	1.95	1.07	.96		2.95	.71	.45		.05		245	.33	288	24	.8	396	7.3
May 11-14	106	15	2.00	1.07	1.09		3.06	.71	.51		.04		250	.34	36	26	.9	414	7.4
May 21, 28, June 4	--	--	2.20	1.07	1.13		--	--	--		--		263	--	--	26	.9	436	--

GILA RIVER BASIN--Continued

AGUA FRIA RIVER BELOW LAKE PLEASANT DAM, ARIZ--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 5-10, 1954...	608	9.7	2.15	1.15	1.13		3.28	0.75	0.54		0.04		271	0.37	225	26	0.9	439	7.7
June 11-20.....	1,510	7.8	1.85	1.15	1.04		2.93	.89	.48		.03		238	.32	483	26	.8	394	7.7
June 21-30.....	2,510	13	1.95	1.07	1.00		2.97	.69	.48		.03		249	.34	853	25	.8	400	7.6
July 1-10.....	2,580	12	1.90	1.15	.96		2.93	.67	.48		.05		242	.33	851	24	.8	393	7.4
July 11-20.....	2,630	11	2.00	1.15	.96		2.98	.65	.48		.03		233	.32	842	23	.8	395	7.5
July 21-31.....	2,770	14	1.95	1.15	1.04		3.05	.65	.48		.04		243	.33	914	25	.8	401	7.6
Aug. 1-10.....	2,400	13	2.00	1.15	1.09		3.13	.67	.54		.03		247	.34	816	26	.9	414	7.6
Aug. 11-20.....	2,740	14	2.05	1.07	1.04		3.06	.67	.51		.05		247	.34	932	25	.8	410	7.5
Aug. 21-31.....	2,580	16	1.95	1.15	1.09		3.02	.69	.51		.05		248	.34	877	26	.9	406	7.5
Sept. 1-10.....	2,500	16	1.85	1.32	1.17		3.00	.85	.56		.03		252	.34	850	27	.9	421	7.2
Sept. 11-20.....	2,100	17	1.90	1.48	1.26		3.20	.81	.56		.02		260	.35	735	27	1.0	435	7.7
Sept. 21-30.....	591	19	2.00	1.48	1.39		3.62	.77	.62		.02		279	.38	225	29	1.1	473	7.5
Total or weighted average[a]	27,640	14	1.95	1.15	1.09		3.06	0.71	0.51		0.04		249	0.34	9,400	26	0.9	411	--

a No flow Oct. 1-Apr. 18, May 15-June 4.

SEVIER LAKE BASIN

SEVIER RIVER NEAR LYNNDYL, UTAH

LOCATION.--At county highway bridge, 1½ miles upstream from gaging station, which is 3½ miles southwest of Lynndyl, Millard County.
DRAINAGE AREA.--6,270 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 4,590 micromhos Jan. 3; minimum daily, 1,450 micromhos July 29.
Percent sodium: Maximum, 59 Aug. 11-20, 21-31; minimum, 43 July 27-29.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 5,630 micromhos Mar. 13, 1953; minimum daily, 1,340 micromhos Mar. 30, 1952.
Percent sodium: Maximum, 60 Sept. 11-20, 1951; minimum, 39 Oct. 5-6, 8-9, 1952.
REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1953 to September 1954 given in WSP 1344.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	1,470	21	4.79	8.80	15.26	0.19	5.46	9.24	14.05		0.04	--	1,690	2.30	3,380	53	5.9	2,780	8.0
Oct. 11-20.....	710	19	6.19	11.10	20.74	.20	5.38	12.78	19.88		.02	0.55	2,250	3.06	2,170	54	7.1	3,580	7.8
Oct. 21-31.....	736	19	6.49	11.02	20.52	.20	5.59	12.80	19.60		.02	--	2,240	3.05	2,240	54	6.9	3,560	7.9
Nov. 1-10.....	962	17	4.69	7.57	11.18	.14	5.01	7.35	11.00		.04	--	1,360	1.85	1,780	47	4.5	2,230	7.9
Nov. 11-20.....	1,270	17	4.99	8.47	12.74	.15	5.15	8.39	12.55		.03	--	1,520	2.07	2,630	48	4.9	2,490	8.1
Nov. 21-30.....	571	22	7.49	11.84	22.92	.20	6.19	14.34	22.42		.03	--	2,520	3.43	1,960	54	7.4	3,940	7.9
Dec. 1-10.....	500	24	8.03	12.25	25.18	.21	6.36	15.70	23.97		.03	--	2,720	3.70	1,850	55	7.9	4,230	8.0
Dec. 11-20.....	480	24	8.28	12.17	25.48	.21	6.75	15.70	23.69		.03	--	2,730	3.71	1,780	55	8.0	4,190	8.0
Dec. 21-31.....	436	27	7.98	12.91	27.66	.20	6.52	16.70	24.96		.06	.54	2,880	3.92	1,710	57	8.6	4,430	8.0

SEVIER LAKE BASIN--Continued

SEVIER RIVER NEAR LYNNDYL, UTAH--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Jan. 1-10, 1954	397	25	8.38	12.66	26.87	0.20	6.82	16.91	24.82		0.08	.58	2,880	3.92	1,560	56	8.3	4,350	7.9
Jan. 11-20	373	24	7.44	11.27	23.48	.18	6.23	14.32	21.43		.06	.50	2,500	3.40	1,270	55	7.7	3,840	8.1
Jan. 21-31	420	23	7.39	11.84	22.39	.19	6.13	14.45	21.43		.06	.48	2,480	3.37	1,420	54	7.2	3,910	8.0
Feb. 1-10	397	24	7.73	13.16	25.31	.20	6.10	16.43	23.97		.05	.50	2,750	3.74	1,480	55	7.8	4,270	8.0
Feb. 11-20	411	22	7.63	12.83	25.31	.21	6.15	16.07	23.97		.04	.54	2,730	3.71	1,520	55	7.9	4,280	8.0
Feb. 21-28	282	22	7.78	12.91	26.35	.23	6.23	16.41	24.54		.03	.56	2,800	3.81	1,070	56	8.2	4,360	8.0
Mar. 1-3	141	26	6.49	11.68	22.22	.22	5.39	13.70	21.43		.06	.52	2,400	3.26	460	55	7.4	3,820	7.9
Mar. 4-10	468	19	5.09	8.47	13.31	.15	5.05	8.47	12.97		.06	.31	1,560	2.12	992	49	5.1	2,540	7.8
Mar. 11, 13-19	587	19	5.09	9.37	13.39	.17	4.85	9.47	13.31		.07	.33	1,630	2.22	1,300	48	5.0	2,650	8.0
Mar. 12	75	23	6.49	11.84	21.74	.20	5.13	14.01	21.01		.06	--	2,380	3.24	243	54	7.2	3,740	7.9
Mar. 20-31	516	20	6.69	12.17	22.22	.22	5.39	13.89	21.15		.06	.49	2,400	3.26	1,680	54	7.2	3,830	7.7
Apr. 1-10	540	18	5.64	9.87	16.05	.20	5.21	10.56	16.22		.05	.38	1,870	2.54	1,370	51	5.8	3,020	7.9
Apr. 11-20	916	21	4.44	7.89	12.52	.18	4.85	7.81	12.13		.05	.30	1,450	1.97	1,800	50	5.0	2,390	7.8
Apr. 21-30	10,560	28	4.29	7.81	15.57	.19	5.46	9.06	12.83		.16	.46	1,640	2.23	23,550	56	6.3	2,640	8.1
May 1-10	12,170	26	4.39	7.98	16.00	.21	5.59	9.37	12.97		.13	.46	1,670	2.27	27,630	56	6.4	2,690	7.8
May 11-20	12,800	24	4.09	7.81	16.00	.19	5.51	9.16	12.83		.15	.46	1,650	2.24	28,670	57	6.6	2,680	8.0
May 21-31	10,400	23	4.19	7.98	16.00	.19	5.39	9.29	13.11		.13	.46	1,660	2.26	23,500	56	6.5	2,700	7.9
June 1-10	4,020	22	4.24	8.31	16.18	.20	5.29	9.49	13.82		.13	.48	1,700	2.31	9,290	56	6.4	2,700	8.1
June 11-20	6,000	23	3.99	8.14	16.18	.20	5.15	9.35	13.48		.14	.47	1,670	2.27	13,620	57	6.6	2,680	8.0
June 21-30	12,360	23	3.99	8.22	16.78	.21	5.16	9.68	14.16		.15	.48	1,730	2.35	29,050	57	6.8	2,730	8.0
July 1-10	11,470	23	3.84	8.39	17.09	.21	5.11	9.74	14.33		.15	.47	1,740	2.37	27,180	58	6.9	2,770	8.1
July 11-20	8,350	26	3.69	8.47	16.87	.22	5.20	9.58	13.68		.12	.31	1,710	2.33	19,460	58	6.8	2,810	7.9
July 21-26, 30-31	3,130	22	3.89	8.39	16.78	.23	5.06	9.74	14.52		.09	.30	1,740	2.37	7,420	57	6.8	2,840	8.1
July 27-29	883	18	2.99	5.67	6.52	.15	4.59	3.98	6.54		.05	.11	867	1.18	1,040	43	3.1	1,500	7.8

Aug. 1-10, 1954	7,050	21	3.64	8.72	17.44	.22	5.11	9.89	14.38		.12	.30	1,760	2.39	16,850	58	7.0	2,870	8.0
Aug. 11-20.....	5,120	21	3.64	8.55	18.18	.22	5.00	10.37	15.09		.12	.30	1,820	2.48	12,700	59	7.4	2,970	8.0
Aug. 21-31.....	7,350	20	3.44	8.88	18.22	.25	4.95	10.35	15.09		.11	.31	1,810	2.46	18,080	59	7.3	2,960	8.0
Sept. 1-10.....	4,270	23	3.74	8.47	17.18	.21	5.10	10.03	14.95		.11	.49	1,780	2.42	10,330	58	7.0	2,850	8.1
Sept. 11-20.....	1,770	17	3.99	8.14	14.61	.18	4.83	8.70	13.20		.06	.47	1,570	2.14	3,790	54	5.9	2,570	8.1
Sept. 21-30.....	1,670	17	4.09	8.22	14.83	.16	4.87	8.95	13.40		.06	.37	1,600	2.18	3,640	54	6.0	2,580	7.9
Total or weighted average	132,000	23	4.19	8.39	16.70	0.20	5.28	9.72	14.07		0.12	0.42	1,730	2.35	311,500	57	6.7	2,800	--

HUMBOLDT RIVER BASIN

HUMBOLDT RIVER NEAR RYE PATCH, NEV.

LOCATION.--Below Rye Patch Dam, 1,000 feet upstream from gaging station, and 2 miles northwest of Rye Patch, Pershing County.
DRAINAGE AREA.--13,700 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1951 to September 1954.
Water temperatures: December 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 4,010 micromhos Sept. 2; minimum daily, 1,020 micromhos June 27.
Percent sodium: Maximum, 71 Sept. 1-5; minimum, 59 May 21-31, June 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 4,010 micromhos Sept. 2, 1954; minimum daily, 784 micromhos Dec. 31, 1951, Sept. 10, 1952.
Percent sodium: Maximum, 71 Sept. 1-5, 1954; minimum, 48 Aug. 11-20, Sept. 1-10, 11-20, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Discharge records for gaging station near Rye Patch for water year October 1953 to September 1954 given in WSP 1344. No appreciable inflow between gaging station and sampling point except during periods of local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	3,110	52	2.15	1.97	7.00	0.51	a6.00	2.25	3.36		0.01	--	696	0.94	2,920	60	4.9	1,120	8.3
Oct. 11-20	1,830	51	2.20	1.97	7.00	.51	5.90	2.31	3.36		.01	0.66	692	.93	1,700	60	4.8	1,110	8.2
Oct. 21-31	124	48	2.15	1.89	7.13	.51	5.93	2.27	3.33		.01	--	694	.94	117	61	5.0	1,110	8.2
Nov. 1-10	708	46	2.15	1.89	7.13	.51	5.90	2.27	3.36		.01	--	697	.94	666	61	5.0	1,110	8.2
Nov. 11-20	504	51	2.10	1.89	7.00	.49	a5.88	2.19	3.41		.01	--	702	.95	479	61	5.0	1,110	8.6
Nov. 21-30	260	51	2.10	1.89	7.00	.49	5.87	2.19	3.41		.01	--	701	.95	247	61	5.0	1,110	8.2
Dec. 1-10	256	49	2.15	1.89	7.00	.49	a5.84	2.19	3.41		.01	--	700	.95	243	61	4.9	1,110	8.3
Dec. 11-20	585	48	2.10	1.89	7.04	.51	a5.85	2.19	3.44		.01	--	702	.95	556	61	5.0	1,110	8.3
Dec. 21-24	162	48	2.15	1.89	7.04	.49	a5.85	2.19	3.50		.00	--	704	.96	156	61	5.0	1,110	8.4
Mar. 22-31, 1954	3,210	48	2.10	2.06	7.31	.49	a5.94	2.29	3.55		.00	.73	721	.98	3,150	61	5.0	1,140	8.3
Apr. 1-10	3,780	49	2.10	2.14	7.31	.51	a5.90	2.31	3.61		.00	.70	724	.98	3,700	61	5.0	1,140	8.2
Apr. 11-20	6,220	48	2.10	2.06	7.17	.51	a5.91	2.31	3.67		.00	.71	724	.98	6,100	61	4.9	1,150	8.3
Apr. 21-30	9,100	43	2.15	2.06	7.17	.46	a5.81	2.25	3.61		.00	.67	708	.96	8,740	61	4.9	1,130	8.3
May 1-10	8,630	36	2.20	1.97	7.04	.46	a5.75	2.21	3.50		.00	.66	698	.95	8,200	60	4.9	1,110	8.4
May 11-20	9,030	37	2.20	1.97	6.91	.46	a5.75	2.25	3.47		.01	.79	692	.94	8,490	60	4.8	1,100	8.2
May 21-31	8,070	36	2.30	1.97	6.78	.46	a5.61	2.19	3.38		.01	.73	676	.92	7,420	59	4.6	1,080	8.2

aIncludes equivalent of carbonate.

June 1-10, 1954 ...	3,820	36	2.20	1.97	6.87	.46	5.60	2.27	3.38		.01	.74	676	.92	3,510	60	4.7	1,070	8.1
June 11-20	2,810	36	2.20	2.06	6.78	.46	a 5.57	2.25	3.41		.01	.73	679	.92	2,590	59	4.6	1,080	8.2
June 21-30	7,070	47	1.95	1.97	6.91	.43	5.41	2.31	3.44		.01	.51	670	.91	6,430	61	4.9	1,090	8.0
July 1-10	9,560	48	2.10	1.89	7.09	.46	5.51	2.33	3.55		.01	.51	690	.94	8,990	61	5.0	1,110	8.0
July 11-20	8,210	48	2.15	1.97	7.13	.51	5.60	2.39	3.78		.02	.51	713	.97	7,960	61	5.0	1,150	7.9
July 21-31	3,020	49	2.20	2.06	7.57	.51	5.64	2.58	4.34		.01	.60	762	1.04	3,140	61	5.2	1,230	8.1
Aug. 1-10.....	1,670	51	2.10	2.14	8.13	.56	5.67	2.66	4.91		.01	.64	796	1.08	1,800	63	5.6	1,300	8.0
Aug. 11-20.....	3,930	53	2.15	2.38	9.44	.59	5.77	2.81	5.58		.03	.87	878	1.19	4,680	65	6.3	1,390	8.1
Aug. 21-23, 26-27.	2,350	58	2.30	2.71	11.13	.69	6.10	3.14	7.25		.02	1.1	1,010	1.37	3,220	66	7.0	1,620	8.1
Aug. 29, 31.....	1,190	60	2.69	3.37	15.74	.92	6.65	3.79	12.24		.02	--	b 1,370	1.86	2,210	69	9.0	2,270	8.1
Sept. 1-5	1,180	56	5.29	4.36	26.18	1.20	8.26	3.83	24.96		.04	3.4	2,190	2.98	3,520	71	12	3,680	7.7
Total or weighted average	c 100,400	45	2.20	2.06	7.61	0.51	a 5.56	2.37	4.09		0.01	0.72	740	1.01	101,400	61	5.2	1,190	--

a Includes equivalent of carbonate.
b Sum of determined constituents.
c Represents 97 percent of runoff for water year October 1953 to September 1954.

PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA

SAN JOAQUIN RIVER BASIN

SAN JOAQUIN RIVER NEAR BIOLA, CALIF.

LOCATION.--At Skaggs Bridge, 1.9 miles upstream from gaging station, and about 2.5 miles northwest of Biola, Fresno County.
DRAINAGE AREA.--1,805 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1952 to September 1954.
Water temperatures: November 1952 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 124 micromhos Apr. 3; minimum daily, 36.1 micromhos Oct. 12.
Percent sodium: Maximum, 44 Feb. 1-10, Mar. 11-20, May 21-31; minimum, 31 Oct. 11-20, May 11-20.
EXTREMES, 1952-54.--Specific conductance: Maximum daily, 170 micromhos Jan. 3, 1953; minimum daily, 36.1 micromhos Oct. 12, 1953.
Percent sodium: Maximum, 49 Nov. 1-5, 7-10, 1952; minimum, 30 Jan. 3-13, 1953.
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 1953 to September 1954 given in WSP 1345. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953....	16,040	6.4	0.15	0.13	0.15	0.02	0.30	0.04	0.11	0.01	0.02	0.10	35	0.05	802	33	0.4	42.2	6.6
Oct. 11-20.....	16,500	7.5	.15	.13	.14	.02	.28	.04	.10	.01	.01	.08	34	.05	825	31	.4	39.5	6.8
Oct. 21-31.....	12,630	7.7	.18	.10	.18	.03	.33	.04	.11	.01	.01	.03	35	.05	632	37	.5	43.9	6.9
Nov. 1-10.....	9,510	8.8	.20	.10	.20	.03	.31	.05	.15	.01	.01	.08	38	.05	476	38	.5	51.3	6.8
Nov. 11-20.....	7,120	8.4	.22	.10	.24	.01	.38	.04	.17	.00	.00	.06	44	.06	427	41	.6	56.8	6.9
Nov. 21-30.....	3,810	5.8	.30	.14	.27	.03	.52	.04	.15	.01	.02	.03	51	.07	267	36	.6	75.3	6.8
Dec. 1-10.....	4,520	6.4	.27	.13	.24	.03	.46	.04	.16	.01	.02	.02	48	.07	316	35	.5	69.5	7.0
Dec. 11-20.....	5,170	6.6	.26	.12	.25	.03	.44	.05	.17	.01	.02	.05	47	.06	310	38	.6	68.2	7.0
Dec. 21-31.....	3,840	10	.31	.11	.30	.03	.51	.05	.17	.01	.03	.06	54	.07	269	40	.7	76.2	7.1
Jan. 1-10, 1954 ...	6,890	6.5	.25	.12	.22	.04	.41	.04	.18	.01	.01	.09	45	.06	413	35	.5	63.2	7.2
Jan. 11-20.....	7,640	6.2	.22	.12	.22	.04	.38	.04	.17	.01	.01	.09	42	.06	458	37	.5	60.8	7.2
Jan. 21, 26-29.....	3,020	--	.27	.17	.27	.03	.44	.05	.23	--	.00	--	65	.09	272	36	.6	75.3	6.9
Jan. 22-25, 30-31..	5,170	--	.22	.09	.22	.03	.38	.05	.15	--	.00	--	55	.07	362	39	.6	55.3	7.0

Feb. 1-10, 1954...	9,680	8.5	.22	.07	.26	.03	.36	.05	.18	.01	.01	.08	41	.06	581	44	.7	60.4	6.8
Feb. 11-15.....	5,820	--	.24	.08	.22	.04	.39	.05	.15	--	.00	--	44	.06	349	38	.6	65.8	7.0
Feb. 16-20.....	1,480	--	.36	.13	.34	.04	.62	.08	.19	--	.02	--	66	.09	133	39	.7	96.5	7.2
Feb. 21-28.....	1,960	13	.37	.18	.38	.05	.67	.09	.21	.02	.02	.13	66	.09	176	39	.7	97.7	7.0
Mar. 1-10.....	2,280	12	.34	.17	.38	.05	.67	.07	.19	.02	.01	.09	64	.09	205	40	.7	93.3	7.1
Mar. 11-20	2,330	9.6	.33	.15	.42	.04	.62	.09	.20	.01	.03	.04	63	.09	210	44	.9	91.6	7.1
Mar. 21-31	2,610	10	.41	.17	.44	.04	.75	.09	.21	.01	.01	.04	71	.10	261	41	.8	116	7.4
Apr. 1-10.....	2,430	5.5	.43	.21	.44	.05	.79	.09	.21	.02	.01	.09	76	.10	243	39	.8	112	7.0
Apr. 11-20.....	2,870	7.1	.31	.17	.38	.04	.62	.06	.18	.01	.02	.11	52	.07	201	42	.8	87.7	7.2
Apr. 21-30.....	9,200	8.0	.24	.12	.24	.04	.41	.04	.15	.02	.02	.15	49	.07	644	37	.6	66.0	6.6
May 1-10	24,830	11	.22	.14	.20	.04	.38	.04	.15	.02	.01	.09	46	.06	1,490	33	.5	57.2	6.7
May 11-20	33,520	9.2	.22	.14	.18	03	.38	.05	.13	.02	.00	.12	46	.06	2,010	31	.4	52.8	6.8
May 21-31.....	18,480	12	.24	.11	.30	04	.43	.06	.15	.02	.00	.08	48	.07	1,290	44	.7	67.8	6.7
June 1-10	4,330	11	.27	.11	.30	.05	.52	.05	.16	.02	.02	.08	53	.07	303	41	.7	75.6	6.7
June 11-20	3,190	11	.28	.17	.30	.05	.59	.05	.16	.02	.01	.10	56	.08	255	37	.6	76.8	7.0
June 21-30.....	2,350	11	.31	.18	.31	.05	.62	.05	.16	.03	.00	.04	57	.08	188	37	.6	79.5	7.0
July 1-10.....	2,190	11	.31	.14	.32	.04	.62	.05	.15	.02	.00	.04	58	.08	175	39	.7	82.0	7.1
July 11-20.....	2,170	12	.29	.18	.30	.04	.59	.05	.15	.01	.02	.09	54	.07	152	37	.6	79.3	7.2
July 21-31.....	2,220	11	.28	.17	.29	.04	.59	.05	.14	.02	.01	.08	55	.07	155	37	.6	75.5	7.1
Aug. 1-10.....	2,430	10	.28	.16	.28	.04	.56	.05	.15	.02	.01	.08	52	.07	170	37	.6	74.1	7.1
Aug. 11-20.....	2,230	11	.24	.15	.29	.04	.56	.05	.13	.02	.02	.03	54	.07	156	40	.7	76.5	6.8
Aug. 21-31.....	2,540	11	.25	.13	.30	.04	.54	.06	.12	.02	.01	.00	54	.07	178	41	.7	74.9	6.7
Sept. 1-10	2,320	12	.20	.18	.29	.04	.54	.05	.12	.02	.02	.04	53	.07	162	41	.7	73.3	6.7
Sept. 11-20.....	2,220	11	.26	.18	.27	.03	.57	.05	.12	.01	.00	.06	50	.07	155	37	.6	71.4	7.0
Sept. 21-30.....	1,780	11	.29	.15	.28	.03	.57	.05	.13	.01	.01	.03	53	.07	125	37	.6	73.7	7.1
Total or weighted average[a]	249,300	b9.0	0.23	0.13	0.23	0.03	0.41	0.05	0.14	b0.01	0.01	b0.08	46	0.06	14,960	37	0.6	61.4	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.
b Represents 94 percent of runoff for water year October 1953 to September 1954.

SAN JOAQUIN RIVER BASIN--Continued

SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.

LOCATION.--At gaging station at Durham Ferry highway bridge, 3 miles downstream from Stanislaus River, and 3.4 miles northeast of Vernalis, San Joaquin County.
DRAINAGE AREA.--14,010 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 1,090 micromhos July 30; minimum daily, 87.9 micromhos May 21.
Percent sodium: Maximum, 56 Jan. 21-31; minimum, 34 May 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 1,090 micromhos July 30, 1954; minimum daily, 60.0 micromhos June 21, 1953.
Percent sodium: Maximum, 56 Jan. 21-31, 1954; minimum, 34 Apr. 1-10, May 1-10, 1952, May 11-20, 1954.
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 1953 to September 1954 given in WSP 1345.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	29,040	25	1.75	1.15	3.00	0.10	2.21	0.81	2.79	0.01	0.03	0.24	377	0.51	14,810	50	2.5	622	7.4
Oct. 11-20.....	38,440	18	1.40	.90	2.44	.07	1.66	.79	2.26	.01	.03	.19	306	.42	16,140	51	2.3	507	7.3
Oct. 21-31.....	32,730	28	1.70	1.23	3.00	.09	1.85	.96	3.02	.01	.02	.17	371	.50	16,360	50	2.5	625	7.3
Nov. 1-10.....	31,080	13	1.65	1.15	2.83	.09	1.79	.90	2.88	.01	.02	.17	355	.48	14,920	49	2.4	604	7.3
Nov. 11-20	33,640	26	1.65	1.15	2.70	.07	1.79	.87	2.85	.01	.02	.14	350	.48	16,150	48	2.3	600	7.3
Nov. 21-30	34,180	22	1.55	.99	2.44	.06	1.75	.79	2.51	.00	.02	.15	323	.44	15,040	48	2.2	548	7.5
Dec. 1-10.....	37,800	25	1.50	.90	2.61	.09	1.70	.87	2.57	.01	.02	.11	331	.45	17,010	51	2.4	556	7.5
Dec. 11-20	34,080	15	1.45	1.23	2.78	.08	1.74	.92	2.79	.01	.03	.19	347	.47	16,020	50	2.4	587	7.9
Dec. 21-31	36,460	14	1.45	1.15	2.83	.08	1.69	.94	2.82	.01	.03	.17	356	.48	17,500	51	2.5	585	7.4
Jan. 1-10, 1954 ..	30,230	13	1.55	1.15	2.91	.08	1.70	1.00	3.05	.01	.02	.20	355	.48	14,510	51	2.5	613	7.4
Jan. 11-20.....	30,110	12	1.70	1.23	3.26	.08	1.84	1.19	3.19	.01	.03	.22	389	.53	15,960	52	2.7	664	7.5
Jan. 21-31.....	41,510	19	1.40	.90	3.04	.08	1.75	1.04	2.62	.01	.03	.19	350	.48	19,920	56	2.8	573	7.2

Feb. 1-10, 1954..	33,580	22	1.50	1.15	2.91	.08	1.80	1.06	2.68	.01	.03	.21	371	.50	16,790	52	2.5	590	7.6
Feb. 11-14, 16...	19,340	--	1.50	1.07	3.09	.09	1.74	1.08	2.79	--	.04	--	355	.48	9,280	54	2.7	600	7.4
Feb. 15, 17-20...	34,060	--	1.25	.82	2.26	.08	1.54	.87	1.97	--	.03	--	284	.39	13,280	51	2.2	473	7.4
Feb. 21-28.....	44,010	20	1.30	.99	2.26	.08	1.59	.83	2.06	.01	.03	.21	292	.40	17,600	49	2.1	477	7.5
Mar. 1-5	18,050	29	1.35	.99	2.26	.07	1.54	.83	2.23	.01	.02	.23	294	.40	7,220	48	2.1	532	7.5
Mar. 6-10	8,620	35	2.15	1.56	3.78	.09	2.06	1.12	4.29	.01	.05	.28	497	.68	5,860	50	2.8	832	7.7
Mar. 11, 15-16 ..	17,890	--	.90	.58	1.35	.05	1.02	.44	1.38	--	.01	--	186	.25	4,470	47	1.6	311	7.4
Mar. 12-13, 18-19	55,910	--	.44	.30	.52	.04	.59	.17	.51	--	.01	--	89	.12	6,710	40	.9	140	7.3
Mar. 14, 17, 20..	32,730	--	.60	.40	.83	.04	.75	.31	.85	--	.01	--	126	.17	5,560	44	1.2	232	7.4
Mar. 21-31	141,000	19	.60	.40	.87	.04	.88	.27	.76	.01	.03	.11	128	.17	23,970	46	1.2	209	7.1
Apr. 1-10.....	123,900	8.9	.65	.42	.83	.04	.88	.27	.73	.02	.02	.12	124	.17	21,060	43	1.1	202	7.0
Apr. 11-20.....	81,320	10	.75	.47	1.00	.04	.93	.33	.96	.01	.02	.12	146	.20	16,260	44	1.3	238	7.1
Apr. 21-30.....	95,800	12	.55	.36	.65	.05	.72	.20	.71	.01	.02	.09	114	.16	15,330	40	1.0	174	6.9
May 1, 7-10	66,820	--	.49	.27	.57	.04	.66	.18	.54	--	.01	--	100	.14	9,350	41	.9	144	7.3
May 2-6	49,130	--	.70	.35	.78	.05	.93	.23	.73	--	.02	--	134	.18	8,840	41	1.1	200	7.4
May 11-20	173,800	6.6	.38	.31	.38	.04	.57	.12	.40	.01	.01	.05	77	.10	17,380	34	.6	116	7.1
May 21-24	74,360	--	.36	.20	.42	.04	.52	.12	.34	--	.00	--	102	.14	10,410	41	.8	104	6.9
May 25-26	20,370	--	.70	.38	1.00	.05	.88	.35	.82	--	.00	--	136	.18	3,670	47	1.4	220	7.4
May 27-31	28,480	--	1.15	.75	1.78	.07	1.43	.54	1.64	--	.02	--	219	.30	8,540	48	1.8	379	7.8

SAN JOAQUIN RIVER BASIN--Continued

SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 1-10, 1954	33,240	24	1.80	1.07	2.91	0.09	2.02	0.92	2.93	0.02	0.02	0.20	378	0.51	16,950	50	2.4	622	7.4
June 11-20	26,900	27	1.90	1.32	3.22	.11	2.28	.96	3.44	.02	.03	.21	417	.57	15,330	49	2.5	687	7.1
June 21-30	16,370	30	2.25	1.81	4.26	.14	2.54	1.21	4.79	.02	.05	.24	552	.75	12,280	50	3.0	888	7.1
July 1-10	14,450	30	2.59	1.48	4.04	.14	2.67	1.21	4.51	.02	.03	.28	a 499	.68	9,830	49	2.8	857	7.3
July 11-20	11,030	30	2.79	1.73	4.04	.14	2.62	1.15	4.85	.02	.04	.23	554	.75	8,270	46	2.7	886	7.4
July 21-31	7,850	31	2.94	1.81	4.65	.14	2.75	1.17	5.58	.01	.04	.31	633	.86	6,750	49	3.0	980	7.5
Aug. 1-10	7,630	31	2.74	2.14	4.52	.14	2.79	1.21	5.22	.01	.06	.30	607	.83	6,330	47	2.9	953	7.6
Aug. 11-20	11,100	32	2.50	1.89	4.52	.14	2.82	1.29	4.65	.01	.02	.31	548	.75	8,320	50	3.0	903	7.5
Aug. 21-31	14,870	31	2.35	1.75	4.44	.11	2.82	1.23	4.23	.01	.05	.29	514	.70	10,410	51	3.1	886	7.4
Sept. 1-10	13,270	32	2.45	1.75	4.44	.12	2.82	1.21	4.37	.01	.05	.30	522	.71	9,420	51	3.1	898	7.3
Sept. 11-20	14,980	34	2.40	1.60	4.44	.13	2.87	1.17	4.37	.02	.06	.31	522	.71	10,640	52	3.1	893	7.4
Sept. 21-30	16,610	34	2.35	1.75	4.35	.10	2.84	1.21	4.17	.02	.04	.30	510	.69	11,460	51	3.0	872	7.4
Total or weighted average [b]	1,717,000	[c] 17	1.05	0.73	1.74	0.06	1.29	0.56	1.72	[c] 0.01	0.02	[c] 0.15	232	0.32	549,400	49	1.7	381	--

a Sum of determined constituents.
b Represents 100 percent of runoff for water year October 1953 to September 1954.
c Represents 77 percent of runoff for water year October 1953 to September 1954.

MOKELUMNE RIVER AT WOODBRIDGE, CALIF.

LOCATION.--At dam of Woodbridge Irrigation District, San Joaquin County, 0.4 mile upstream from gaging station at Woodbridge.
DRAINAGE AREA.--644 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 84.6 micromhos Dec. 5; minimum daily, 36.2 micromhos Oct. 2.
Percent sodium: Maximum, 28 Jan. 1-10, Apr. 11-20; minimum, 17 Oct. 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 202 micromhos Dec. 15, 1952; minimum daily, 29.4 micromhos July 9, 1952.
Percent sodium: Maximum, 33 Nov. 21-30, 1952; minimum, 10 Dec. 22-23, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1953 to September 1954 given in WSP 1345.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	5,620	8.6	0.18	0.10	0.10	0.03	0.31	0.06	0.03	0.01	0.00	0.11	32	0.04	225	25	0.3	59.1	6.8
Oct. 11-20	6,360	8.6	.19	.17	.08	.02	.33	.06	.08	.01	.01	.09	33	.04	254	17	.2	39.4	6.8
Oct. 21-31	7,730	9.1	.20	.12	.10	.03	.33	.06	.08	.01	.01	.03	34	.05	386	23	.3	42.8	6.7
Nov. 1-10	7,440	9.9	.19	.13	.09	.02	.31	.04	.08	.00	.00	.02	39	.05	372	21	.2	42.5	6.9
Nov. 11-18	7,420	6.2	.20	.14	.09	.03	.31	.05	.09	.00	.01	.00	34	.05	371	19	.2	42.0	6.9
Dec. 1-4, 6-10	9,720	5.0	.22	.14	.09	.03	.26	.05	.15	.00	.01	.05	36	.05	486	19	.2	47.9	6.6
Dec. 5	1,280	--	--	--	.08	.04	.16	--	.16	--	--	--	--	--	--	--	--	84.6	6.2
Dec. 11-20	10,030	6.8	.22	.14	.09	.02	.30	.05	.12	.00	.01	.02	35	.05	502	19	.2	47.3	6.9
Dec. 21-31	11,010	4.7	.22	.11	.12	.02	.31	.07	.07	.00	.00	.03	33	.04	440	26	.3	44.3	7.2
Jan. 1-10, 1954	11,010	6.6	.20	.12	.14	.02	.33	.05	.06	.01	.01	.07	31	.04	440	28	.3	42.9	7.2
Jan. 11-20	9,300	3.6	.22	.16	.09	.02	.33	.06	.08	.01	.00	.06	35	.05	465	18	.2	46.9	7.0
Jan. 21-31	8,740	5.7	.22	.14	.14	.02	.31	.09	.11	.01	.00	.06	36	.05	437	27	.3	54.9	6.8
Feb. 1-10	9,110	8.1	.24	.12	.14	.02	.33	.08	.08	.01	.00	.05	38	.05	456	26	.3	53.0	6.8
Feb. 11-20	10,050	7.1	.24	.11	.12	.02	.34	.09	.06	.01	.01	.04	40	.05	502	25	.3	54.8	7.2
Feb. 21-28	7,350	8.7	.24	.14	.12	.02	.38	.07	.08	.01	.00	.04	42	.06	441	24	.3	55.8	7.2
Mar. 1-10	8,610	11	.25	.15	.12	.03	.36	.08	.11	.01	.01	.06	45	.06	517	22	.3	57.9	6.8
Mar. 11-20	9,340	8.9	.25	.15	.15	.02	.36	.09	.12	.01	.01	.05	44	.06	560	26	.3	55.6	6.8
Mar. 21-31	9,080	15	.26	.16	.12	.02	.36	.09	.09	.01	.01	.06	43	.06	545	22	.3	55.4	6.9

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SAN JOAQUIN RIVER BASIN--Continued

MOKELUMNE RIVER AT WOODBRIDGE, CALIF.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-10, 1954...	16,830	11	0.24	0.18	0.12	0.02	0.38	0.08	0.07	0.01	0.01	0.10	42	0.06	1,010	22	0.3	51.5	6.9
Apr. 11-20	14,550	7.4	.24	.12	.15	.03	.38	.06	.08	.01	.01	.02	42	.06	873	28	.3	51.3	6.9
Apr. 21-30	16,240	10	.24	.16	.12	.03	.38	.06	.09	.01	.00	.04	42	.06	974	22	.3	49.9	7.0
May 1-10.....	13,640	7.6	.24	.16	.12	.03	.38	.06	.11	.01	.01	.05	43	.06	818	22	.3	53.1	7.0
May 11-20	18,940	8.3	.24	.12	.09	.03	.38	.06	.07	.01	.00	.08	40	.05	947	18	.2	49.6	6.9
May 21-31	15,190	9.6	.25	.14	.12	.03	.39	.06	.08	.00	.00	.03	38	.05	760	22	.3	48.1	6.9
June 1-10.....	1,940	9.1	.24	.12	.12	.03	.38	.06	.08	.00	.00	.04	37	.05	97	24	.3	49.8	6.9
June 11-20.....	1,030	11	.24	.14	.11	.03	.39	.05	.08	.00	.00	.06	38	.05	52	21	.3	46.7	6.9
June 21-30.....	734	13	.22	.16	.11	.03	.39	.05	.08	.00	.00	.08	38	.05	37	21	.3	49.9	7.0
July 1-10.....	752	13	.23	.19	.11	.03	.43	.05	.08	.00	.00	.05	41	.06	45	20	.2	60.0	7.0
July 11-20	778	11	.22	.16	.10	.03	.36	.04	.08	.01	.00	.07	37	.05	39	20	.2	45.1	6.9
July 21-31	543	12	.22	.18	.10	.03	.39	.04	.08	.00	.00	.08	38	.05	27	20	.2	46.6	7.0
Aug. 1-10.....	664	10	.21	.13	.12	.04	.36	.05	.07	.01	.00	.00	36	.05	33	24	.3	43.9	7.0
Aug. 11-20.....	1,390	12	.20	.16	.10	.03	.36	.05	.06	.00	.01	.00	37	.05	70	21	.2	43.2	7.4
Aug. 21-31	2,680	11	.19	.15	.10	.02	.34	.04	.06	.01	.02	.10	36	.05	134	21	.2	45.7	6.8
Sept. 1-10	2,730	11	.18	.10	.10	.02	.33	.03	.04	.01	.00	.00	34	.05	136	25	.3	39.1	6.9
Sept. 11-20	3,970	11	.20	.08	.10	.02	.33	.04	.04	.01	.00	.00	34	.05	198	24	.3	38.4	7.0
Sept. 21-30	4,160	11	.18	.12	.09	.02	.33	.04	.05	.01	.00	.00	33	.04	166	23	.2	39.2	6.6
Total or weighted average[a]	266,000	8.5	0.23	0.14	0.11	0.02	0.34	0.06	0.08	0.01	0.00	0.05	38	0.05	13,230	22	0.3	49.5	--

a Represents 95 percent of runoff for water year October 1953 to September 1954.

SACRAMENTO RIVER BASIN

SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.

LOCATION.--At Southern Pacific Railroad bridge, at Knights Landing, Yolo County, just downstream from gaging station and about 34 miles upstream from Sacramento.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 346 micromhos June 10; minimum daily, 99.8 micromhos Jan. 19.
Percent sodium: Maximum, 40 June 1-10, 11-20; minimum, 18 Mar. 1-10.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 447 micromhos Sept. 9, 1952; minimum daily, 99.1 micromhos Mar. 17, 1952.
Percent sodium: Maximum, 46 May 12, 19, 21, 23-29, 1953; minimum, 15 Dec. 21-23, 29, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1953 to September 1954 given in WSP 1345. Considerable inflow during irrigation season of irrigation waste water from drainage canal about 0.3 mile above sampling site. Mixing not complete at sampling site.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	144,000	24	0.70	0.67	0.61	0.04	1.49	0.27	0.22	0.01	0.01	0.13	127	0.17	24,480	30	0.7	198	7.5
Oct. 11-20	144,000	22	.65	.60	.48	.04	1.31	.25	.23	.01	.01	.11	118	.16	23,040	27	.6	173	7.6
Oct. 21-31	159,200	28	.70	.56	.57	.04	1.31	.25	.25	.01	.00	.10	118	.16	25,470	30	.7	178	7.4
Nov. 1-10	145,900	25	.65	.61	.52	.03	1.34	.21	.22	.00	.00	.08	119	.16	23,340	29	.7	177	7.4
Nov. 11-20	172,600	22	.65	.58	.57	.03	1.23	.27	.27	.01	.00	.08	128	.17	29,340	31	.7	178	7.3
Nov. 21-30	198,600	26	.65	.51	.52	.04	1.23	.23	.24	.01	.01	.11	115	.16	31,780	30	.7	174	7.4
Dec. 1-10	191,300	17	.65	.51	.42	.04	1.25	.19	.21	.01	.02	.06	112	.15	28,700	26	.6	162	7.8
Dec. 11-20	173,100	26	.65	.54	.44	.04	1.28	.20	.22	.01	.01	.11	119	.16	27,700	26	.6	172	7.7
Dec. 21-31	178,800	15	.75	.55	.52	.03	1.34	.23	.25	.01	.01	.11	119	.16	28,610	28	.6	177	7.8
Jan. 1-10, 1954	141,700	15	.70	.63	.57	.04	1.41	.23	.27	.01	.00	.07	125	.17	24,090	29	.7	187	7.7
Jan. 11-16	83,860	--	.75	.67	.70	.04	1.51	.33	.37	--	.01	--	168	.23	19,290	32	.8	224	7.5
Jan. 17-20	149,900	--	.55	.44	.28	.04	1.02	.15	.16	--	.01	--	124	.17	25,480	22	.4	136	7.3
Jan. 21-31	517,300	22	.55	.36	.30	.03	.98	.15	.13	.01	.02	.13	107	.15	77,600	24	.4	132	7.2

SACRAMENTO RIVER BASIN--Continued

SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954	460,800	22	0.60	0.42	0.30	0.03	1.10	0.15	0.14	0.01	0.01	0.09	97	0.13	59,900	22	0.4	146	7.4
Feb. 11-20	460,000	23	.60	.38	.28	.04	1.02	.16	.14	.01	.01	.06	103	.14	64,400	22	.4	135	7.3
Feb. 21-28	362,200	23	.60	.44	.27	.04	1.08	.15	.13	.01	.01	.07	96	.13	47,090	20	.4	137	7.3
Mar. 1-10	322,100	28	.70	.51	.28	.04	1.23	.17	.13	.01	.01	.09	106	.14	45,090	18	.4	149	7.5
Mar. 11-20	420,500	25	.60	.42	.28	.02	1.05	.16	.13	.01	.01	.09	95	.13	54,660	21	.4	128	7.5
Mar. 21-31	432,400	18	.65	.48	.29	.03	1.13	.18	.14	.01	.01	.09	109	.15	64,860	20	.4	143	7.3
Apr. 1-10	362,600	31	.70	.49	.30	.03	1.20	.17	.14	.01	.01	.11	108	.15	54,390	20	.4	158	7.5
Apr. 11-20	361,600	7.4	.70	.41	.30	.03	1.11	.17	.12	.01	.01	.10	103	.14	50,620	21	.4	141	7.4
Apr. 21-30	267,600	17	.65	.45	.36	.04	1.15	.19	.15	.01	.01	.10	103	.14	37,460	24	.5	145	7.4
May 1 10	223,600	10	.70	.49	.44	.03	1.21	.23	.19	.01	.01	.12	113	.15	33,540	26	.6	161	7.8
May 11-20	159,200	23	.75	.61	.52	.04	1.34	.31	.27	.01	.01	.12	127	.17	27,060	27	.6	192	7.5
May 21-31	153,100	25	.75	.67	.65	.04	1.44	.33	.37	.00	.01	.16	142	.19	29,090	31	.8	225	7.5
June 1-10	141,000	22	.85	.90	1.22	.05	1.77	.65	.51	.02	.00	.17	173	.24	33,840	40	1.3	289	7.4
June 11-20	151,100	24	.90	.72	1.13	.05	1.74	.56	.45	.02	.01	.13	158	.21	31,730	40	1.3	276	7.2
June 21-30	126,900	26	.70	.52	.61	.04	1.36	.31	.24	.02	.00	.13	126	.17	21,570	33	.8	190	7.1
July 1-10	133,600	24	.70	.48	.57	.03	1.25	.27	.24	.01	.00	.10	118	.16	21,380	32	.7	181	7.3
July 11-20	141,600	26	.75	.48	.61	.04	1.36	.31	.24	.02	.00	.06	126	.17	24,070	33	.8	188	7.3
July 21-31	162,900	24	.70	.56	.70	.04	1.43	.31	.28	.01	.00	.00	128	.17	27,690	35	.9	194	7.5
Aug. 1-10	163,800	22	.60	.79	.78	.04	1.56	.35	.31	.01	.01	.02	136	.18	29,480	35	.9	211	7.6
Aug. 11-20	168,100	24	.70	.74	.83	.04	1.67	.38	.31	.01	.00	.14	130	.18	30,260	36	1.0	230	7.7
Aug. 21-31	191,200	25	.75	.77	.91	.03	1.75	.38	.34	.02	.00	.12	152	.21	40,150	37	1.0	239	7.4

Sept. 1-10, 1954..	167,600	24	.75	.85	.96	.04	1.80	.40	.37	.02	.01	.19	159	.22	36,870	37	1.1	254	7.4
Sept. 11-20	168,500	24	.80	.86	.04	.04	1.90	.44	.40	.02	.01	.25	167	.23	38,760	38	1.1	266	7.3
Sept. 21-30	172,700	24	.75	.87	.87	.04	1.84	.38	.34	.02	.00	.08	155	.21	36,270	34	1.0	246	7.4
Total or weighted average [a]	8,275,000	[b]22	0.65	0.53	0.48	0.03	1.28	0.23	0.21	[b]0.01	0.01	[b]0.10	118	0.16	1,324,000	28	0.6	173	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.
b Represents 97 percent of runoff for water year October 1953 to September 1954.

SACRAMENTO RIVER BASIN--Continued

FEATHER RIVER AT NICOLAUS, CALIF.

LOCATION.--At highway bridge at Nicolaus, Sutter County, just 0.4 mile upstream from gaging station and 1.2 miles downstream from Bear River.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 245 micromhos June 21; minimum daily, 56.8 micromhos Mar. 11.
Percent sodium: Maximum, 22 Jan. 1-10, 11-17, 19-20; minimum, 12 May 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 245 micromhos June 21, 1954; minimum daily, 50.0 micromhos May 28, 1952.
Percent sodium: Maximum, 27 Dec. 1-2, 4, 7, 1952; minimum, 8 June 21-30, 1951, Jan. 11-20, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1953 to September 1954 given in WSP 1345.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	59,370	11	0.65	0.39	0.22	0.03	1.07	0.09	0.16	0.01	0.01	0.04	79	0.11	6,530	17	0.3	126	7.4
Oct. 11-20	62,180	14	.65	.39	.22	.03	1.07	.11	.10	.01	.00	.09	77	.10	6,220	17	.3	121	7.4
Oct. 21-31	61,390	13	.60	.41	.20	.03	1.03	.09	.08	.01	.00	.08	75	.10	6,140	16	.3	116	7.2
Nov. 1-10	54,820	12	.60	.43	.25	.04	1.08	.10	.09	.01	.01	.02	76	.10	5,480	19	.3	120	7.4
Nov. 11-20	90,370	14	.55	.37	.18	.04	.93	.10	.09	.01	.00	.06	73	.10	9,040	16	.3	108	7.3
Nov. 21-30	100,200	11	.50	.37	.22	.02	.92	.08	.08	.00	.01	.05	69	.09	9,020	20	.3	105	7.4
Dec. 1-10	100,000	11	.55	.36	.20	.03	.95	.09	.10	.01	.01	.08	71	.10	10,000	17	.3	113	7.3
Dec. 11-20	82,610	12	.55	.40	.22	.03	1.00	.09	.11	.01	.01	.09	74	.10	8,260	18	.3	116	7.3
Dec. 21-31	74,280	9.4	.55	.38	.18	.03	.97	.10	.08	.01	.00	.05	72	.10	7,430	16	.3	115	7.4
Jan. 1-10, 1954	59,270	9.4	.60	.38	.28	.03	1.05	.09	.09	.01	.01	.01	77	.10	5,930	22	.4	117	7.7
Jan. 11-17, 19-20	93,140	8.6	.60	.35	.28	.03	1.00	.12	.11	.01	.01	.08	86	.12	11,180	22	.4	119	7.5
Jan. 18	37,880	--	--	--	.18	.04	.64	--	.08	--	--	--	--	--	--	--	--	84.8	7.1
Jan. 21-31	245,400	13	.46	.34	.15	.03	.77	.12	.08	.01	.01	.04	80	.11	26,990	15	.2	95.3	7.1
Feb. 1-10	152,600	16	.46	.32	.18	.02	.84	.09	.08	.01	.00	.07	73	.10	15,260	18	.3	99.5	7.2
Feb. 11-20	440,900	9.8	.44	.28	.14	.02	.74	.10	.06	.01	.01	.03	69	.09	39,680	15	.2	89.8	7.0
Feb. 21-28	223,500	14	.42	.30	.14	.02	.74	.09	.06	.01	.00	.06	65	.09	20,120	15	.2	85.6	7.3

Mar. 1-10, 1954 ..	290,200	13	.22	.53	.14	.02	.77	.09	.05	.01	.01	.14	65	.09	26,120	15	.2	88.7	7.2
Mar. 11-20	608,300	9.0	.35	.26	.15	.02	.62	.07	.06	.02	.01	.07	59	.08	48,660	19	.3	72.8	7.0
Mar. 21-23, 30-31.	150,700	--	.44	.34	.15	.02	.75	.11	.06	--	.01	--	69	.09	13,560	16	.2	93.5	7.6
Mar. 24-29.....	151,300	--	.45	.33	.18	.02	.79	.12	.07	--	.01	--	72	.10	15,130	18	.3	122	7.6
Apr. 1-5.....	139,000	--	.46	.32	.17	.01	.77	.09	.08	--	.01	--	66	.09	12,510	17	.3	96.0	7.8
Apr. 6-10.....	314,600	--	.34	.26	.12	.01	.59	.06	.03	--	.01	--	58	.08	25,170	17	.2	72.0	7.3
Apr. 11-20.....	390,500	11	.36	.24	.12	.01	.62	.06	.04	.02	.00	.03	56	.08	31,240	17	.2	69.1	7.2
Apr. 21-30.....	417,900	10	.32	.22	.10	.02	.56	.05	.06	.01	.00	.03	52	.07	29,250	16	.2	64.6	7.1
May 1-10.....	282,800	12	.34	.24	.10	.03	.61	.06	.06	.01	.00	.03	53	.07	19,800	15	.2	68.3	7.0
May 11-20	190,700	12	.37	.22	.09	.02	.64	.06	.04	.01	.00	.04	54	.07	13,350	12	.2	69.5	7.1
May 21-31	107,500	13	.44	.28	.12	.03	.74	.07	.07	.00	.01	.05	60	.08	8,600	14	.2	90.2	7.1
June 1-10.....	59,680	16	.50	.33	.18	.03	.88	.09	.09	.01	.01	.04	69	.09	5,370	17	.3	108	7.2
June 11-20.....	63,870	16	.55	.41	.18	.03	.97	.08	.10	.01	.00	.06	72	.10	6,390	16	.3	108	7.0
June 21.....	4,240	--	--	--	.24	.04	1.77	--	.11	--	--	--	--	--	--	--	--	245	7.1
June 22-30.....	26,600	18	.65	.53	.22	.04	1.18	.10	.13	.01	.01	.06	86	.12	3,190	15	.3	141	7.2
July 1-10	23,230	16	.45	.79	.20	.04	1.21	.11	.10	.02	.00	.02	89	.12	2,790	13	.3	136	7.3
July 11-20.....	19,330	16	.55	.64	.22	.04	1.23	.12	.10	.02	.00	.10	89	.12	2,320	15	.3	138	7.3
July 21-31.....	17,370	18	.70	.56	.24	.04	1.26	.11	.11	.01	.01	.00	90	.12	2,080	16	.3	139	7.3
Aug. 1-10.....	15,710	17	1.15	.07	.26	.04	1.30	.12	.11	.01	.00	.00	92	.13	2,040	17	.3	144	7.4
Aug. 11-20.....	18,320	18	.70	.50	.23	.04	1.23	.11	.08	.01	.01	.16	91	.12	2,200	16	.3	142	7.6
Aug. 21-31	25,120	18	.70	.48	.23	.04	1.26	.10	.10	.01	.02	.15	90	.12	3,010	16	.3	141	7.3

SACRAMENTO RIVER BASIN--Continued

FEATHER RIVER AT NICOLAUS, CALIF.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Sept. 1-10, 1954 ..	24,690	17	0.70	0.46	0.24	0.04	1.25	0.09	0.11	0.01	0.02	0.09	89	0.12	2,960	16	0.3	141	7.3
Sept. 11-20	26,720	16	.65	.47	.24	.04	1.23	.09	.09	.01	.02	.09	88	.12	3,210	17	.3	141	7.3
Sept. 21-30	35,760	16	.65	.43	.22	.04	1.20	.07	.10	.01	.01	.13	83	.11	3,930	17	.3	130	7.5
Total or weighted average[a]	5,343,000	c12	b0.42	b0.31	0.15	0.02	0.75	b0.08	0.07	c0.01	b0.01	c0.06	b65	b0.09	b477,000	b17	b0.2	89.6	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.
b Represents 99 percent of runoff for water year October 1953 to September 1954.
c Represents 85 percent of runoff for water year October 1953 to September 1954.

SACRAMENTO RIVER BASIN--Continued

AMERICAN RIVER AT FAIR OAKS, CALIF.

LOCATION.--At highway bridge just downstream from gaging station at Fair Oaks, Sacramento County, 10 miles downstream from South Fork, and about 19 miles from mouth.
DRAINAGE AREA.--1,921 square miles.
RECORDS AVAILABLE.--Chemical analyses: January to December 1906, March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 106 micromhos Aug. 20, 21; minimum daily, 33.6 micromhos May 21.
Percent sodium: Maximum, 20 Nov. 1-10, 11-20, Dec. 21-31, Feb. 1-10, Aug. 1-10; minimum, 11 May 1-10.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 112 micromhos Aug. 28, 1951; minimum daily, 29.1 micromhos June 3, 1952.
Percent sodium: Maximum, 28 June 1-10, 1953; minimum, 8 Jan. 21-31, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1953 to September 1954 given in WSP 1345.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	7,450	10	0.38	0.21	0.15	0.03	0.57	0.07	0.11	0.01	0.01	0.05	52	0.07	522	19	0.3	77.6	7.0
Oct. 11-20.....	11,110	11	.44	.21	.16	.03	.62	.10	.09	.00	.01	.05	56	.08	889	19	.3	87.5	6.9
Oct. 21-31.....	15,820	12	.38	.22	.15	.02	.54	.09	.11	.01	.00	.04	52	.07	1,110	19	.3	68.8	7.1
Nov. 1-10.....	9,040	12	.42	.21	.16	.01	.61	.09	.14	.00	.00	.02	58	.08	723	20	.3	79.5	7.2
Nov. 11-20.....	23,760	11	.44	.26	.18	.01	.64	.11	.14	.01	.00	.03	66	.09	2,140	20	.3	85.3	7.2
Nov. 21-30	30,330	11	.37	.26	.14	.02	.56	.09	.11	.00	.01	.06	50	.07	2,120	17	.2	77.0	7.0
Dec. 1-10.....	34,430	8.3	.36	.23	.12	.02	.54	.10	.11	.01	.01	.07	54	.07	2,410	17	.2	77.7	7.3
Dec. 11-20.....	25,690	6.9	.36	.20	.12	.04	.54	.08	.11	.01	.00	.00	48	.07	1,800	17	.2	69.0	7.3
Dec. 21-31.....	26,440	7.3	.35	.18	.14	.02	.52	.08	.09	.01	.01	.01	47	.06	1,590	20	.3	67.6	7.3
Jan. 1-10, 1954 ..	20,550	6.4	.37	.21	.14	.02	.56	.09	.10	.01	.00	.04	51	.07	1,440	19	.3	73.8	7.2
Jan. 11-20.....	36,260	5.8	.41	.26	.17	.02	.62	.11	.10	.01	.01	.03	61	.08	2,900	19	.3	83.6	7.4
Jan. 21-31.....	83,680	12	.36	.27	.11	.02	.59	.10	.09	.01	.01	.01	60	.08	6,690	15	.2	74.2	7.1

SACRAMENTO RIVER BASIN--Continued

AMERICAN RIVER AT FAIR OAKS, CALIF.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954..	38,100	11	0.39	0.19	0.15	0.02	0.56	0.09	0.09	0.01	0.00	0.02	50	0.07	2,670	20	0.3	69.0	7.1
Feb. 11-20.....	123,500	9.7	.36	.26	.10	.02	.57	.10	.08	.01	.01	.03	55	.07	8,640	14	.2	72.3	7.0
Feb. 21-28	58,590	9.7	.34	.24	.12	.02	.57	.08	.09	.00	.00	.00	50	.07	4,100	17	.2	69.3	7.3
Mar. 1-10.....	160,300	7.3	.32	.21	.09	.02	.51	.07	.08	.01	.00	.07	48	.07	11,220	14	.2	61.5	7.2
Mar. 11-20	168,200	9.6	.32	.24	.10	.02	.51	.07	.07	.01	.01	.01	49	.07	11,770	15	.2	65.6	7.2
Mar. 21-31	122,900	12	.36	.27	.14	.02	.59	.10	.10	.01	.00	.06	56	.08	9,830	17	.2	76.9	7.1
Apr. 1-10.....	180,100	16	.33	.25	.10	.02	.56	.07	.07	.01	.00	.03	51	.07	12,610	15	.2	65.8	7.1
Apr. 11-20.....	178,400	7.1	.24	.20	.08	.02	.43	.05	.06	.01	.00	.00	46	.06	10,700	14	.2	48.6	7.0
Apr. 21-30.....	188,100	6.0	.22	.12	.07	.03	.34	.04	.05	.01	.00	.03	36	.05	9,400	15	.2	41.9	7.0
May 1-10	147,600	6.1	.22	.19	.05	.02	.36	.05	.04	.00	.01	.06	34	.05	7,380	11	.1	43.5	6.9
May 11-20	133,500	8.2	.19	.15	.05	.02	.33	.03	.04	.00	.00	.04	32	.04	5,340	13	.1	36.9	6.8
May 21-31	77,260	9.8	.24	.14	.08	.02	.38	.05	.06	.01	.00	.04	35	.05	3,860	16	.2	46.6	6.8
June 1-10.....	43,200	13	.37	.16	.10	.02	.44	.06	.16	.00	.01	.00	50	.07	3,020	15	.2	50.8	6.8
June 11-20.....	37,250	13	.30	.20	.10	.02	.49	.05	.07	.00	.00	.00	43	.06	2,240	17	.2	55.0	7.4
June 21-30.....	23,150	13	.34	.16	.12	.02	.52	.05	.08	.00	.00	.03	47	.06	1,390	18	.2	65.8	7.1
July 1 10	12,050	15	.42	.26	.13	.02	.62	.07	.11	.00	.00	.00	54	.07	844	16	.2	78.6	7.1
July 11-20	8,610	16	.48	.28	.16	.03	.72	.08	.14	.00	.01	.04	62	.08	689	17	.3	92.2	7.3
July 21-31	6,720	16	.55	.21	.18	.04	.75	.09	.15	.00	.01	.00	65	.09	605	18	.3	94.2	7.3

Aug. 1-10, 1954..	4,590	16	.55	.26	.20	.04	.79	.10	.17	.00	.01	.00	69	.09	413	20	.3	101	7.1
Aug. 11-20.....	4,410	14	.55	.26	.20	.04	.80	.10	.18	.01	.00	.06	83	.11	485	19	.3	102	7.2
Aug. 21-31	5,950	13	.55	.23	.17	.03	.75	.09	.16	.01	.00	.06	65	.09	536	17	.3	99.8	7.0
Sept. 1-10	6,020	12	.48	.24	.15	.03	.69	.08	.14	.01	.01	.13	59	.08	482	17	.3	90.1	7.0
Sept. 11-20	6,680	12	.44	.22	.15	.02	.64	.08	.14	.00	.01	.09	57	.08	534	18	.3	86.8	7.1
Sept. 21-30	8,030	13	.40	.24	.14	.02	.61	.07	.12	.01	.00	.04	54	.07	562	17	.2	75.1	7.2
Total or weighted average [a]	2,068,000	9.6	0.31	0.21	0.10	0.02	0.49	0.07	0.08	0.01	0.00	0.03	47	0.06	124,100	16	0.2	60.6	

a Represents 100 percent of runoff for water year October 1953 to September 1954.

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

UPPER COLUMBIA RIVER BASIN

COLUMBIA RIVER MAIN STEM

COLUMBIA RIVER AT INTERNATIONAL BOUNDARY

LOCATION.--At cableway 2.2 miles downstream from gaging station, which is 0.5 mile downstream from Pend Oreille River, and about 10 miles upstream from Northport, Stevens County, Washington.
DRAINAGE AREA.--59,700 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: February 1910 to January 1911, November 1951 to September 1954.
Water temperatures: November 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 180 micromhos Jan. 22; minimum daily, 130 micromhos Aug. 4.
Percent sodium: Maximum, 6 Nov. 1-10, Apr. 11-20, May 1-10; minimum, 3 July 21-31, Aug. 1-10, 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 190 micromhos Mar. 10, 1953; minimum daily, 130 micromhos Aug. 4, 1954.
Percent sodium: Maximum, 6 during several periods; minimum, 3 July 21-31, Aug. 1-10, 11-20, 1954.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1953 to September 1954 given in WSP 1346.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	1,267,000	6.1	1.15	0.49	0.07	0.03	1.41	0.29	0.02		0.01	--	95	0.13	164,700	4	0.1	161	7.4
Oct. 11-20	1,307,000	6.1	1.15	.49	.07	.03	1.34	.31	.04		.00	0.05	94	.13	169,900	4	.1	160	7.4
Oct. 21-31	1,460,000	6.5	1.15	.48	.07	.03	1.33	.29	.06		.00	--	96	.13	189,800	4	.1	160	7.4
Nov. 1-10	1,302,000	7.2	1.10	.49	.11	.02	1.36	.29	.05		.00	--	98	.13	169,300	6	.1	164	7.4
Nov. 11-20	1,179,000	7.1	1.20	.46	.07	.02	1.29	.35	.03		.00	.05	96	.13	153,300	4	.1	162	7.4
Nov. 21-30	1,072,000	7.4	1.20	.49	.07	.02	1.34	.33	.02		.00	--	97	.13	139,400	4	.1	164	7.6
Dec. 1-5	498,600	6.7	1.15	.52	.06	.01	1.34	.37	.04		.01	--	98	.13	64,820	4	.1	166	7.4
Dec. 18-31	1,180,000	8.1	1.20	.49	.07	.01	1.38	.40	.03		.01	.02	103	.14	165,200	4	.1	171	7.4
Jan. 1-2, 22-31, 1954	821,400	7.4	1.25	.51	.07	.03	1.38	.37	.03		.01	.02	105	.14	115,000	4	.1	173	7.4
Feb. 1-10	690,800	7.3	1.25	.49	.07	.03	1.41	.42	.03		.01	--	107	.15	103,600	4	.1	177	7.8
Feb. 11-20	680,500	6.9	1.25	.51	.07	.03	1.41	.40	.03		.01	.02	106	.14	95,270	4	.1	178	7.7
Feb. 21-28	598,000	6.9	1.25	.50	.07	.03	1.34	.42	.03		.00	--	106	.14	83,720	4	.1	176	7.7

Mar. 1-10, 1954 ..	920,500	7.0	1.25	.52	.08	.03	1.43	.40	.02		.01	--	104	.14	128,900	4	.1	177	7.4
Mar. 11-20	1,004,000	7.4	1.30	.48	.10	.03	1.41	.40	.03		.01	0.08	104	.14	140,600	5	.1	176	7.4
Mar. 21-31	1,063,000	7.6	1.30	.49	.10	.02	1.39	.42	.02		.01	--	104	.14	148,800	5	.1	173	7.4
Apr. 1-10.....	776,700	7.9	1.20	.48	.10	.02	1.39	.37	.03		.01	--	106	.14	108,700	5	.1	174	7.6
Apr. 11-20.....	1,021,000	7.9	1.15	.44	.10	.02	1.34	.35	.03		.01	.03	100	.14	142,900	6	.1	168	7.5
Apr. 21-30.....	1,396,000	7.7	1.10	.46	.09	.02	1.36	.31	.03		.01	--	98	.13	181,500	5	.1	163	7.4
May 1-10	1,651,000	6.9	1.10	.44	.09	.02	1.33	.31	.03		.01	--	96	.13	214,600	6	.1	162	7.4
May 11-20	3,178,000	6.9	1.00	.40	.08	.02	1.21	.27	.03		.01	.05	90	.12	381,400	5	.1	147	7.3
May 21-31.....	6,808,000	6.8	1.00	.39	.08	.02	1.20	.23	.04		.01	--	86	.12	817,000	5	.1	143	7.3
June 1-10.....	6,733,000	7.3	1.05	.42	.08	.02	1.26	.23	.02		.01	--	84	.11	740,600	5	.1	147	7.2
June 11-20.....	6,636,000	7.1	1.05	.39	.07	.02	1.25	.21	.03		.01	.04	84	.11	730,000	5	.1	146	7.3
June 21-30.....	6,377,000	7.3	1.00	.40	.07	.02	1.21	.23	.03		.01	--	83	.11	701,500	5	.1	143	7.1
July 1-10	7,148,000	6.4	1.00	.39	.07	.02	1.20	.21	.02		.02	--	82	.11	786,300	4	.1	141	7.1
July 11-20	7,500,000	5.4	1.00	.39	.06	.02	1.18	.20	.02		.01	.04	78	.11	825,000	4	.1	137	7.1
July 21-31	6,171,000	5.0	.95	.39	.05	.02	1.16	.20	.02		.01	--	73	.10	617,100	3	.1	135	7.1
Aug. 1-10.....	3,812,000	5.0	.95	.36	.05	.02	1.16	.21	.02		.01	--	73	.10	381,200	3	.1	134	7.1
Aug. 11-20.....	3,081,000	4.4	1.00	.35	.05	.02	1.16	.23	.02		.01	.02	74	.10	308,100	3	.1	136	7.1
Aug. 21-31.....	3,030,000	4.7	1.00	.36	.05	.02	1.15	.21	.02		.01	--	76	.10	303,000	4	.1	135	7.2
Sept. 1-10	2,591,000	4.6	.95	.36	.05	.02	1.15	.21	.02		.01	--	75	.10	259,100	4	.1	136	7.2
Sept. 11-20	1,940,000	5.2	1.00	.37	.06	.02	1.15	.23	.02		.01	.06	78	.11	213,400	4	.1	136	7.2
Sept. 21-30	1,496,000	4.5	1.05	.38	.06	.02	1.15	.27	.03		.01	--	78	.11	164,600	4	.1	140	7.2
Total or weighted average	a86,390,000	6.3	1.05	0.41	0.07	0.02	1.23	0.25	0.03		0.01	--	85	0.12	10,370,000	5	0.1	147	--

aRepresents 97 percent of runoff for water year October 1953 to September 1954.

UPPER COLUMBIA RIVER BASIN--Continued

COLUMBIA RIVER MAIN STEM--Continued

COLUMBIA RIVER AT GRAND COULEE DAM, WASH.

LOCATION.--At Grand Coulee Dam, Grant-Okanogan County line, 2,500 feet upstream from gaging station, which is 14 miles upstream from Nespelem River.
DRAINAGE AREA.--74,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1954.
Water temperatures: November 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 174 micromhos Jan. 11; minimum daily, 126 micromhos May 30, 31, June 1.
EXTREMES, 1950-54.--Specific conductance: Maximum daily, 183 micromhos Apr. 13, 21, 1952, May 11, 13, 1953; minimum daily, 126 micromhos May 30-31, June 1, 1954.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Ore. Records of discharge for water year October 1953 to September 1954 given in WSP 1346.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	1,297,000	--	--	--	--	--	---	--	--		--	--	79	0.11	142,700	--	--	141	--
Oct. 11-20.....	1,371,000	--	--	--	--	--	--	--	--		--	--	77	.10	137,100	--	--	145	--
Oct. 21-31.....	1,544,000	--	--	--	--	--	--	--	--		--	--	85	.12	185,300	--	--	151	--
Nov. 1-10.....	1,316,000	--	--	--	--	--	--	--	--		--	--	87	.12	157,900	--	--	153	--
Nov. 11-20	1,249,000	--	--	--	--	--	--	--	--		--	--	89	.12	149,900	--	--	157	--
Nov. 21-30	1,119,000	6.8	1.15	0.31	0.09	--	1.36	0.23	0.03		0.01	0.05	90	.12	134,300	6	0.1	156	7.7
Dec. 1-10.....	1,191,000	6.6	1.15	.35	.10	--	1.31	.27	.04		.01	.03	91	.12	142,900	6	.1	161	7.5
Dec. 11-20	1,037,000	6.8	1.10	.35	.09	--	1.31	.27	.03		.01	.03	91	.12	124,400	6	.1	156	7.3
Dec. 21-31	1,131,000	5.9	1.10	.35	.08	--	1.28	.27	.04		.01	.04	91	.12	135,700	5	.1	157	7.4
Jan. 1-10, 1954 ..	1,072,000	6.6	1.10	.37	.08	--	1.28	.27	.03		.01	.03	91	.12	128,600	5	.1	159	7.6
Jan. 11-20.....	1,338,000	5.9	1.10	.42	.11	--	1.28	.27	.03		.01	.08	92	.13	173,900	7	.1	161	7.4
Jan. 21-31.....	1,380,000	5.5	1.15	.37	.09	--	1.31	.27	.03		.01	.08	88	.12	165,600	5	.1	159	7.3
Feb. 1-10	1,263,000	--	--	--	--	--	--	--	--		--	--	95	.13	164,200	--	--	162	--
Feb. 11-20	1,071,000	6.7	1.15	.42	.09	--	1.34	.31	.04		.01	.03	95	.13	139,200	5	.1	163	7.3
Feb. 21-28	784,900	--	--	--	--	--	--	--	--		--	--	97	.13	102,000	--	--	166	--

Mar. 1-10, 1954..	1,210,000	--	--	--	--	--	--	--	--		--	--	98	.13	157,300	--	--	165	--
Mar. 11-20	1,328,000	7.7	1.15	.42	.09	--	1.34	.31	.04		.01	.04	98	.13	172,600	5	.1	164	7.4
Mar. 21-31	1,523,000	--	--	--	--	--	--	--	--		--	--	102	.14	213,200	--	--	165	--
Apr. 1-10.....	1,253,000	--	--	--	--	--	--	--	--		--	--	101	.14	175,400	--	--	167	--
Apr. 11-20	1,019,000	8.3	1.15	.38	.10	--	1.29	.35	.03		.02	.06	102	.14	142,700	6	.1	166	7.4
Apr. 21-30	1,205,000	--	--	--	--	--	--	--	--		--	--	104	.14	168,700	--	--	171	--
May 1-10	2,128,000	8.9	1.15	.47	.12	0.02	1.33	.35	.04		.02	.00	106	.14	297,900	7	.1	165	7.4
May 11-20	4,326,000	9.5	1.15	.47	.12	.02	1.33	.33	.03		.01	.01	103	.14	605,600	7	.1	163	7.5
May 21-31	7,841,000	8.6	1.00	.42	.11	.02	1.18	.27	.03		.01	.02	89	.12	940,900	7	.1	144	7.5
June 1-10.....	7,524,000	8.5	.95	.37	.11	.02	1.10	.23	.03		.01	.02	86	.12	902,900	8	.1	132	7.3
June 11-20.....	7,234,000	8.0	.95	.47	.11	.02	1.15	.27	.03		.01	.01	83	.11	795,700	7	.1	136	7.3
June 21-30.....	6,550,000	7.1	.95	.33	.10	--	1.16	.23	.03		.01	.04	84	.11	720,500	7	.1	143	7.5
July 1-10	6,544,000	6.7	1.00	.33	.08	--	1.16	.20	.02		.01	.01	84	.11	719,800	6	.1	144	7.3
July 11-20	7,370,000	6.6	.95	.36	.08	--	1.21	.23	.03		.01	.00	84	.11	810,700	6	.1	139	7.8
July 21-31	6,351,000	--	--	--	--	--	--	--	--		--	--	81	.11	698,600	--	--	138	--

UPPER COLUMBIA RIVER BASIN--Continued

COLUMBIA RIVER MAIN STEM--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 1-10, 1954	3,844,000	--	--	--	--	--	--	--	--		--	--	81	0.11	422,800	--	--	138	--
Aug. 11-20	3,140,000	5.8	0.95	0.36	0.07	--	1.21	0.23	0.03		0.01	0.04	82	.11	345,400	5	0.1	137	7.4
Aug. 21-31	3,119,000	--	--	--	--	--	--	--	--		--	--	78	.11	343,100	--	--	136	--
Sept. 1-10	2,674,000	--	--	--	--	--	--	--	--		--	--	78	.11	294,100	--	--	135	--
Sept. 11-20	1,989,000	4.7	.95	.35	.07	--	1.18	.21	.03		.01	.00	80	.11	218,800	5	.1	136	7.5
Sept. 21-30	1,706,000	--	--	--	--	--	--	--	--		--	--	82	.11	187,700	--	--	136	--
Total or weighted average	98,040,000	--	--	--	--	--	--	--	--		--	--	87	0.12	11,760,000	--	--	146	--

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YAKIMA RIVER BASIN

YAKIMA RIVER AT KIONA, WASH.

LOCATION.--At highway bridge just downstream from gaging station at Kiona, Benton County, 3½ miles downstream from intake of Kiona Canal and 25 miles upstream from mouth.
DRAINAGE AREA.--5,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1952 to September 1954.
Water temperatures: December 1952 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximun daily, 367 micromhos Sept. 11; minimum daily, 118 micromhos May 20.
Percent sodium: Maximum, 29 Nov. 21-30, Dec. 12-17, 19-31, Jan. 1-10, Sept. 1-10, 11-20; Minimum, 23 June 1-10.
EXTREMES, 1952-54.--Specific conductance; Maximum daily, 385 micromhos, Sept. 18, 1953; minimum daily, 118 micromhos May 20, 1954.
Percent sodium: Maximum, 29 Nov. 21-30, Dec. 12-17, 19-31, 1953, Jan. 1-10, Sept. 1-10, 11-20, 1954; minimum, 23 Feb. 1-14, May 4-7, 21-31, 1953, June 1-10, 1954.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Discharge records for water year October 1953 to September 1954 given in WSP 1346.

Chemical analyes, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	38,420	32	1.55	0.99	1.00	0.10	2.98	0.44	0.17	0.01	0.03	0.09	193	0.26	9,990	28	0.9	352	7.7
Oct. 11-20	39,870	32	1.60	1.07	1.09	.09	3.10	.48	.20	.02	.03	.06	207	.28	11,160	28	.9	366	7.8
Oct. 21-31	63,310	26	1.30	.77	.83	.08	2.46	.33	.17	.01	.03	.01	156	.21	13,300	28	.8	288	7.7
Nov. 1-10	42,550	33	1.45	.90	.91	.08	2.72	.40	.21	.02	.04	--	206	.28	11,910	27	.8	320	8.1
Nov. 11-20	42,010	32	1.45	.90	.96	.09	2.72	.42	.23	.02	.05	.08	200	.27	11,340	28	.9	321	7.8
Nov. 21-30	44,090	30	1.35	.82	.91	.08	2.52	.40	.23	.01	.05	--	197	.27	11,900	29	.9	302	7.7
Dec. 1-11, 18....	65,970	27	1.20	.82	.78	.07	2.21	.33	.16	.01	.05	--	168	.23	15,170	27	.8	262	8.1
Dec. 12-17,19-31	162,500	20	.85	.38	.52	.05	1.51	.20	.10	.01	.04	.02	116	.16	26,000	29	.7	179	7.8
Jan. 1-10, 1954 ..	84,810	22	.80	.44	.52	.06	1.46	.18	.11	.02	.03	--	116	.16	13,570	29	.7	177	7.9
Jan. 11-20	94,140	16	.65	.49	.40	.05	1.28	.19	.10	.02	.03	.07	103	.14	13,180	25	.5	153	7.7
Jan. 21-31	92,750	19	.65	.51	.41	.05	1.31	.18	.11	.01	.03	--	106	.14	12,980	25	.5	157	7.8
Feb. 1-7, 9-10, 23-27	149,100	21	.70	.54	.48	.05	1.39	.10	.18	.02	.04	.02	116	.16	23,860	27	.6	170	7.7
Feb. 8, 11-22,28	128,800	20	.75	.55	.52	.06	1.51	.23	.13	.02	.04	--	127	.17	21,900	28	.6	189	7.9
Mar. 1-10	100,900	25	.80	.56	.48	.06	1.52	.18	.12	.01	.03	--	129	.18	18,160	25	.6	180	8.1
Mar. 11-20	107,800	23	.70	.56	.42	.05	1.41	.16	.09	.01	.03	--	123	.17	18,330	24	.5	164	7.8
Mar. 21-31	87,550	25	.80	.58	.48	.05	1.56	.19	.11	.01	.02	--	128	.17	14,880	25	.6	182	8.0

YAKIMA RIVER BASIN--Continued

YAKIMA RIVER AT KIONA, WASH.--Continued

Chemical analyes, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-10, 1954	76,900	18	0.85	0.44	0.48	0.05	1.54	0.17	0.11	0.01	0.02	--	122	0.17	13,070	26	0.6	175	7.7
Apr. 11-17, 28-30	82,690	18	.80	.44	.48	.05	1.46	.17	.10	.02	.02	0.10	118	.16	13,230	27	.6	173	7.7
Apr. 18-27	130,300	18	.70	.37	.36	.05	1.23	.13	.09	.02	.02	--	103	.14	18,240	24	.5	144	7.8
May 1-10	84,990	25	.90	.54	.52	--	1.67	.25	.13	.00	.03	--	133	.18	15,300	27	.6	199	7.2
May 11-20	173,800	21	.70	.34	.34	.05	1.18	.13	.10	.01	.02	--	95	.13	22,590	24	.5	140	7.4
May 21-31	165,200	23	.75	.38	.39	.06	1.31	.15	.10	.00	.02	--	104	.14	23,130	25	.5	155	7.4
June 1-10	113,700	25	.85	.52	.44	.06	1.56	.19	.11	.00	.02	--	120	.16	18,190	23	.5	181	7.9
June 11-17, 19-21	132,700	23	.80	.40	.44	.06	1.43	.17	.09	.01	.03	--	111	.15	19,900	26	.6	164	7.8
June 18, 22-30	165,400	21	.65	.34	.35	.05	1.15	.14	.08	.00	.02	--	91	.12	19,850	25	.5	134	7.7
July 1-10	165,100	19	.65	.34	.34	.05	1.15	.14	.07	.00	.02	--	89	.12	19,810	25	.5	133	7.6
July 11-20	109,900	21	.75	.40	.44	.05	1.38	.18	.08	.02	.03	.06	110	.15	16,480	27	.6	161	7.3
July 21-31	56,930	28	1.15	.68	.70	.07	2.16	.29	.14	.02	.03	--	168	.23	13,090	27	.7	247	7.8
Aug. 1-31	139,300	31	1.35	.80	.87	.10	2.57	.35	.18	.02	.03	.04	200	.27	37,610	28	.8	296	7.8
Sept. 1-10	40,500	37	1.50	.90	1.00	.11	2.90	.40	.18	.02	.03	--	225	.31	12,560	29	.9	327	8.0
Sept. 11-20	47,720	38	1.50	.90	1.00	.10	2.85	.42	.19	.00	.04	.05	226	.31	14,790	29	.9	328	8.0
Sept. 21-30	61,090	31	1.25	.72	.78	.08	2.33	.31	.16	.02	.03	--	183	.25	15,270	28	.8	271	7.9
Total or weighted average	3,091,000	23	0.90	0.53	0.52	0.06	1.64	0.21	0.12	0.01	0.03	--	129	0.18	540,700	26	0.6	193	--

PART 13. SNAKE RIVER BASIN

SNAKE RIVER MAIN STEM

SNAKE RIVER NEAR HEISE, IDAHO

LOCATION.--At Eagle Rock Canal headgate, 1¼ mile upstream from Heise, Bonneville County, 1 5/8 mile downstream from Anderson canal headgate, 1¾ mile downstream from gaging station, about 4¾ miles east of Ririe, and about 21 miles upstream from Henrys Fork.
DRAINAGE AREA.--5,752 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: January 1953 to September 1954.
Water temperatures: January 1953 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 628 micromhos Dec. 25; minimum daily, 240 micromhos June 27.
Percent sodium: Maximum, 16 Sept. 11-20; minimum, 8 May 11-20.
EXTREMES, Jan. 1953 to September 1954.--Specific conductance: Maximum daily, 628 micromhos Dec. 25, 1953; minimum daily, 240 micromhos June 27, 1954.
Percent sodium: Maximum, 16 Sept. 11-20, 1953; Sept. 11-20, 1954; minimum, 7 June 11-20, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge for water year October 1953 to September 1954 given in WSP 1347. About 2.5 percent of normal annual stream flow of 5,000,000 acre feet is diverted by Anderson canal between sampling point and gaging station. This diversion occurs during the months May to November except for leakage through the headgate. No other diversion or appreciable inflow between sampling point and gaging station except during periods of local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	61,800	11	3.29	1.48	0.57	0.06	3.31	1.50	0.45	0.02	0.01	--	304	0.41	25,340	11	0.4	490	7.6
Oct. 11-20	57,920	10	3.44	1.56	.61	.06	3.46	1.58	.48	.02	.01	0.08	318	.43	24,910	11	.4	513	7.6
Oct. 21-31	64,440	10	3.39	1.56	.61	.06	3.51	1.58	.51	.02	.01	--	320	.44	28,350	11	.4	514	7.6
Nov. 1-10	56,930	9.9	3.39	1.64	.61	.06	3.52	1.56	.51	.02	.02	--	324	.44	25,050	11	.4	519	7.6
Nov. 11-20	54,190	10	3.44	1.73	.65	.06	3.57	1.65	.51	.02	.02	.08	328	.45	24,390	11	.4	528	7.6
Nov. 21-30	53,490	11	3.59	1.56	.65	.05	3.51	1.64	.56	.03	.01	--	332	.45	24,070	11	.4	534	7.8
Dec. 1-10	51,030	11	3.59	1.56	.65	.05	3.61	1.69	.59	.03	.01	--	335	.46	23,470	11	.4	534	8.1
Dec. 11-20	49,150	10	3.59	1.64	.70	.06	3.67	1.67	.59	.02	.03	.10	340	.46	22,610	12	.4	553	7.6
Dec. 21-31	49,430	11	3.69	1.73	.74	.06	3.80	1.81	.62	.01	.02	--	358	.49	24,220	12	.5	580	7.7
Jan. 1-10, 1954	46,510	11	3.54	1.64	.74	.06	3.64	1.71	.56	.02	.02	--	342	.47	21,860	12	.5	553	7.8
Jan. 11-20	45,920	11	3.59	1.64	.74	.06	3.64	1.73	.62	.02	.02	.08	347	.47	21,580	12	.5	555	7.7
Jan. 21-31	50,960	11	3.59	1.64	.74	.06	3.61	1.73	.56	.02	.01	--	339	.46	23,440	12	.5	553	7.8

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR HEISE, IDAHO--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954...	44,670	11	3.64	1.73	0.74	0.06	3.75	1.79	0.62	0.01	0.02	--	352	0.48	21,440	12	0.5	569	7.9
Feb. 11-20	44,730	11	3.54	1.64	.70	.06	3.59	1.73	.62	.02	.02	0.10	342	.47	21,020	12	.4	552	7.7
Feb. 21-28.....	34,750	10	3.59	1.64	.74	.06	3.62	1.75	.65	.02	.02	--	342	.47	16,330	12	.5	556	7.8
Mar. 1-10	43,160	11	3.74	1.73	.74	.06	3.75	1.79	.68	.01	.02	--	354	.48	20,720	12	.4	573	7.9
Mar. 11-20	48,650	11	3.44	1.56	.74	.07	3.51	1.58	.62	.02	.02	.08	330	.45	21,890	13	.5	532	7.6
Mar. 21-31	49,610	11	3.49	1.56	.78	.07	3.57	1.69	.68	.02	.01	--	340	.46	22,820	13	.5	553	7.7
Apr. 1-10.....	53,450	10	3.39	1.56	.78	.07	3.52	1.58	.65	.02	.01	--	326	.44	23,520	13	.5	534	7.7
Apr. 11-20.....	93,980	9.3	2.99	1.32	.65	.06	3.24	1.21	.51	.02	.01	.06	281	.38	35,710	13	.4	464	7.7
Apr. 21-30.....	156,000	12	2.69	1.07	.48	.05	2.92	.94	.31	.02	.03	--	243	.33	51,480	11	.3	398	7.6
May 1-10	186,900	11	2.54	.99	.40	.04	2.82	.83	.24	.02	.02	--	226	.31	57,940	10	.3	371	7.8
May 11-20	364,000	10	2.15	.80	.25	.03	2.41	.56	.14	.02	.03	.04	180	.24	87,360	8	.2	300	7.6
May 21-31	475,200	10	1.85	.72	.27	.04	2.16	.50	.15	.02	.02	--	166	.23	109,300	9	.2	270	7.7
June 1-10.....	245,800	11	2.05	.91	.34	.04	2.36	.69	.19	.02	.01	--	189	.26	63,910	10	.3	312	7.6
June 11-20.....	223,500	11	2.20	.99	.36	.03	2.64	.73	.20	.01	.01	.04	202	.27	60,340	10	.3	336	8.0
June 21-30.....	416,100	12	1.95	.74	.29	.04	2.25	.52	.14	.01	.02	--	168	.23	95,700	10	.3	279	7.7
July 1-10	340,600	11	1.80	.72	.30	.04	2.08	.54	.15	.01	.01	--	161	.22	74,930	11	.3	268	7.4
July 11-20	275,700	11	1.80	.76	.33	.04	2.08	.58	.18	.02	.01	.05	168	.23	63,410	11	.3	282	7.5
July 21-31	252,400	11	1.85	.79	.38	.05	2.13	.67	.20	.02	.01	--	176	.24	60,580	12	.3	291	7.5
Aug. 1-10	211,300	14	1.85	.81	.41	.06	2.07	.71	.21	.03	.01	--	176	.24	50,710	13	.4	295	7.4
Aug. 11-20.....	177,000	13	2.05	.90	.44	.05	2.20	.79	.23	.03	.01	.07	188	.26	46,020	13	.4	312	7.4
Aug. 21-31	177,600	14	2.00	.90	.44	.05	2.20	.81	.26	.03	.01	--	190	.26	46,180	13	.4	318	7.5
Sept. 1-10	178,700	14	1.90	.82	.48	.05	2.07	.75	.26	.03	.01	--	179	.24	42,890	15	.4	302	7.4
Sept. 11-20	155,500	15	1.90	.81	.52	.05	2.18	.77	.34	.04	.00	.12	191	.26	40,430	16	.4	318	7.3
Sept. 21-30	102,600	13	2.40	1.07	.57	.05	2.62	1.08	.39	.03	.01	--	236	.32	32,830	14	.4	389	7.2
Total or weighted average	4,994,000	11	2.30	0.99	0.43	0.05	2.56	0.85	0.28	0.02	0.01	--	214	0.29	1,448,000	11	0.3	352	--

SNAKE RIVER MAIN STEM--Continued

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 Malad River.
DRAINAGE AREA.--35,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 574 micromhos Oct. 21; minimum daily, 472 micromhos Mar. 9.
Percent sodium: Maximum, 28 Oct. 1-10, 11-20; minimum, 24 Apr. 11-20, June 1-10.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 594 micromhos Oct. 3, 1952; minimum daily, 394 micromhos May 7, 1952.
Percent sodium: Maximum, 29 July 21-31, 1951; minimum, 17 Apr. 1-10, 1951.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1953 to September 1954 given in WSP 1347.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	182,500	41	2.45	1.89	1.70	0.11	3.83	1.35	0.82		0.05	--	354	0.48	87,600	28	1.2	556	8.2
Oct. 11-20	186,800	39	2.40	1.89	1.70	.12	3.77	1.31	.85		.05	0.13	358	.48	89,660	28	1.2	558	8.2
Oct. 21-31	206,000	38	2.45	1.89	1.61	.09	3.77	1.33	.79		.05	--	351	.47	96,820	27	1.1	555	7.9
Nov. 1-10	183,200	39	2.50	1.89	1.61	.09	3.74	1.39	.79		.05	--	350	.47	86,100	26	1.1	554	8.0
Nov. 11-20	183,700	36	2.40	1.89	1.61	.08	3.70	1.29	.82		.05	--	348	.47	86,340	27	1.1	551	8.0
Nov. 21-30	199,300	35	2.50	1.89	1.61	.08	3.74	1.31	.85		.05	--	345	.47	93,670	26	1.1	551	8.0
Dec. 1-10	197,800	35	2.40	1.81	1.57	.12	3.69	1.23	.85		.06	--	346	.47	92,970	27	1.1	552	7.9
Dec. 11-20	216,000	35	2.45	1.73	1.57	.12	3.69	1.21	.85		.06	.09	354	.48	103,700	27	1.1	550	7.9
Dec. 21-31	224,900	34	2.35	1.81	1.52	.12	3.67	1.19	.85		.06	--	340	.46	103,500	26	1.0	544	7.9
Jan. 1-10, 1954	204,900	37	2.40	1.73	1.48	.12	3.67	1.21	.85		.05	--	343	.47	96,300	26	1.0	546	8.0
Jan. 18-25	161,200	37	2.50	1.73	1.48	.12	3.64	1.23	.85		.05	.14	342	.47	75,760	25	1.0	542	8.0
Feb. 1-10	202,900	34	2.40	1.64	1.39	.12	3.54	1.19	.79		.06	--	329	.45	91,300	25	1.0	527	7.9
Feb. 11-20	205,700	34	2.35	1.64	1.39	.12	3.52	1.15	.79		.06	.14	328	.45	92,560	25	1.0	519	8.0
Feb. 21-28	166,600	33	2.40	1.64	1.39	.12	3.54	1.15	.79		.05	--	324	.44	73,300	25	1.0	519	8.1
Mar. 1-10	215,000	32	2.30	1.64	1.35	.12	3.44	1.15	.79		.04	--	320	.44	94,600	25	1.0	511	7.9
Mar. 11-20	204,600	31	2.35	1.56	1.44	.09	3.44	1.12	.76		.05	.37	318	.43	87,980	26	1.0	519	7.8
Mar. 21-31	220.200	32	2.40	1.56	1.44	.09	3.47	1.12	.76		.05	--	322	.44	96.890	26	1.0	516	7.7

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER AT KING HILL, IDAHO--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-10, 1954 ..	239,600	30	2.35	1.56	1.35	0.10	3.47	1.12	0.76		0.05	--	318	0.43	103,000	25	1.0	518	7.7
Apr. 11-20.....	202,800	28	2.40	1.56	1.30	.10	3.43	1.10	.73		.05	0.41	313	.43	87,200	24	.9	509	7.7
Apr. 21-30	177,400	27	2.30	1.48	1.30	.10	3.41	1.12	.73		.05	--	308	.42	74,510	25	.9	504	7.9
May 1-10	151,500	27	2.25	1.56	1.30	.10	3.38	1.10	.73		.04	--	310	.42	63,630	25	.9	506	8.0
May 11-20.....	138,100	31	2.00	1.64	1.39	.12	3.28	1.15	.73		.05	.09	308	.42	58,000	27	1.0	499	7.8
May 21-31	247,000	33	2.30	1.64	1.39	.12	3.44	1.17	.76		.05	--	319	.43	106,200	26	1.0	517	7.9
June 1-10.....	178,800	34	2.40	1.64	1.30	.11	3.47	1.12	.71		.04	--	318	.43	76,880	24	.9	510	8.0
June 11-20.....	188,000	30	2.35	1.64	1.39	.12	3.54	1.19	.73		.04	.14	328	.45	84,600	25	1.0	523	8.0
June 21-30.....	160,700	38	2.25	1.73	1.48	.12	3.57	1.19	.73		.05	--	336	.46	73,920	27	1.0	516	8.0
July 1-10	160,900	38	2.25	1.81	1.52	.10	3.57	1.17	.79		.05	--	341	.46	74,010	27	1.1	530	8.0
July 11-20	151,600	37	2.25	1.81	1.39	.12	3.54	1.17	.73		.05	.09	333	.45	68,220	25	1.0	519	7.9
July 21-31	173,900	37	2.30	1.81	1.52	.12	3.62	1.21	.79		.05	--	342	.47	81,730	26	1.1	528	8.1
Aug. 1-10	159,200	38	2.30	1.73	1.52	.12	3.62	1.21	.79		.05	--	341	.46	73,230	27	1.1	531	8.1
Aug. 11-20.....	159,500	37	2.30	1.81	1.48	.12	3.62	1.19	.76		.05	.08	338	.46	73,370	26	1.0	539	8.1
Aug. 21-31	183,500	43	2.30	1.73	1.52	.13	3.72	1.23	.79		.07	--	341	.46	84,410	27	1.1	538	7.9
Sept. 1-10	167,600	39	2.40	1.73	1.52	.13	3.65	1.23	.82		.07	.15	342	.47	78,770	26	1.1	541	7.7
Sept. 11-20	178,200	36	2.40	1.73	1.52	.13	3.69	1.25	.85		.07	--	343	.47	83,750	26	1.1	544	7.9
Sept. 21-30	183,000	37	2.40	1.81	1.52	.13	3.70	1.27	.82		.07	--	345	.47	86,010	26	1.0	547	7.9
Total or weighted average	a6,563,000	35	2.35	1.73	1.48	0.11	3.59	1.21	0.79		0.05	--	334	0.45	2,953,000	26	1.0	531	--

a Represents 96 percent of runoff for water year October 1953 to September 1954.

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.

LOCATION.--One mile downstream from gaging station, 1 mile upstream from Alpowa Creek, 8 miles downstream from Clarkston, Asotin County, and 133 miles upstream from mouth.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1951 to September 1954.
Water temperatures: November 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 500 micromhos Oct. 26; minimum daily, 91.8 micromhos May 22.
Percent sodium: Maximum, 36 Sept. 21-30; minimum, 26 Apr. 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 529 micromhos Nov. 30, Dec. 3, 1952; minimum daily, 91.8 micromhos May 22, 1954.
Percent sodium: Maximum, 36 Sept. 21-30, 1954; minimum, 25 May 1-10, 11-20, 1952, Apr. 24-30, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Discharge records for gaging station near Clarkston for water year October 1953 to September 1954 given in WSP 1347. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_3) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	442,700	31	1.80	1.32	1.70	0.11	3.25	1.06	0.48		0.03	--	296	0.40	177,100	34	1.4	459	7.5
Oct. 11-20	448,700	34	1.95	1.32	1.74	.12	3.48	1.04	.45		.03	0.13	305	.41	184,000	34	1.4	474	7.7
Oct. 21-31	499,800	32	2.20	1.32	1.74	.11	3.69	1.19	.51		.03	--	314	.43	214,900	32	1.3	490	7.8
Nov. 1-10	468,100	34	1.80	1.23	1.65	.11	3.16	1.12	.51		.03	--	300	.41	191,900	34	1.3	463	7.7
Nov. 11-20	443,100	31	2.00	1.23	1.44	.10	3.11	1.04	.51		.04	--	285	.39	172,800	30	1.1	440	7.6
Nov. 21-30	515,300	30	1.80	1.15	1.44	.10	2.79	1.06	.51		.04	--	272	.37	190,700	32	1.2	420	7.6
Dec. 1-6	309,200	29	1.80	1.07	1.30	.10	2.69	1.00	.51		.03	--	262	.36	111,300	31	1.1	403	7.6
Dec. 11-20	516,100	28	1.85	1.07	1.35	.10	2.69	1.04	.56		.03	--	266	.36	185,800	31	1.1	409	7.6
Dec. 21-31	616,700	28	1.70	1.15	1.22	.08	2.62	.92	.45		.04	--	248	.34	209,700	29	1.0	392	7.6
Jan. 1-10, 1954	524,400	27	1.70	1.07	1.30	.08	2.62	.94	.48		.03	--	251	.34	178.300	31	1.1	399	7.7
Jan. 11-20	526,000	28	1.80	1.15	1.22	.07	2.69	.98	.54		.03	.08	255	.35	184,100	29	1.0	402	7.8
Jan. 21-31	606,300	28	1.70	1.15	1.13	.07	2.49	.87	.48		.03	--	240	.33	200,100	28	.9	374	7.8
Feb. 1-10	669,400	27	1.45	.99	.96	.07	2.20	.75	.45		.03	--	212	.29	194,100	28	.9	327	7.6
Feb. 11-20	762,600	26	1.35	.90	.91	.07	2.05	.71	.39		.03	.06	200	.27	205,900	28	.9	303	7.5
Feb. 21-28	652,800	27	1.30	.81	.83	.05	1.92	.67	.34		.03	--	189	.26	169,700	28	.8	293	7.6
Mar. 1-10	713,500	27	1.40	.82	.91	.05	2.08	.71	.34		.02	--	199	.27	192,600	29	.9	314	7.6
Mar. 11-20	966,300	24	1.15	.72	.70	.05	1.74	.56	.28		.02	.04	166	.23	222,200	27	.7	256	7.4
Mar. 21-31	760,700	23	1.25	.74	.83	.07	1.93	.65	.31		.03	--	178	.24	182,600	29	.8	287	7.8

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-10, 1954 ..	987,000	23	1.25	0.75	0.83	0.07	1.87	0.62	0.34		0.03	--	177	0.24	236,900	29	0.8	284	7.5
Apr. 11-20.....	1,684,000	20	.95	.58	.57	.05	1.43	.44	.23		.03	0.37	134	.18	303,100	26	.6	210	7.3
Apr. 21-30.....	1,739,000	17	.75	.42	.48	.05	1.13	.33	.17		.02	--	108	.15	260,800	28	.6	168	7.4
May 1-10	1,848,000	15	.70	.40	.48	.04	1.08	.35	.17		.01	--	105	.14	258,700	30	.6	159	7.2
May 11-22	4,024,000	12	.48	.26	.32	.03	.75	.25	.11		.01	.05	79	.11	442,600	29	.5	110	7.0
May 23-31	2,199,000	14	.60	.36	.44	.03	.98	.29	.13		.01	--	93	.13	285,900	30	.6	141	7.3
June 1-10.....	1,835,000	20	.90	.50	.65	.05	1.41	.46	.21		.01	--	130	.18	330,300	31	.8	208	7.1
June 11-20.....	2,118,000	17	.85	.43	.57	.05	1.21	.40	.17		.01	.05	116	.16	338,900	30	.7	183	7.1
June 21-30.....	2,206,000	14	.75	.37	.48	.04	1.07	.33	.15		.01	--	99	.13	286,800	29	.6	154	7.1
July 1-10	1,574,000	16	.80	.41	.52	.04	1.26	.33	.16		.01	--	111	.15	236,100	29	.7	175	7.1
July 11-20	951,100	15	.90	.49	.65	.05	1.36	.46	.20		.01	.06	128	.17	161,700	31	.8	204	7.3
July 21-31	686,900	20	1.15	.67	.96	.06	1.93	.67	.28		.01	--	175	.24	164,900	34	1.0	286	7.2
Aug. 1-10.....	489,900	25	1.45	.90	1.22	.08	2.54	.77	.34		.02	--	220	.30	147,000	33	1.1	354	7.6
Aug. 11-20	446,100	25	1.50	.99	1.26	.08	2.62	.79	.37		.02	.06	231	.31	148,300	33	1.1	371	7.6
Aug. 21-31.....	559,900	24	1.50	.09	1.35	.09	2.59	.87	.37		.02	--	231	.31	173,600	35	1.2	372	7.4
Sept. 1-10	438,100	26	1.65	1.07	1.44	.11	2.85	.90	.45		.03	--	252	.34	149,000	34	1.2	405	7.4
Sept. 11-20	451,600	32	1.70	1.07	1.57	.10	2.82	1.06	.48		.04	.12	268	.36	162,600	35	1.3	412	7.6
Sept. 21-30	446,700	35	1.75	1.07	1.61	.10	3.02	1.00	.45		.03	--	272	.37	165,300	36	1.4	421	7.6
Total or weighted average	a35,130,000	20	1.10	0.65	0.78	0.06	1.69	0.56	0.27		0.02	--	159	0.22	7,729,000	30	0.8	247	--

a Represents 99 percent of runoff for water year October 1953 to September 1954.

BOISE RIVER BASIN

BOISE RIVER AT NOTUS, IDAHO

LOCATION.--At steel highway bridge 1,100 feet downstream from gaging station, a quarter of a mile southeast of Notus, Canyon County, and 7 miles northwest of Caldwell.
DRAINAGE AREA.--3,820 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1939 to January 1940, November 1950 to September 1954.
Water temperatures: November 1950 to September 1954.
Sediment records: January 1939 to June 1940.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 722 micromhos Aug. 18; minimum daily, 122 micromhos May 24.
Percent sodium: Maximum, 50 July 11-20, Aug. 11-20, Sept. 1-10; minimum, 33 Apr. 11-20, 21-30.
EXTREMES, 1939-40, 1950-54.--Specific conductance: Maximum daily, 1,470 micromhos July 30, Aug. 26, 1939; minimum daily, 81.7 micromhos Apr. 27, 1952.
Percent sodium: Maximum, 64 Sept. 1-10, 1939; minimum, 25 Apr. 11-20, 1951.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1953 to September 1954 given in WSP 1347.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953...	10,100	33	1.95	0.99	2.83	0.10	3.72	1.50	0.51		0.05	--	357	0.49	4,950	48	2.3	548	8.0
Oct. 11-20.....	14,300	36	2.10	1.07	2.74	.10	a3.84	1.52	.48		.04	0.14	364	.50	7,150	46	2.2	557	8.3
Oct. 21-31.....	18,800	37	2.50	1.32	3.26	.12	4.51	1.94	.62		.06	--	436	.59	11,090	45	2.4	667	7.7
Nov. 1-10	15,530	36	2.50	1.23	3.22	.12	4.49	1.94	.56		.06	--	431	.59	9,160	46	2.4	661	7.8
Nov. 11-20	14,280	37	2.50	1.32	3.30	.12	4.46	1.96	.65		.07	.12	437	.59	8,430	46	2.4	664	7.9
Nov. 21-30.....	14,120	36	2.50	1.32	3.22	.12	4.39	1.89	.65		.06	--	429	.58	8,190	45	2.3	656	7.8
Dec. 1-10.....	13,790	36	2.50	1.23	3.09	.12	4.29	1.83	.62		.06	--	415	.56	7,720	45	2.3	634	7.7
Dec. 11-20.....	13,400	35	2.45	1.23	3.09	.11	4.26	1.81	.62		.04	.13	411	.56	7,500	45	2.3	630	7.6
Dec. 21-31	13,900	35	2.69	1.23	3.09	.11	4.59	1.81	.62		.04	--	422	.57	7,920	43	2.2	650	7.7
Jan. 1-10, 1954...	11,980	38	2.69	1.15	2.91	.09	4.29	1.85	.59		.03	--	422	.57	6,830	43	2.1	645	7.7
Jan. 11-20.....	11,720	36	2.79	1.15	3.04	.10	4.52	1.85	.59		.01	.15	423	.58	6,800	43	2.2	645	7.5
Jan. 21-31.....	14,750	33	2.69	1.07	2.65	.10	4.26	1.69	.59		.02	--	394	.54	7,960	41	1.9	604	7.6

a Includes 0.47 equivalent per million of carbonate (CO_3).

BOISE RIVER BASIN--Continued

BOISE RIVER AT NOTUS, IDAHO--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 1-10, 1954	15,250	33	2.79	0.99	2.44	0.09	4.20	1.48	0.54		0.05	--	372	0.51	7,780	39	1.8	578	7.8
Feb. 11-19	13,940	31	2.25	1.07	2.22	.08	3.47	1.46	.42		.09	0.11	337	.46	6,410	40	1.7	523	7.8
Feb. 20-28	31,760	23	1.35	.51	1.09	.04	1.97	.73	.23		.05	--	193	.26	8,260	36	1.1	299	7.8
Mar. 1-9	34,810	21	1.20	.46	1.09	.04	1.84	.67	.20		.06	--	173	.24	8,350	39	1.2	273	7.5
Mar. 10-18	83,720	17	.85	.30	.61	.04	1.25	.35	.11		.04	.07	113	.15	12,560	34	.8	170	7.3
Mar. 19-22	18,050	21	1.15	.47	.96	.04	1.70	.62	.20		.05	--	166	.23	4,150	37	1.1	249	7.7
Mar. 23-31	18,710	24	1.65	.77	1.65	.06	2.52	1.15	.34		.06	--	288	.39	7,300	40	1.5	399	7.7
Apr. 1-5	6,620	28	2.00	.90	2.26	.06	3.11	1.50	.42		.07	--	315	.43	2,850	43	1.9	490	7.7
Apr. 6-10	12,540	21	1.30	.54	1.17	.04	1.85	.79	.25		.04	--	179	.24	3,010	38	1.2	278	7.4
Apr. 11-20	54,660	17	.80	.30	.57	.03	1.16	.33	.11		.03	.08	107	.15	8,200	33	.8	158	7.4
Apr. 21-30	54,330	16	.80	.31	.57	.03	1.20	.33	.12		.02	--	110	.15	8,150	33	.8	162	7.4
May 1-10	31,220	19	.90	.35	.87	.05	1.48	.44	.15		.03	--	138	.19	5,930	40	1.1	211	7.6
May 11-20	35,330	17	.90	.35	.78	.05	1.44	.44	.15		.03	.04	132	.18	6,360	38	1.0	202	7.4
May 21-26	50,180	15	.65	.22	.48	.04	1.05	.25	.09		.03	--	98	.13	6,520	34	.7	140	7.3
May 27-31	19,540	18	.90	.39	.91	.05	1.54	.50	.17		.04	--	152	.21	4,100	40	1.1	222	7.3
June 1-10	35,520	20	1.05	.43	1.00	.05	1.77	.56	.19		.04	--	168	.23	8,170	40	1.2	256	7.8
June 11-23	24,500	22	1.20	.51	1.35	.05	2.15	.71	.25		.04	.09	201	.27	6,620	43	1.5	310	7.5
June 24-30	34,830	16	.80	.30	.65	.04	1.29	.33	.12		.03	--	116	.16	5,570	36	.9	176	7.4
July 1-5	11,110	20	1.10	.44	1.09	.06	1.90	.58	.20		.03	--	175	.24	2,670	40	1.2	266	7.5
July 6-10	2,530	27	1.75	.82	2.26	.11	3.15	1.29	.45		.04	--	309	.42	1,060	46	2.0	476	7.9
July 11-20	4,640	28	1.65	.90	2.61	.10	3.38	1.35	.51		.05	.13	338	.46	2,130	50	2.3	506	7.8
July 21-31	5,160	29	1.90	1.07	2.74	.10	3.61	1.50	.56		.05	--	350	.48	2,480	47	2.2	540	8.0

Aug. 1-10, 1954...	2,200	30	2.15	1.23	3.39	.12	4.20	2.06	.73		.04	--	430	.58	1,280	49	2.6	667	8.0
Aug. 11-20.....	2,400	32	2.25	1.23	3.61	.12	4.38	2.12	.79		.05	.18	448	.61	1,460	50	2.7	689	8.0
Aug. 21-31	6,440	33	2.05	1.07	3.13	.11	3.98	1.71	.71		.06	--	385	.52	3,350	49	2.5	589	8.2
Sept. 1-10	4,240	37	2.30	1.15	3.57	.12	b4.41	2.04	.73		.06	--	441	.60	2,540	50	2.7	669	8.3
Sept. 11-20.....	10,710	32	1.95	.99	2.61	.11	3.65	1.48	.51		.06	.11	348	.47	5,030	46	2.2	535	7.8
Sept. 21-30	7,360	33	2.15	1.07	3.26	.11	4.11	1.79	.62		.08	--	399	.54	3,970	49	2.6	611	8.0
Total or weighted average	799,000	23	1.40	0.61	1.48	0.06	2.31	0.87	0.28		0.04	--	221	0.30	239,700	42	1.5	336	--

b Includes 0.23 equivalent per million of carbonate (CO_3).

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

DESCHUTES RIVER BASIN

DESCHUTES RIVER AT MOODY, NEAR BIGGS, OREG.

LOCATION.--At right bank, 0.5 mile upstream from bridge on U. S. Highway 30, 0.6 mile downstream from gaging station at Moody, 0.9 mile upstream from mouth, and about 4 miles southwest of Biggs, Sherman County.
DRAINAGE AREA.--10,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1911 to July 1912, December 1952 to February 1954.
Water temperatures.--December 1952 to February 1954.
EXTREMES, 1952-53.--Specific conductance: Maximum daily, 141 micromhos Jan. 18, Mar. 26; minimum daily, 92.4 micromhos Jan. 19.
Percent sodium: Maximum, 36 July 1-10; minimum, 27 Apr. 21-30.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Discharge records for water year October 1953 to September 1954 given in WSP 1348.

Chemical analyses, October 1953 to February 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	95,350	31	0.35	0.44	0.52	0.06	1.16	0.05	0.07	0.00	0.01	0.10	86	0.12	11,440	38	0.8	130	7.4
Oct. 11-20.....	96,120	31	.33	.41	.56	.05	1.20	.06	.07	.01	.01	.10	90	.12	11,530	42	.9	128	7.4
Oct. 21-31.....	102,600	34	.33	.51	.48	.05	1.21	.06	.07	.00	.01	.05	89	.12	12,310	35	.7	129	7.6
Nov. 1-10	97,920	35	.35	.41	.61	.05	1.20	.05	.09	.02	.01	--	98	.13	12,730	43	1.0	127	7.5
Nov. 11-20	108,100	34	.33	.44	.41	.05	1.11	.05	.08	.01	.01	.04	101	.14	15,130	33	.7	121	7.4
Nov. 21-30	138,100	33	.33	.41	.39	.05	1.06	.05	.09	.01	.10	--	92	.13	17,950	33	.6	117	7.3
Dec. 1-10.....	129,800	32	.36	.34	.42	.05	1.10	.04	.06	.00	.01	--	98	.13	16,870	36	.7	117	7.9
Dec. 11-20	150,300	32	.36	.33	.41	.05	1.03	.04	.08	.00	.01	--	97	.13	19,540	36	.7	115	7.8
Dec. 21-31	194,200	28	.38	.30	.39	.05	1.00	.04	.06	.00	.01	--	98	.13	25,250	35	.7	110	7.8
Jan. 1-10, 1954 ..	146,300	30	.43	.35	.44	.06	1.15	.05	.07	.02	.02	--	100	.14	20,480	34	.7	125	7.7
Jan. 11-20.....	141,800	31	.41	.35	.44	.05	1.08	.04	.07	.01	.02	.08	94	.13	18,430	35	.7	118	7.5
Jan. 21-31	216,200	31	.45	.24	.40	.06	1.03	.05	.06	.00	.02	--	101	.14	30,270	35	.7	112	7.4
Feb. 1-15	286,600	31	.38	.34	.39	.06	1.05	.02	.12	.00	.02	.05	100	.14	40,120	33	.6	119	7.2

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 The Dalles gaging station, which is just upstream from Celilo Falls, 3 miles downstream from Deschutes River, and 11 miles east of The Dalles, Wasco County, and at mile 201.
DRAINAGE AREA.--237,000 square miles (above gaging station near The Dalles).
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 242 micromhos Oct. 8; minimum daily, 115 micromhos May 17, 18.
Percent sodium: Maximum, 23 Oct. 1-10, Jan. 1-10, Mar. 11-20; minimum, 9 July 1-10, 21-31.
EXTREMES, 1950-54.--Specific conductance: Maximum daily, 268 micromhos Dec. 29, 1952; minimum daily, 115 micromhos May 17, 18, 1954.
Percent sodium: Maximum, 32 Aug. 11-20, 1953; minimum, 9 July 1-10, 21-31, 1954.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Portland, Oreg. Discharge records for gaging station near The Dalles for water year October 1953 to September 1954 given in WSP 1348. These records include the inflow of the Deschutes River, which on the average amounts to less than 5 percent of the annual runoff at the gaging station. No other appreciable inflow between Maryhill Ferry and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953...	2,008,000	7.3	1.10	0.63	0.52	0.05	1.61	0.46	0.25	--	0.02	0.08	a131	0.18	361,400	23	0.6	212	7.5
Oct. 11-20.....	2,040,000	9.0	1.15	.55	.48	.05	1.61	.46	.14	--	.02	.09	a128	.17	346,800	21	.5	218	7.4
Oct. 21-31.....	2,153,000	9.8	1.20	.50	.48	.06	1.64	.48	.14	--	.03	.06	a132	.18	387,500	21	.5	222	7.4
Nov. 1-10.....	2,056,000	12	1.25	.53	.52	.05	1.67	.48	.16	.00	.02	--	142	.19	390,600	22	.6	238	7.7
Nov. 11-20.....	2,047,000	12	1.25	.51	.48	.05	1.67	.46	.14	.01	.02	--	140	.19	388,900	21	.5	233	8.0
Nov. 21-30.....	1,982,000	12	1.20	.56	.48	.04	1.67	.46	.16	.00	.02	--	142	.19	376,600	21	.5	235	7.8
Dec. 1-10.....	1,996,000	14	1.15	.58	.48	.06	1.67	.46	.16	.00	.02	--	143	.19	379,200	21	.5	229	7.8
Dec. 11-20.....	2,079,000	14	1.15	.57	.48	.04	1.64	.44	.14	.01	.02	--	144	.20	415,800	21	.5	224	8.0
Dec. 21-31.....	2,313,000	15	1.15	.53	.48	.05	1.64	.44	.16	.01	.02	--	149	.20	462,600	22	.5	226	8.0
Jan. 1-10, 1954 ..	2,191,000	14	1.20	.52	.52	.05	1.64	.44	.14	.02	.03	--	132	.18	394,400	23	.6	222	7.7
Jan. 11-20.....	2,155,000	14	1.20	.51	.48	.05	1.66	.44	.14	.02	.03	.05	132	.18	387,900	21	.5	219	7.7
Jan. 21-31.....	2,565,000	13	1.15	.54	.44	.05	1.59	.42	.15	.02	.02	--	128	.17	436,000	20	.5	213	7.7
Feb. 1-14.....	3,463,000	15	1.05	.65	.44	.06	1.57	.42	.14	.02	.03	.09	140	.19	658,000	20	.5	222	7.6
Feb. 15-28.....	3,461,000	16	1.05	.61	.44	.06	1.54	.40	.16	.02	.04	--	138	.19	657,600	20	.5	216	7.6

a Sum of determined constituents.

COLUMBIA RIVER MAIN STEM.--Continued

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

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1954..	2,386,000	13	1.05	0.53	0.48	0.06	1.56	0.40	0.18	0.02	0.02	--	140	0.19	453,300	22	0.5	211	7.8
Mar. 11-20	2,902,000	13	1.05	.51	.48	.06	1.52	.40	.17	.02	.02	.20	134	.18	522,400	23	.5	208	7.8
Mar. 21-31	2,819,000	13	1.10	.48	.44	.05	1.54	.38	.16	.02	.02	--	126	.17	479,200	20	.5	205	7.8
Apr. 1-10	2,703,000	17	1.05	.46	.37	.05	1.46	.35	.11	.02	.02	--	126	.17	459,500	19	.4	192	7.8
Apr. 11-20.....	3,221,000	13	.90	.40	.36	.05	1.25	.29	.12	.02	.02	.15	113	.15	483,200	21	.4	170	7.7
Apr. 21-30	3,540,000	10	.80	.31	.30	.05	1.10	.25	.10	.02	.02	--	98	.13	460,200	21	.4	147	7.6
May 1-10	4,005,000	12	.80	.33	.27	.05	1.06	.27	.08	.02	.02	--	93	.13	520,600	19	.4	151	8.1
May 11-20	7,543,000	7.5	.70	.29	.19	.04	.95	.23	.05	.01	.02	.08	80	.11	829,700	16	.3	130	8.1
May 21-31	11,610,000	8.5	.80	.27	.17	.04	.98	.23	.05	.01	.02	--	82	.11	1,277,000	13	.2	134	8.0
June 1-10	10,060,000	13	.80	.35	.17	.07	1.10	.23	.05	.01	.01	--	85	.12	1,207,000	12	.2	134	7.8
June 11-20	10,090,000	11	.80	.34	.15	.07	1.08	.20	.03	.01	.01	--	81	.11	1,110,000	11	.2	131	7.8
June 21-30	9,771,000	9.8	.85	.35	.14	.06	1.10	.20	.10	.00	.01	--	84	.11	1,075,000	10	.2	144	7.3
July 1-10	8,787,000	8.6	.85	.34	.13	.06	1.15	.20	.03	.00	.01	--	80	.11	966,600	9	.2	134	7.4
July 11-20	9,070,000	8.4	.90	.37	.15	.06	1.16	.23	.05	.00	.01	--	84	.11	997,700	10	.2	143	7.5
July 21-31	8,055,000	7.9	.90	.40	.14	.06	1.23	.23	.04	.01	.01	--	86	.12	966,600	9	.2	146	7.3
Aug. 1-10	5,060,000	9.5	1.00	.34	.22	.04	1.28	.25	.07	.00	.01	--	97	.13	657,800	14	.3	158	7.4
Aug. 11-20	4,062,000	8.2	1.00	.32	.23	.04	1.30	.27	.06	.00	.01	.04	98	.13	528,100	14	.3	160	7.4
Aug. 21-31	4,120,000	7.6	1.00	.39	.27	.04	1.34	.29	.08	.01	.01	--	102	.14	576,800	16	.3	169	7.3
Sept. 1-10	3,519,000	8.0	1.05	.40	.31	.04	1.38	.31	.08	.01	.02	--	108	.15	527,800	17	.4	178	8.0
Sept. 11-20	2,902,000	9.8	1.05	.43	.36	.04	1.41	.35	.10	.02	.01	.02	114	.16	464,300	19	.4	186	8.1
Sept. 21-30	2,620,000	12	1.15	.47	.48	.05	1.62	.44	.15	.00	.02	--	136	.18	471,600	22	.5	214	7.9
Total or weighted average	151,400,000	11	0.95	0.40	0.28	0.05	1.28	0.29	0.0	0.01	0.02	--	103	0.14	21,200,000	16	0.3	167	--

WILLAMETTE RIVER BASIN

WILLAMETTE RIVER AT SALEM, OREG.

LOCATION.--At bridge on Oregon Highway 22, 300 feet downstream from gaging station at Salem, Marion County.
DRAINAGE AREA.--7,280 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August to December 1910, August 1911 to August 1912, February 1951 to September 1954.
Water temperatures: February 1951 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 109 micromhos Aug. 5; minimum daily, 39.6 micromhos Nov. 22.
Percent sodium: Maximum, 32 Jan. 1-4, 8-10, 12, 14-16, June 1-10; minimum, 25 Oct. 1-10, June 11-20.
EXTREMES, 1951-54.--Specific conductance: Maximum daily, 109 micromhos Aug. 5, 1954; minimum daily, 34.6 micromhos Jan. 20, 1953.
Percent sodium: Maximum, 36 July 11-20, 1952; minimum, 20 Apr. 11-20, 1951, May 11-20, 1952, Mar. 21-31, 1953.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Portland, Oreg. Discharge records for water year October 1953 to September 1954 given in WSP 1348.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953	158,200	15	0.28	0.23	0.17	0.02	0.52	0.05	0.09	0.01	0.02	--	54	0.07	11,070	25	0.3	66.7	7.0
Oct. 19-22, 24-27	178,800	15	.26	.17	.17	.02	.49	.04	.08	.00	.02	--	54	.07	12,520	27	.4	61.2	7.0
Oct. 11-18, 23, 28-31	213,600	15	.28	.20	.17	.02	.49	.05	.09	.01	.02	0.05	56	.08	17,090	26	.4	67.0	6.9
Nov. 1-10, 13	176,900	13	.33	.11	.18	.03	.52	.05	.10	.00	.01	--	62	.08	14,150	28	.4	69.8	7.1
Nov. 11, 12, 14-21	323,900	15	.28	.10	.15	.03	.43	.05	.08	.00	.02	--	58	.08	25,910	27	.3	62.7	7.0
Nov. 22-30	1,728,000	14	.20	.11	.12	.02	.33	.04	.06	.00	.02	--	a38	.05	86,400	26	.3	50.2	6.8
Dec. 1-10	1,756,000	14	.22	.07	.14	.03	.36	.04	.06	.00	.02	--	52	.07	122,900	30	.4	49.3	7.1
Dec. 11-20	1,630,000	12	.26	.07	.16	.03	.43	.04	.06	.01	.02	.01	50	.07	114,100	30	.4	52.2	7.0
Dec. 21-31	1,544,000	16	.25	.11	.14	.03	.43	.04	.05	.00	.02	--	48	.07	108,100	26	.3	52.6	7.0
Jan. 1-4, 8-10, 12, 14-16, 1954.	748,600	23	.30	.13	.22	.03	.54	.05	.06	.01	.02	--	68	.09	67,370	32	.5	67.3	7.3
Jan. 5-7, 11, 13, 17-20	1,019,000	19	.24	.12	.16	.03	.41	.06	.06	.01	.02	.05	56	.08	81,520	29	.4	56.0	7.1
Jan. 21-31	2,048,000	15	.19	.15	.14	.03	.36	.04	.05	.01	.02	--	54	.07	143,400	27	.3	47.1	7.0
Feb. 1-4, 8, 10, 13-16, 18, 20-23	2,100,000	15	.26	.05	.15	.03	.39	.04	.06	.00	.01	.08	50	.07	147,000	31	.4	48.7	7.1
Feb. 5-7, 9, 11-12, 17, 19, 24-28	1,217,000	17	.32	.06	.16	.03	.43	.04	.06	.01	.01	--	50	.07	85,190	29	.4	55.6	7.0

a Sum of determined constituents.

WILLAMETTE RIVER BASIN--Continued

WILLAMETTE RIVER AT SALEM, OREG.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1954..	486,700	16	0.29	0.12	0.17	0.02	0.48	0.05	0.07	0.00	0.02	--	56	0.08	38,940	29	0.4	60.2	7.4
Mar. 11-20	668,800	14	.26	.12	.16	.02	.48	.04	.06	.00	.01	--	55	.07	46,820	29	.4	58.0	7.3
Mar. 21-31	397,900	16	.28	.15	.18	.03	.49	.06	.07	.00	.02	--	61	.08	31,830	29	.4	63.6	7.3
Apr. 1-10.....	723,600	15	.27	.12	.16	.03	.43	.05	.06	.01	.01	--	54	.07	50,650	28	.4	55.4	6.8
Apr. 11-20	671,800	12	.23	.11	.14	.03	.41	.04	.06	.01	.01	05	44	.06	40,310	27	.3	49.7	7.2
Apr. 21-30.....	341,400	16	.25	.13	.16	.03	.44	.04	.07	.00	.01	--	51	.07	23,900	28	.4	59.5	7.1
May 1-10	258,800	13	.26	.15	.16	.03	.46	.06	.06	.00	.01	--	54	.07	18,120	28	.4	61.6	7.2
May 11-20	262,000	14	.26	.11	.16	.03	.43	.05	.05	.00	.01	02	53	.07	18,340	29	.4	57.9	7.2
May 21-31	261,200	14	.24	.12	.15	.03	.46	.05	.05	.00	.01	--	52	.07	18,280	29	.4	57.4	7.7
June 1-10.....	280,700	17	.26	.10	.16	--	.43	.05	.06	.00	.01	--	47	.06	16,840	32	.4	54.7	6.9
June 11-20.....	376,900	17	.22	.12	.11	--	.39	.04	.06	.00	.01	--	43	.06	22,610	25	.3	47.9	6.9
June 21-30.....	274,900	18	.24	.12	.13	--	.43	.04	.05	.00	.01	--	46	.06	16,490	26	.3	52.7	6.9
July 1-10	214,400	19	.24	.11	.16	.02	.48	.03	.04	.00	.01	--	51	.07	15,010	30	.4	59.3	7.0
July 11-20	168,500	19	.30	.08	.17	.02	.48	.05	.06	.00	.01	02	56	.08	13,480	30	.4	63.1	7.0
July 21-31	150,900	20	.28	.13	.17	.02	.51	.05	.06	.00	.01	--	56	.08	12,070	29	.4	53.8	7.0
Aug. 1-10	123,000	19	.32	.16	.22	.02	.54	.07	.10	.01	.01	--	61	08	9,840	30	.4	71.6	6.9
Aug. 11-20	131,600	19	.30	.13	.18	.02	.52	.05	.08	.00	.01	02	54	.07	9,210	29	.4	66.4	6.9
Aug. 21-31	154,100	17	.31	.12	.19	.02	.51	.04	.07	.01	.01	--	54	.07	10,790	29	.4	64.0	6.7
Sept. 1-10	146,000	18	.29	.12	.17	.03	.51	.04	.06	.00	.01	--	49	.07	10,220	28	.4	61.7	7.1
Sept. 11-20	188,700	18	.29	.11	.17	.03	.49	.05	.06	.00	.00	05	51	.07	13,210	29	.4	61.1	7.3
Sept. 21-30	173,900	17	.31	.16	.18	.02	52	.06	.08	.01		--	55	.07	12,170	26	.4	67.1	7.0
Total or weighted average	21,300,000	15	0.25	0.11	0.15	0.03	0.43	0.04	0.06	0.06	0.01	--	51	0.07	1,491,000	28	0.4	54.2	

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ROGUE RIVER BASIN

ROGUE RIVER AT GRANTS PASS, OREG.

LOCATION.--At bridge on U. S. Highway 99 at Grants Pass, Josephine County, and 0.6 mile downstream from gaging station.
DRAINAGE AREA.--2,420 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1953 to September 1954.
Water temperatures: January 1953 to September 1954.
EXTREMES, 1953-54.--Specific conductance: Maximum daily, 251 micromhos Feb. 21; minimum daily, 60.7 micromhos May 24.
Percent sodium: Maximum, 35 Oct. 11-20; minimum, 11 Feb. 16-22.
EXTREMES, January 1953 to September 1954.--Specific conductance: Maximum daily, 251 micromhos Feb. 21, 1954; minimum daily, 58.5 micromhos Jan. 19, 1943.
Percent sodium: Maximum, 35 Oct. 11-20, 1953; minimum, 11 Feb. 16-22, 1954.
REMARKS.--Values reported for dissolved solids are residue on evaporation unless otherwise noted. Records of specific conductance of daily samples available in district office at Portland, Oreg. Discharge records for water year October 1953 to September 1954 given in WSP 1348.

Chemical analyses, water year October 1953 to September 1954

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1953 ..	35,210	32	0.35	0.41	0.40	0.04	1.08	0.05	0.07	0.02	0.01	0.05	a 94	0.13	4,580	33	0.6	98.6	7.0
Oct. 11-20	38,440	31	.35	.34	.39	.04	.84	.05	.08	.02	.00	.06	a 83	.11	4,230	35	.7	97.3	7.7
Oct. 21-31	37,770	31	.39	.40	.25	.04	.84	.05	.07	.02	.01	.04	a 82	.11	4,150	23	.4	97.0	7.2
Nov. 1-21.....	79,080	30	.40	.24	.26	.04	.85	.04	.08	.00	.01	--	85	.12	9,490	27	.5	97.1	7.4
Nov. 22-30.....	255,700	19	.33	.18	.16	.04	.57	.04	.06	.00	.02	--	a 56	.08	20,460	22	.3	72.2	7.3
Dec. 1-10.....	203,300	23	.42	.19	.21	.04	.75	.04	.06	.01	.02	--	a 68	.09	18,300	24	.4	84.2	7.4
Dec. 11-20.....	133,000	22	.41	.21	.21	.04	.75	.04	.05	.00	.02	.06	75	.10	13,300	24	.4	84.1	7.8
Dec. 21-31.....	115,800	25	.38	.21	.20	.03	.75	.04	.04	.02	.01	--	68	.09	10,420	25	.4	81.2	7.6
Jan. 1-10, 1954 ..	94,610	25	.43	.27	.24	.05	.85	.05	.08	.00	.02	--	a 77	.10	9,460	25	.4	98.7	7.2
Jan. 11-20.....	227,000	23	.50	.25	.23	.04	.90	.05	.05	.00	.02	.01	a 76	.10	22,700	23	.4	103	7.2
Jan. 21-31.....	363,400	22	.46	.32	.24	.04	.90	.05	.07	.00	.02	--	a 76	.10	36,340	22	.4	101	7.2
Feb. 1-15, 23-28	403,200	25	.65	.04	.21	.04	.84	.05	.08	.00	.01	.02	81	.11	44,350	23	.4	94.0	7.5
Feb. 16-22	118,400	23	1.30	.39	.22	.05	1.61	.21	.03	.00	.05	--	136	.18	21,310	11	.2	190	7.8
Mar. 1-10	102,100	28	.44	.29	.24	.03	.90	.05	.06	.00	.02	--	85	.12	12,250	24	.4	98.5	7.4
Mar. 11-20	99,710	25	.43	.24	.21	.04	.80	.04	.06	.00	.01	--	77	.10	9,970	23	.4	89.0	7.7
Mar. 21-31	79,080	26	.43	.29	.24	.04	.88	.05	.08	.00	.01	--	84	.11	8,700	24	.4	98.4	7.4

a Sum of determined constituents.

ROGUE RIVER BASIN--Continued

ROGUE RIVER AT GRANTS PASS, OREG.--Continued

Chemical analyses, water year October 1953 to September 1954--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million									Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 1-10, 1954	114,500	25	0.44	0.24	0.23	0.04	0.85	0.04	0.05	0.01	0.01	--	a74	0.10	11,450	24	0.4	92.3	7.3
Apr. 11-20.....	109,900	21	.37	.21	.20	.04	.74	.02	.05	.02	.01	.08	72	.10	10,990	25	.4	86.2	7.3
Apr. 21-30	96,420	20	.33	.21	.18	.03	.67	.03	.04	.01	.01	--	62	.08	7,710	24	.4	72.2	7.4
May 1-10	76,440	20	.34	.16	.18	.04	.62	.04	.05	.01	.01	--	66	.09	6,880	25	.4	77.1	7.6
May 11-20	73,840	22	.32	.17	.18	.04	.64	.04	.04	.01	.01	.01	71	.10	7,380	27	.4	75.0	8.0
May 21-31	65,020	18	.32	.16	.18	.04	.62	.04	.05	.01	.01	--	66	.09	5,850	25	.4	74.8	7.5
June 1-10.....	56,850	26	.34	.24	.18	.07	.74	.03	.05	.00	.00	--	67	.09	5,120	22	.3	77.2	7.8
June 11-20.....	65,690	28	.38	.22	.19	--	.75	.04	.06	.00	.01	--	72	.10	6,570	24	.3	81.3	7.7
June 21-30.....	44,210	28	.34	.20	.19	--	.70	.03	.06	.00	.01	--	68	.09	3,980	26	.4	74.9	7.6
July 1-10	35,070	31	.34	.20	.21	--	.74	.03	.06	.00	.01	--	72	.10	3,510	28	.4	77.6	7.4
July 11-20	30,270	32	.34	.18	.21	--	.72	.03	.06	.00	.01	--	74	.10	3,030	29	.4	78.7	7.1
July 21-31	30,050	33	.36	.18	.21	--	.72	.03	.05	.00	.01	--	75	.10	3,000	28	.4	79.4	7.2
Aug. 1-10	26,000	34	.42	.23	.29	.05	.84	.05	.07	.00	.02	--	90	.12	3,120	29	.5	96.8	7.1
Aug. 11-20.....	26,160	32	.40	.16	.27	.05	.80	.04	.06	.00	.02	.05	84	.11	2,880	30	.5	89.3	7.0
Aug. 21-31.....	32,970	33	.38	.21	.25	.05	.80	.03	.06	.01	.01	--	81	.11	3,630	28	.5	87.2	7.0
Sept. 1-10	26,680	33	.41	.23	.26	.05	.85	.03	.07	.00	.00	--	84	.11	2,930	27	.5	93.4	8.1
Sept. 11-20	31,000	32	.43	.24	.26	.05	.88	.03	.07	.00	.01	.06	82	.11	3,410	26	.4	94.2	7.7
Sept. 21-30	26,820	33	.43	.24	.26	.05	.87	.03	.08	.00	.00	--	83	.11	2,950	27	.5	94.3	8.0
Total or weighted average	3,354,000	24	0.46	0.22	0.22	0.04	0.82	0.05	0.06	0.00	0.01	--	76	0.10	335,400	23	0.4	92.7	--

a Sum of determined constituents.

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