

Quality of Surface Waters for Irrigation Western United States 1952

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

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1362



UNITED STATES DEPARTMENT OF THE INTERIOR

Douglas McKay, *Secretary*

GEOLOGICAL SURVEY

W. E. Wrather, *Director*

**For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 75 cents (paper cover)**

PREFACE

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

C. G. Paulsen Chief Hydraulic Engineer
S. K. Love Chief, Quality of Water Branch

District Supervisors (Quality of Water)

P. C. Benedict Lincoln, Nebr.
J. W. Geurin Fayetteville, Ark.
T. B. Dover Oklahoma City, Okla.
J. M. Stow Albuquerque, N. Mex.
J. G. Connor Salt Lake City, Utah
Burdge Ireland Austin, Tex.
H. A. Swenson Portland, Oreg.
I. W. Walling Sacramento, Calif.

CONTENTS

	Page
Introduction	1
Acknowledgments	5
Collection of samples	6
Examination of samples	6
Reporting of data	8
Explanation of tables	8
Location of station	8
Drainage area	8
Records available	8
Extremes	8
Remarks	9
Discharge records	9
Analytical values	9
Discussion of results	9
Criteria of water quality	13
Selected references	15
Quality of surface waters for irrigation	16
Part 5-Hudson Bay and Upper Mississippi River basins ..	16
Red River of the North basin	16
Sheyenne River near Warwick, N. Dak.	16
Part 6-Missouri River basin	18
Missouri River main stem	18
Missouri River near Williston, N. Dak.	18
Missouri River at Pierre, S. Dak.	21
Missouri River at Nebraska City, Nebr.	24
Yellowstone River basin	26
Yellowstone River at Billings, Mont.	26
Yellowstone River near Sidney, Mont.	28
Bighorn River at Thermopolis, Wyo.	30
Bighorn River at Bighorn, Mont.	32
Tongue River at Miles City, Mont.	34
Powder River near Locate, Mont.	36
Grand River basin	38
Grand River near Wakpala, S. Dak.	38
Cheyenne River basin	40
Cheyenne River near Eagle Butte, S. Dak.	40
Platte River basin	43
North Platte River below Guernsey Reservoir, Wyo.	43
Platte River at Brady, Nebr.	45
Supply Canal (Tri-County Diversion) near Maxwell, Nebr.	46

Quality of surface waters for irrigation--Continued

Missouri River basin--Continued

Platte River basin--Continued	Page
South Platte River at Julesburg, Colo.	47
Kansas River basin	49
Republican River at Cambridge, Nebr.	49
Saline River at Tescott, Kans.	51
Part 7-Lower Mississippi River basin	53
Arkansas River basin	53
Arkansas River below John Martin Reservoir, Colo.	53
Arkansas River at Arkansas City, Kans.....	55
Arkansas River at Ralston, Okla.	58
Arkansas River at Van Buren, Ark.	61
Cimarron River at Mannford, Okla.	64
Canadian River near Tascosa, Tex.	68
Canadian River near Whitefield, Okla.	70
Red River basin	75
Red River at Denison Dam near Denison, Tex.	75
Washita River near Tabler, Okla.	77
Part 8-Western Gulf of Mexico basins	80
Sabine River basin	80
Sabine River near Ruliff, Tex.	80
Neches River basin	83
Neches River at Evadale, Tex.	83
San Jacinto River basin	85
San Jacinto River near Huffman, Tex.	85
Brazos River basin	88
Brazos River at Richmond, Tex.	88
Colorado River basin	90
Colorado River at Austin, Tex.	90
Colorado River at Wharton, Tex.	92
Guadalupe River basin	94
Guadalupe River at Victoria, Tex.	94
Nueces River basin	96
Nueces River near Mathis, Tex.	96
Rio Grande basin	97
Rio Grande above Culebra Creek near Lobatos, Colo.	97
Rio Grande at Otowi Bridge near San Ildefonso, N.Mex.	99
Rio Grande (Tiffany Channel) nr. San Marcial, N.Mex.	101
Rio Grande at San Marcial, N. Mex.	103
Rio Grande below Elephant Butte Outlet, N. Mex. ..	105
Rio Grande near El Paso, Tex.	106
Rio Grande below Old Fort Quitman, Tex.	107
Rio Grande at Upper Presidio, Tex.	108
Rio Grande at Langtry, Tex.	109
Rio Grande at Eagle Pass, Tex.	110
Rio Grande at Roma, Tex.	111
Pecos River below Alamogordo Dam, N. Mex.	112
Pecos River near Artesia, N. Mex.	114
Pecos River near Orla, Tex.	116
Pecos River near Comstock, Tex.	117

Quality of surface waters for irrigation--Continued	Page
Part 9--Colorado River basin	118
Colorado River main stem	118
Colorado River near Glenwood Springs, Colo.	118
Colorado River near Cisco, Utah	120
Colorado River at Lees Ferry, Ariz.	122
Colorado River near Grand Canyon, Ariz.	125
Colorado River below Hoover Dam, Ariz. -Nev.	127
Diversions and Return Flows at and below Imperial Dam	129
Yuma Main Canal below Colorado River siphon at	
Yuma, Ariz.	129
Gunnison River basin	131
Gunnison River near Grand Junction, Colo.	131
Green River basin	133
Green River at Green River, Utah	133
San Juan River basin	135
San Juan River near Blanco, N. Mex.	135
Little Colorado River basin	137
Little Colorado River at Cameron, Ariz.	137
Virgin River basin	139
Virgin River at Littlefield, Ariz.	139
Gila River basin	141
Gila River at Kelvin, Ariz.	141
Gila River below Gillespie Dam, Ariz.	143
Salt River at Stewart Mountain Dam, Ariz.	146
Verde River below Bartlett Dam, Ariz.	148
Agua Fria River below Lake Pleasant Dam, Ariz....	150
Part 10--The Great Basin	152
Sevier Lake basin	152
Sevier River near Lynndyl, Utah	152
Part 11--Pacific Slope basins in California	154
San Joaquin River basin	154
San Joaquin River main stem	154
San Joaquin River near Vernalis, Calif.	154
Calaveras River basin	157
Stockton Diverting Canal at Stockton, Calif.	157
Mokelumne River basin	159
Mokelumne River at Woodbridge, Calif.	159
Sacramento River basin	161
Sacramento River main stem	161
Sacramento River at Knights Landing, Calif.	161
Feather River basin	163
Feather River at Nicolaus, Calif.	163
American River basin	165
American River at Fair Oaks, Calif.	165
Part 12--Pacific Slope basins in Washington and Upper	
Columbia River basin	167
Upper Columbia River basin	167
Columbia River main stem	167
Columbia River at Grand Coulee Dam, Wash.	167

Quality of surface waters for irrigation--Continued	Page
Part 13-Snake River basin	169
Snake River main stem	169
Snake River at King Hill, Idaho	169
Boise River basin	171
Boise River at Notus, Idaho	171
Part 14-Pacific slope basins in Oregon and Lower	
Columbia River basin	173
Columbia River main stem	173
Columbia River at Maryhill Ferry near Rufus, Oreg.	173
Willamette River basin	175
Willamette River at Salem, Oreg.	175
Index	177

ILLUSTRATION

	Page
Plate 1. Recommended stations for irrigation-quality network in Western United States.	6

QUALITY OF SURFACE WATERS FOR IRRIGATION, WESTERN UNITED STATES, 1952

INTRODUCTION

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

Increased development of irrigation agriculture in the Western States during the past decade has brought sharply into focus the need for comprehensive continuing information about the chemical quality of surface waters used for irrigation and the changes resulting from the drainage of irrigated lands. The U. S. Census of Agriculture for 1945 reports that approximately 20.5 million acres of land were irrigated in 1944; of this acreage nearly 95 percent was in the 17 Western States. Straus (1952) estimates that the acreage of irrigated land in the Western States had increased to 21.5 million acres in 1948. In 1934, an estimate by the National Resources Board placed the ultimate acreage that could be irrigated in the Western States at 51.5 million acres.

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

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

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

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

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

It was contemplated that the network stations would be located at stream-flow gaging stations and that the program of collecting and analyzing the samples and reporting the findings would be the responsibility of the Geological Survey. The scope of the chemical analyses would provide for the calculation of the salt burden of streams and in general would conform with the current Geological Survey standards for the comprehensive investigation of the chemical quality of surface waters.

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

1. All recommended stations should be located on streams west of the main stem of the Mississippi River.
2. All proposed stations should relate primarily to irrigation although multiple-purpose needs which include irrigation may be considered.
3. All stations should be located at or near stream-flow gaging stations. The most nearly up-to-date list of gaging stations currently operated by the U. S. Geological Survey (which com-

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

No.	Geological Survey Part no.	Stream	Location	Date established
1.	5	Souris River	nr. Westhope, N. Dak.	--
2.	6	Missouri River	nr. Williston, N. Dak.	12/5/50
3.		Missouri River	at Pierre, S. Dak.	10/3/50
4.		Missouri River	at Nebraska City, Nebr.	1/4/51
5.		Yellowstone River	at Billings, Mont.	12/15/50
6.		Yellowstone River	nr. Sidney, Mont.	1/3/51
7.	a	Bighorn River	at Thermopolis, Wyo.	1/1/51
8.		Bighorn River	at Bighorn, Mont.	10/2/50
9.		Tongue River	at Miles City, Mont.	1/4/51
10.		Powder River	nr. Locate, Mont.	1/4/51
11.		Grand River	nr. Wapakala, S. Dak.	1/17/51
12.		Moreau River	at Promise, S. Dak.	--
13.		Cheyenne River	nr. Eagle Butte, S. Dak.	1/17/51
14.		White River	nr. Oacoma, S. Dak.	--
15.		James River	nr. Huron, S. Dak.	--
16.		N. Platte River	below Alcova Dam, Wyo.	--
17.		N. Platte River	below Guernsey Reservoir, Wyo.	12/7/50
18.		Platte River	at Brady, Nebr.	2/28/51
18 a.		Supply Canal (Tri-County Diversion)	nr. Maxwell, Nebr.	3/1/51
19.		South Platte River	at Julesburg, Colo.	10/1/45
20.		Republican River	at Cambridge, Nebr.	12/22/50
21.		Republican River	nr. Hardy, Nebr.	--
22.		Smoky Hill River	nr. Langley, Kans.	--
23.	b	Saline River	nr. Wilson (or Russell), Kans.	
			at Tescott, Kans.	4/3/50
24.	7	Arkansas River	below John Martin Reservoir, Colo.	1/10/51
25.		Arkansas River	at Arkansas City, Kans.	10/8/51
26.		Arkansas River	at Ralston, Okla.	1/1/50
27.		Arkansas River	at Van Buren, Ark.	10/1/45
28.		Cimarron River	at Mannford, Okla.	10/1/49
			at Perkins, Okla.	10/1/52
29.		Canadian River	nr. Tascosa, Tex.	6/2/48
30.		Canadian River	nr. Whitefield, Okla.	9/1/46
31.		Red River	at Denison Dam, nr. Denison, Tex.	5/1/44
32.	c	Washita River	nr. Tabler, Okla.	9/10/46
33.		Sabine River	nr. Ruliff, Tex.	10/1/47
34.		Neches River	at Evadale, Tex.	10/1/47
35.	8	Trinity River	at Romayor, Tex.	9/1/45
36.	d	San Jacinto River	nr. Huffman, Tex.	9/1/45
37.		Brazos River	at Richmond, Tex.	9/1/45
38.	e	Colorado River	at Robert Lee, Tex.	10/1/47
39.		Colorado River	at Austin, Tex.	10/1/47
40.		Colorado River	at Wharton, Tex.	4/11/44
41.		Guadalupe River	at Victoria, Tex.	9/1/45
42.		Nueces River	nr. Mathis, Tex.	10/1/47
43.		Rio Grande	above Culebra Cr. nr. Lobatos, Colo.	10/11/46
44.		Rio Grande	at Otowi Bridge nr. San Ildefonso, N. Mex.	10/23/47
45.		Rio Grande	at San Marcial, N. Mex.	7/1/48
46.		Rio Grande	below Elephant Butte Outlet, N. Mex.	--/--/33
47.	f	Rio Grande	nr. El Paso, Tex.	--/--/30
48.	f	Rio Grande	below Old Fort Quitman, Tex.	--/--/30
49.	f	Rio Grande	at Upper Presidio, Tex.	--/--/35
50.	f	Rio Grande	at Langtry, Tex.	--/--/45
51.	f	Rio Grande	at Eagle Pass, Tex.	--/--/38
52.	f	Rio Grande	at Roma, Tex.	--/--/44
53.		Pecos River	below Alamogordo Dam, N. Mex.	6/26/37
54.		Pecos River	nr. Artesia, N. Mex.	7/1/37
55.		Pecos River	nr. Orla, Tex.	7/1/37
56.	f	Pecos River	nr. Comstock, Tex.	--/--/35
57.	9	Colorado River	nr. Glenwood Springs, Colo.	10/--/41
58.		Colorado River	nr. Cisco, Utah	10/--/28
59.		Colorado River	at Lees Ferry, Ariz.	10/1/47
60.		Colorado River	nr. Grand Canyon, Ariz.	10/--/39

QUALITY FOR IRRIGATION, 1952

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

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

a Dropped from list 1/21/54. Replaced by Station Wind River below Boysen Dam.

b Dropped from list 10/3/52. Replaced by Station at Tescott.

c Dropped from list 10/3/52. Replaced by Station at Pauls Valley.

d Dropped from list 4/5/54.

e Discontinued 9/30/51.

f Operated by International Boundary and Water Commission.

g Dropped from list 10/3/52. Replaced by Station San Joaquin River near Mendota.

prises all but a small percentage of all gaging stations) will be found in the most recently published Geological Survey water-supply papers for the areas involved.

4. Consideration should be given to the location of irrigation development areas which are now affecting or are likely to affect the chemical quality of the river water.

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

Plate 1 is a plot of the recommended list of 109 network stations on streams in Western United States. The 78 stations in operation in 1952 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.

One network station, Arkansas River at Arkansas City, Kans., was activated, and the Colorado River at Robert Lee, Tex., was discontinued during the water year. The record for the Trinity River at Romayor, Tex., was not satisfactory for publication and was deleted. However the record for the Rio Grande Tiffany Channel at San Marcial, is included although this station is not a part of the Network list. The record at this station represents sampling of an artificial channel which bypasses the regular gaging station. During low flow the Tiffany Channel carries drainage water differing decidedly in quality from that in the main channel. Both channels carry water from flood flows at which times the quality in the two channels is about the same.

ACKNOWLEDGMENTS

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

During 1952, the United States Section of the International Boundary and Water Commission operated the stream gaging stations for the following Rio Grande stations included in this report: El Paso, Fort Quitman, Upper Presidio, and Langtry; it operated the station Pecos River near Comstock, also. The Mexican Section operated the stream gaging stations on the main stem at Eagle Pass

and Roma. Each section operated the gaging stations on tributary streams, floodways, and diversions within its own country.

Descriptive headings and discharge data for the seven stations operated by the International Boundary and Water Commission, were obtained from Water Bulletins 21 and 22 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 1951 and 1952. Analyses for seven Rio Grande main stem stations and for the Pecos River near Comstock, Tex., were obtained from the U. S. Salinity Laboratory, Riverside, Calif.

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

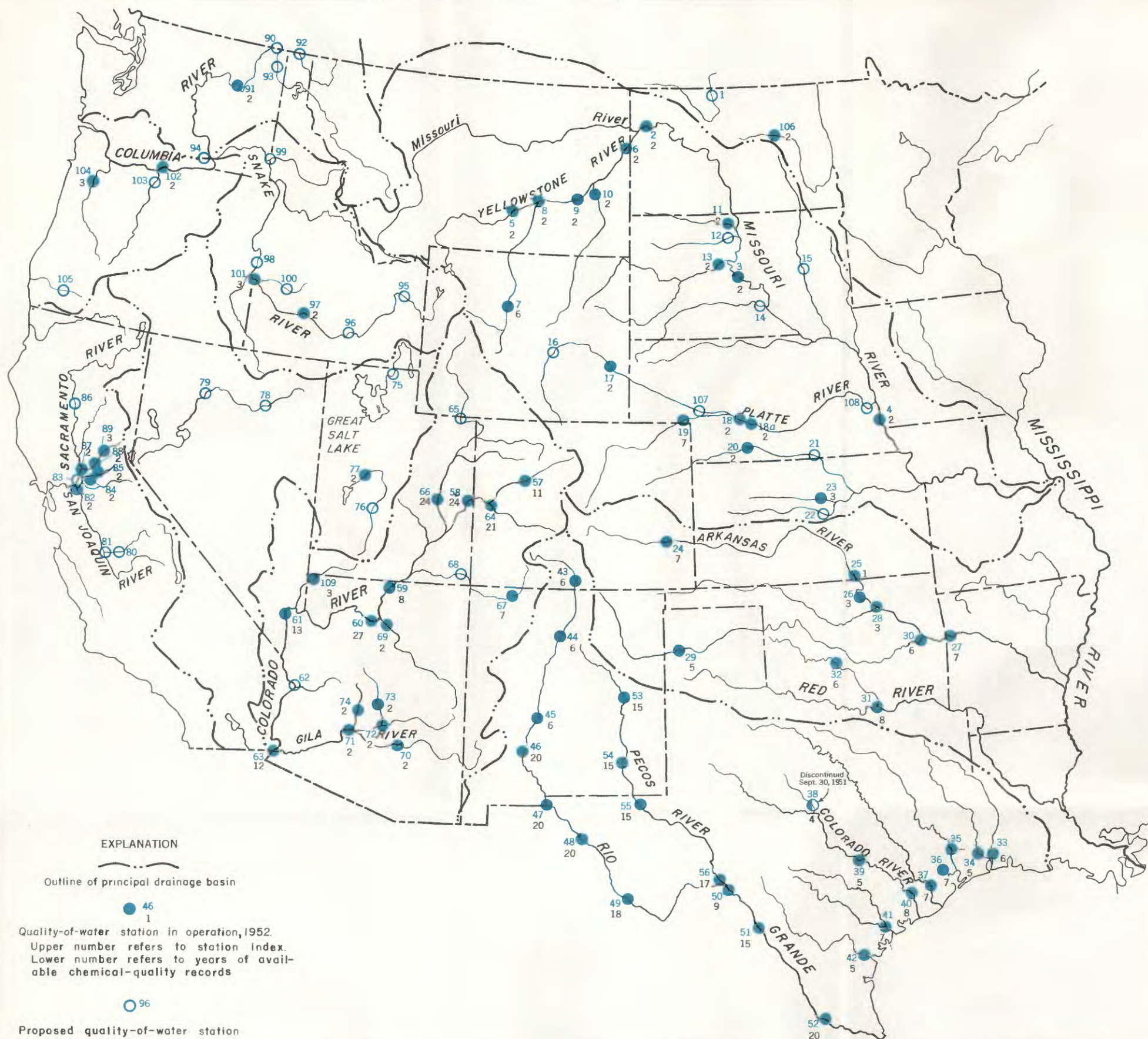
COLLECTION OF SAMPLES

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

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

EXAMINATION OF SAMPLES

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



RECOMMENDED STATIONS FOR IRRIGATION-QUALITY NETWORK IN WESTERN UNITED STATES

able discharge values were reported with the samples, or could be obtained promptly from rating tables, samples were prepared by mixing values of individual samples in proportion to water discharge.

The following series of 15 determinations (schedule 1) were made on all composite samples for all new network stations during the first year of operation: Silica, iron, calcium, magnesium, sodium, potassium, bicarbonate, carbonate, sulfate, chloride, fluoride, nitrate, boron, dissolved solids, and specific conductance. The following values were calculated from the analytical data: Dissolved solids in tons per acre-foot, dissolved solids in 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 1952 data there were notable exceptions to the recommended schedules as outlined above. At some stations, where more complete data were needed for other uses, the number of constituents determined was increased. Conversely, some stations that had been in operation for several years prior to this project, during which time at least the minimum determinations in schedule 1 were completed, were immediately placed on a reduced analytical schedule.

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

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

REPORTING OF DATA

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

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

EXPLANATION OF TABLES

The tables of analyses beginning on page 16 include a brief descriptive heading summarizing the more pertinent features at each station as follows:

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

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

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

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

$$\frac{\text{Na} \times 100}{\text{Na} + \text{K} + \text{Ca} + \text{Mg}},$$
 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 14.

DISCUSSION OF RESULTS

Discharge data and dissolved-solids loads for stations operated in 1952 are summarized in the following table. During the year the highest weighted average annual concentration observed was for the Pecos River near Orla, Tex. (9.22 tons per acre-foot) and the lowest was for the Mokelumne River at Woodbridge, Calif. and American River at Fair Oaks, Calif. (.06 ton per acre-foot). For the most part observations were made at stations for the entire period of flow giving better coverage than in 1951.

The median value for 67 weighted average annual observed concentrations of dissolved solids was 0.51 ton per acre-foot or about 375 ppm; the middle 50 percent of concentrations ranged between 0.26 and 0.89 ton per acre-foot.

Summary of water discharge, and tonnages of dissolved solids

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Red River of the North basin		
Sheyenne River nr. Warwick, N. Dak.	25,100	0.51
Missouri River main stem		
Missouri River nr. Williston, N. Dak.	21,060,000	.51
Missouri River at Pierre, S. Dak.	26,490,000	.52
Missouri River at Nebraska City, Nebr.	42,240,000	.56
Yellowstone River basin		
Yellowstone River at Billings, Mont.	5,906,000	.24
Yellowstone River nr. Sidney, Mont.	9,486,000	.50
Bighorn River at Thermopolis, Wyo.	542,300	.58
Bighorn River at Bighorn, Mont.	2,340,000	.91
Tongue River at Miles City, Mont.	359,900	.53
Powder River near Locate, Mont.	486,800	1.16
Grand River basin		
Grand River nr. Wakpala, S. Dak.	564,600	.40
Cheyenne River basin		
Cheyenne River nr. Eagle Butte, S. Dak.	893,500	1.18
Platte River basin		
North Platte River below Guernsey Reservoir, Wyo. .	1,514,000	.49
Platte River at Brady, Nebr.	630,300	.66
Supply Canal (Tri-County Diversion) nr. Maxwell, Nebr.	1,371,000	.83
South Platte River at Julesburg, Colo.	337,700	1.75
Kansas River basin		
Republican River at Cambridge, Nebr.	224,400	.50
Saline River at Tescott, Kans.	199,500	1.88
Arkansas River basin		
Arkansas River below John Martin Reservoir, Colo. ...	176,900	2.26
Arkansas River at Arkansas City, Kans.	1,384,000	1.48
Arkansas River at Ralston, Okla.	3,097,000	1.47
Arkansas River at Van Buren, Ark.	19,419,690	.76
Cimarron River at Mannford, Okla.	--	--
Canadian River nr. Tascosa, Tex.	59,580	.96
Canadian River nr. Whitefield, Okla.	1,902,000	1.93
Red River basin		
Red River at Denison Dam nr. Denison, Tex.	1,670,070	1.12
Washita River nr. Tabler, Okla.	170,300	1.17
Sabine River basin		
Sabine River nr. Ruliff, Tex.	4,657,000	.15
Neches River basin		
Neches River at Evadale, Tex.	2,699,000	.16
San Jacinto River basin		
San Jacinto River nr. Huffman, Tex.	564,200	.21
Brazos River basin		
Brazos River at Richmond, Tex.	1,321,000	.50
Colorado River basin		
Colorado River at Austin, Tex.	547,500	.40
Colorado River at Wharton, Tex.	554,400	.37
Guadalupe River basin		
Guadalupe River at Victoria, Tex.	594,200	.40
Nueces River basin		
Nueces River nr. Mathis, Tex.	177,300	.42
Rio Grande basin		
Rio Grande above Culebra Creek nr. Lobatos, Colo.	447,900	.23
Rio Grande at Otowi Bridge nr. San Ildefonso, N. Mex.	1,378,000	.26
Rio Grande (Tiffany Channel) nr. San Marcial, N. Mex.	281,900	.51
Rio Grande at San Marcial, N. Mex.	685,300	.47
Rio Grande below Elephant Butte Outlet, N. Mex.	542,985	--
Rio Grande nr. El Paso, Tex.	284,020	--
Rio Grande below Old Fort Quitman, Tex.	11,200	--
Rio Grande at Upper Presidio, Tex.	12,798.2	--
Rio Grande at Langtry, Tex.	693,800	--
Rio Grande at Eagle Pass, Tex.	998,280	--
Rio Grande at Roma, Tex.	1,093,650	--

SUMMARY OF WATER DISCHARGE

11

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

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Rio Grande basin--Continued		
Pecos River below Alamogordo Dam, N. Mex.	126,000	2.16
Pecos River nr. Artesia, N. Mex.	110,400	4.38
Pecos River nr. Orla, Tex.	49,350	9.22
Pecos River nr. Comstock, Tex.	104,340	--
Colorado River main stem		
Colorado River nr. Glenwood Springs, Colo.	2,441,000	.32
Colorado River nr. Cisco, Utah	a 6,253,000	.61
Colorado River at Lees Ferry, Ariz.	17,960,000	.63
Colorado River nr. Grand Canyon, Ariz.	17,710,000	.74
Colorado River below Hoover Dam, Ariz.-Nev.	a 10,840,000	.89
Diversions and Return Flows at and below Imperial Dam		
Yuma Main Canal below Colorado River Siphon at Yuma, Ariz.	a 276,600	.95
Gunnison River basin		
Gunnison River nr. Grand Junction, Colo.	a 2,438,000	.66
Green River basin		
Green River at Green River, Utah	6,844,000	.62
San Juan River basin		
San Juan River nr. Blanco, N. Mex.	1,490,000	.21
Little Colorado River basin		
Little Colorado River at Cameron, Ariz.	337,200	.50
Virgin River basin		
Virgin River at Littlefield, Ariz.	273,400	--
Gila River basin		
Gila River at Kelvin, Ariz.	274,100	.75
Gila River below Gillespie Dam, Ariz.	51,630	6.72
Salt River at Stewart Mountain Dam, Ariz.	262,800	.83
Verde River below Bartlett Dam, Ariz.	604,700	.30
Agua Fria River below Lake Pleasant Dam, Ariz.	59,070	.26
Sevier Lake basin		
Sevier River nr. Lynndyl, Utah	a 128,800	1.84
San Joaquin River basin		
San Joaquin River main stem		
San Joaquin River nr. Vernalis, Calif.	a 7,012,000	.15
Calaveras River basin		
Stockton Diverting Canal at Stockton, Calif.	a 265,900	.14
Mokelumne River basin		
Mokelumne River at Woodbridge, Calif.	1,034,000	.06
Sacramento River main stem		
Sacramento River at Knights Landing, Calif.	a 9,726,000	.16
Feather River basin		
Feather River at Nicolaus, Calif.	a 11,940,000	.08
American River basin		
American River at Fair Oaks, Calif.	5,030,000	.06
Columbia River main stem		
Columbia River at Grand Coulee Dam, Wash.	81,590,000	.12
Snake River main stem		
Snake River at King Hill, Idaho	a 9,922,000	.42
Boise River basin		
Boise River at Notus, Idaho	1,833,000	.19
Columbia River main stem		
Columbia River at Maryhill Ferry nr. Rufus, Oreg. .	a 134,700,000	.15
Willamette River basin		
Willamette River at Salem, Oreg.	a 14,580,000	.07

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

Differences in runoff in the 1951 and 1952 water year are reflected in concentrations of dissolved solids at some stations for the two years. For example, in the Missouri River basin, the Saline River at Tescott, Kans. increased from 0.67 to 1.88 tons per acre-foot as runoff decreased to less than one-fourth of the 1951 flow. Sizeable increases in concentrations of dissolved solids were observed in the Arkansas River basin, particularly for the Arkansas River at Ralston, Okla. where runoff was about one-third that of 1951 and the dissolved solids concentration was nearly twice that of 1951.

In some western Gulf of Mexico basins, the effects of regulation are noteworthy. For example, releases from Denison Dam to the Red River near Denison, Tex. were about 1.7 million acre-feet in 1952 as compared with about 5.1 million acre-feet in 1951. However, dissolved solids concentrations actually decreased slightly from 1.24 to 1.12 tons per acre-foot.

In the Rio Grande basin, a large increase in flow of the Rio Grande in Tiffany Channel (an artificial channel which bypasses the gaging station at Tiffany, N. Mex.) is reflected in a decrease in dissolved solids concentration from 1.37 tons per acre-foot in 1951 to 0.51 ton per acre-foot in 1952.

Although flows in the Pecos River below Alamogordo Dam, and near Artesia, N. Mex. were lower than in 1951, the changes in quality were not large. However, at Orla, N. Mex. where the flow was less than one-half that in 1951, a proportional increase to 9.22 tons per acre-foot was observed.

A very significant increase in dissolved-solids concentration occurred in the Gila River below Gillespie Dam, owing to a large decrease in releases from the reservoir. Dissolved-solids concentration increased from 2.31 tons in 1951 to 6.72 tons per acre-foot in 1952. The low value obtained in 1951 is principally attributable to large releases from the reservoir during the period Aug. 28-31 at which time nearly one-half the total discharge for the year was recorded.

Weighted average sodium-adsorption ratio (SAR) values were generally less than 4 indicating that except for a few stations the sodium hazard was low. The highest SAR observed values were for the Cimarron River at Mannford, Okla. where SAR values ranged up to 44 (very high sodium hazard) and were consistently above 20. In the Pecos River main stem, SAR values show a downstream increase to Orla, then decrease near Comstock to values generally less than 10. The observed SAR values in the Rio Grande main stem increased sharply at Fort Quitman where the values were normally above 10.

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 concentration of the constituents is expressed in milliequivalents per liter (or equivalents per million for most irrigation waters). It is reported that the sodium-adsorption ratio is more significant for interpreting water quality than percent sodium because it relates more directly to the adsorption of sodium by the soil.

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

C. Boron hazard.

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

D. Bicarbonate ion hazard.

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

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

In appraising quality of irrigation water with the above classification, the Salinity Laboratory Staff recommends that first consideration be given to salinity and alkali hazards, then to independent characteristics, boron or toxic elements, any one of which may change the quality rating. Other factors such as drainage and management practices likewise must be considered in the use of water having a given rating.

SELECTED REFERENCES

- Eaton, F. M., 1935, Boron in soils and irrigation waters and its effect on plants: U. S. Dept. Agriculture Tech. Bull. 448, p. 1-133.
- 1942, Toxicity and accumulation of chloride and sulfate salts in plants: Jour. Agriculture Res. 64, p. 357-399.
- 1950, Significance of carbonates in irrigation water: Soil Science v. 69, p. 123-133.
- Federal Interagency River Basin Committee, 1950, Minutes of the fifty-sixth meeting, Subcommittee on Hydrology (mimeographed).
- Magistad, O. C., and Christiansen, J. E., 1944, Saline soils, their nature and management: U. S. Dept. Agriculture Circ. 707, p. 8-9.
- President's Water Resources Policy Commission, 1950, A water policy for the American people: v. 1: General Report, p. 152-153.
- Scofield, C. S., and Headley, F. B., 1921, Quality of irrigation water in relation to land reclamation: Jour. Agriculture Res. 21, p. 265-278.
- Scofield, C. S., 1936, The salinity of irrigation water: Smithsonian Institution Ann. Rpt., 1935, p. 275-287.
- 1949, Trends of irrigation development in the United States; Symposium, Am. Chem. Soc., p. 1-11 (mimeographed).
- Straus, Michael, 1952, Use of water for irrigation: Interior and Insular Affairs Committee, U. S. House of Representatives; v. 2, The physical basis of water supply and its principal uses.
- Thorne, J. P., and Thorne, D. W., 1951, Irrigation waters of Utah: Utah Agriculture Expt. Sta. Bull. 349
- U.S. Geol. Survey, 1954, Quality of surface waters for irrigation, Western United States, 1951: U.S. Geol. Survey Water-Supply Paper 1264, p. 1-153.
- U. S. Salinity Laboratory Staff, 1954, Diagnosis and improvement of saline and alkali soils: U. S. Dept. Agriculture Handbook 60, p. 1-160.
- Wilcox, L. V., 1948, The quality of water for irrigation use: U. S. Dept. Agriculture Tech. Bull. 962, p. 1-40.

Part 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

RED RIVER OF THE NORTH BASIN

SHEYENNE RIVER NEAR WARWICK, N. DAK.

LOCATION --At gaging station at bridge on county road, 3.3 miles south of Warwick, Benson County.

DRAINAGE AREA --2,100 square miles, approximately.

RECORDS AVAILABLE --Chemical analyses: January 1951 to September 1952.

Water temperatures: January 1951 to September 1952.

EXTREMES, 1951-52 --Specific conductance: Maximum daily, 1,170 micromhos July 11; minimum daily, 281 micromhos Apr. 7.

Percent sodium: Maximum, 54 July 9-13; minimum, 28 Sept. 1-30.

EXTREMES, January 1951 to September 1952 --Specific conductance: Maximum daily, 1,170 micromhos July 11, 1952; minimum daily, 244 micromhos Mar. 29, 1951.

Percent sodium: Maximum, 54 July 9-13, 1952; minimum, 28 Mar. 1-26, 1951, Sept. 1-30, 1952.

REMARKS --Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1238.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH		
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion					Tons per acre-foot	Total tons
Oct. 1-31, 1951	478	--	2.50	2.30	4.26	6.60	1.98	0.39	--	0.03	0.25	516	0.70	335	47	2.7	809	7.8	
Nov. 1-30	528	--	2.94	2.32	3.04	6.46	1.77	.39	--	.03	.18	496	.67	354	35	1.9	768	8.0	
Dec. 1-31	415	--	3.44	2.41	2.96	6.87	1.83	.39	--	.03	.15	506	.69	286	32	1.7	798	8.0	
Jan. 1-27, 1952	109	--	3.84	2.49	3.30	7.49	2.04	.42	--	.03	.18	564	.77	84	33	1.9	872	7.8	
Jan. 28-Feb. 9	69	--	4.24	2.98	4.44	8.72	2.56	.54	--	.02	.22	670	.91	63	38	2.3	1,030	7.8	
Feb. 10-25	109	--	4.89	1.97	4.04	--	2.46	--	--	.04	.16	--	--	--	37	2.2	--	--	--
Feb. 26-Mar. 31	407	--	3.69	2.69	3.00	7.29	1.81	.48	--	.04	.13	538	.73	297	31	1.7	843	7.9	
Apr. 1-5	3,850	--	1.25	1.01	1.35	2.44	1.10	.28	--	.04	.10	238	.32	1,230	35	1.3	379	7.4	
Apr. 6-13	8,480	--	1.10	.84	1.74	2.44	1.19	.23	--	.05	.12	242	.33	2,800	45	1.8	377	7.5	
Apr. 14-30	4,560	--	1.80	1.68	3.44	4.46	2.39	.39	--	.04	.25	435	.59	2,690	47	2.6	669	7.9	
May 1-June 2	2,730	--	2.35	2.37	4.22	6.10	2.60	.45	--	.03	.29	550	.75	2,050	46	2.8	836	8.1	
June 3-July 6	593	--	2.40	2.36	3.83	ae.18	2.12	.42	--	.02	.22	506	.69	409	44	2.5	786	8.3	
July 7-8	528	--	2.40	2.26	3.57	6.16	1.96	.42	--	.03	.26	492	.67	354	42	2.3	754	8.0	

a Includes 0.33 equivalents per million of carbonate (CO₃).

July 9-13.....	1,100	--	2.45	2.77	6.65	7.65	4.04	.68	--	0.05	.39	740	1.01	1,110	54	4.1	1,100	7.8
July 14-Aug. 16..	960	--	1.90	1.70	3.65	5.08	2.12	.34	--	.04	.23	458	.62	585	48	2.7	688	7.8
Aug. 17-31.....	103	25	2.25	1.63	2.70	4.97	1.52	.25	0.01	.03	.17	402	.55	57	40	1.9	615	7.7
Sept. 1-30.....	81	20	2.45	1.59	1.61	64.43	1.12	.17	.01	.02	.07	328	.45	36	28	1.1	512	8.3
Total or weighted average c	25,100	--	1.75	1.48	2.78	4.10	1.81	0.34	--	0.04	0.19	377	0.51	12,800	44	2.2	581	--

b Includes 0.23 equivalents per million of carbonate (CO₃).

c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

Part 6. MISSOURI RIVER BASIN

MISSOURI RIVER MAIN STEM

MISSOURI RIVER NEAR WILLISTON, N. DAK.

LOCATION.--At gaging station, at bridge on Lewis and Clark Highway, 5 miles southwest of Williston, Williams County, and 25 miles downstream from Yellowstone River.

DRAINAGE AREA.--164,500 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: May 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 815 micromhos Jan. 2, 5, 6; minimum daily, 327 micromhos June 15.

Percent sodium: Maximum, 37 May 28-29; minimum 31 Jan. 30.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 864 micromhos Mar. 20, 1951; minimum daily, 320 micromhos June 24, 1951.

Percent sodium: Maximum, 39 Apr. 8, May 1-31, 1951; minimum, 31 Jan. 30, 1952.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-31, 1951.	2,278,000		2.74	1.72	2.26		3.05	3.52	0.27	0.03	0.08	428	0.58	1,321,000	33	1.5	650	7.9	
Oct. 29, Sta. 420 a.	73,590		--	--	--	--	--	--	--	--	--	--	--	--	--	--	647	--	
Oct. 29, Sta. 670 a.	73,590		--	--	--	--	--	--	--	--	--	--	--	--	--	--	647	--	
Oct. 29, Sta. 780 a.	73,590		--	--	--	--	--	--	--	--	--	--	--	--	--	--	648	--	
Oct. 29, Sta. 982 a.	73,590		--	--	--	--	--	--	--	--	--	--	--	--	--	--	645	--	
Nov. 1-30	1,767,000		2.74	1.74	2.30		3.11	3.50	.27	.02	.13	434	.59	1,043,000	33	1.5	657	7.5	
Dec. 1-6	234,200		2.89	1.85	2.48		3.18	3.83	.28	.03	.13	463	.63	147,500	34	1.6	690	7.6	
Dec. 12-17	163,200		3.29	1.99	2.74		3.51	4.23	.34	.13	.13	508	.69	112,600	34	1.7	760	7.8	
Jan. 2-29, 1952.	825,100		3.29	1.95	2.61		3.51	4.14	.31	.04	.18	494	.67	552,800	33	1.6	749	7.7	

a Not included in total or weighted average.

MISSOURI RIVER BASIN

19

Jan. 30, Sta. 430	32,130	2.94	1.68	2.22	3.21	3.50	.27	.02	.12	428	.58	b19,360	32	1.5	653	7.7
Jan. 30, Sta. 840	c 32,130	2.59	2.26	2.35	3.31	3.75	.25	.03	.13	458	.62	--	32	1.5	691	7.7
Jan. 30, Sta. 980	c 32,130	3.04	1.78	2.30	3.29	3.71	.28	.03	.14	442	.60	--	31	1.5	683	7.8
Jan. 30, Sta. 1080	c 32,130	3.04	1.84	2.36	3.29	3.75	.31	.03	.13	452	.61	--	32	1.5	681	7.8
Jan. 31-Feb. 29	943,500	2.94	1.80	2.44	3.20	3.75	.31	.05	.10	453	.62	585,000	33	1.6	690	7.5
Mar. 1-28	639,300	3.09	1.87	2.61	3.20	4.25	.34	.05	.10	480	.65	415,500	33	1.7	726	7.9
Mar. 29-31	104,100	2.69	1.61	2.39	2.82	3.79	.31	.05	.23	426	.58	60,380	34	1.6	656	8.2
Apr. 1-5	1,066,000	2.05	.83	1.52	2.44	1.92	.13	.05	.01	279	.38	405,100	33	1.3	443	7.7
Apr. 6-30	2,809,000	1.85	1.03	1.70	2.38	2.12	.16	.05	.02	288	.39	1,096,000	36	1.4	457	7.7
May 1-27	1,963,000	2.15	1.03	1.70	2.51	2.31	.18	.04	.08	336	.46	903,000	34	1.3	484	8.0
May 28-29	170,200	3.24	1.64	3.00	3.02	4.64	.31	.10	.11	576	.78	132,800	37	1.9	759	8.0
May 30-June 1	257,500	2.45	1.19	1.96	2.49	2.96	.18	.05	.09	390	.53	136,500	35	1.5	548	8.2
June 2-30	2,378,000	1.75	.87	1.26	2.02	1.75	.14	.03	.07	272	.37	879,900	32	1.1	389	7.9
July 1-31	1,454,000	2.10	1.18	1.51	2.34	2.96	.20	.03	.33	358	.49	712,500	35	1.5	528	7.9
July 3, Sta. 540 a	56,930	--	--	--	--	--	--	--	--	--	--	--	--	--	483	--
July 3, Sta. 810 a	56,930	--	--	--	--	--	--	--	--	--	--	--	--	--	485	--
July 3, Sta. 1020 a	56,930	--	--	--	--	--	--	--	--	--	--	--	--	--	476	--
Aug. 1-31	1,803,000	2.54	1.50	2.22	2.87	3.41	.25	.02	.12	396	.54	973,600	35	1.6	607	8.0
Sept. 1-30	1,642,000	2.69	1.63	2.30	3.00	3.66	.25	.02	.11	420	.57	985,900	33	1.6	639	8.0
Sept. 25, Sta. 600 a	53,750	--	--	--	--	--	--	--	--	--	--	--	--	--	625	--
Sept. 25, Sta. 800 a	53,750	--	--	--	--	--	--	--	--	--	--	--	--	--	628	--

a Not included in total or weighted average.

b Mean for cross section.

c Not included in total.

MISSOURI RIVER MAIN STEM--Continued
MISSOURI RIVER NEAR WILLISTON, N. DAK.--Continued
Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH			
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million				Tons per acre-foot	Total tons	
Sept. 25, 1952			--	--	--	--	--	--	--	--	--	--	--	--	--	628	--		
Sta. 810 a	53,750		--	--	--	--	--	--	--	--	--	--	--	--	--	629	--		
Sept. 25, Sta. 1025 a	53,750		--	--	--	--	--	--	--	--	--	--	--	--	--	629	--		
Total or weighted average d	20,530,000		2.40	1.40	2.00		2.72	2.96	0.22		0.04	0.10	374	0.51	10,430,000	34	1.5	563	--
Total or weighted average e	21,060,000		2.40	1.40	2.00		2.74	2.98	0.22		0.04	0.10	377	0.51	10,790,000	33	1.5	568	--

a Not included in total or weighted average.

d Represents 98 percent of runoff for water year October 1951 to September 1952.

e Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.

LOCATION.--At bridge on U.S. Highway 14 at Pierre, Hughes County, 1½ miles upstream from Bad River.

DRAINAGE AREA.--248,500 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1952.

Water temperatures: May 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 946 micromhos Apr. 1; minimum daily, 403 micromhos June 26.

Percent sodium: Maximum, 43 May 25-31; minimum, 27 Jan. 24-27.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 975 micromhos Mar. 28, 1951; minimum daily, 394 micromhos July 3, 1951.

Percent sodium: Maximum, 43 May 25-31, 1952; minimum, 27 Jan. 24-27, 1952.

REMARKS.--Daily samples for chemical analyses composited by discharge. Periods of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million						Boron (B) ppm	Dissolved solids		Percent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25° C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Parts per million	Tons per acre-foot	Total tons
Oct. 1-5, 1951...	402,400		3.04	1.60	2.74		2.92	4.41	0.25		0.01	478	0.55	261,600
Oct. 6-17,	905,500		2.89	1.63	2.22		3.05	3.75	.25		.02	432	.59	533,100
Oct. 18-23,	492,500		2.89	2.03	2.09		3.03	3.79	.26		.04	430	.58	285,700
Oct. 24-Nov. 1, ..	672,800		3.04	1.54	2.31		3.10	3.75	.26		.03	426	.58	390,200
Nov. 2-10,	674,400		2.99	1.73	2.31		3.21	3.75	.27		.03	426	.58	391,200
Nov. 11-24,	980,800		2.84	1.72	2.09		3.15	3.33	.25		.04	436	.59	578,700
Nov. 25-27,	94,410		3.19	1.69	2.44		3.39	4.06	.31		.04	480	.67	63,250
Nov. 28-30,	61,860		3.29	1.95	2.61		3.43	4.12	.31		.08	468	.66	40,840
Dec. 1-2,	63,470		3.19	1.85	2.83		3.59	3.98	.25		.03	476	.65	41,280
Dec. 3-4,	174,500		3.19	1.93	2.83		3.64	3.91	.25		.03	492	.67	116,900
Dec. 30-Jan. 4, 1952,	85,290		3.14	2.38	3.57		3.70	4.96	.37		.02	558	.76	64,820
Jan. 14-17,	131,700		3.49	1.95	2.65		3.69	4.21	.31		.03	490	.67	88,240
Jan. 24-27,	116,000		3.59	2.21	2.39		3.85	4.56	.34		.05	542	.74	87,320
Jan. 31-Feb. 2, ...	92,030		3.34	2.10	2.52		3.52	4.12	.31		.04	506	.69	63,500

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

Chemical analyses, water year October 1951 to September 1952.--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium	So-ad-sorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Mag-ne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per mil-lion	Tons per acre-foot					
Feb. 3-6, 1952...	131, 100		3.19	2.05	2.44		3.49	3.94	0.31		0.04	0.10	488	0.66	86,530	31	1.5	724	7.6
Feb. 7-9	102, 700		3.14	1.90	2.61		3.41	3.85	.31		.03	.09	466	.63	64,700	34	1.7	706	7.3
Feb. 26-Mar. 1...	100, 600		2.84	1.76	2.44		3.10	3.62	.25		.02	.02	426	.58	58,350	35	1.6	651	7.4
Mar. 2-5	106, 500		2.00	2.32	2.61		3.00	3.62	.27		.04	.03	432	.59	62,840	38	1.8	651	7.4
Mar. 6-9	97, 790		2.75	1.65	2.61		3.08	3.64	.25		.03	.11	444	.60	58,670	37	1.8	654	7.3
Mar. 14-17	104, 300		3.04	1.84	2.78		3.31	4.04	.31		.02	.14	470	.64	66,750	36	1.8	708	7.4
Apr. 1-3	347, 100		3.99	1.51	3.35		2.67	5.79	.23		.05	.10	578	.79	274,200	38	2.0	814	7.2
Apr. 1-a	89, 260		4.64	1.88	3.91		2.96	6.83	.28		.06	.02	676	.92	82,120	37	2.2	946	7.4
Apr. 4-7	1,367, 000		2.89	1.05	2.35		2.52	3.54	.14		.05	.09	398	.54	738,200	37	1.7	591	7.4
Apr. 8-9	1,323, 000		2.50	.76	1.78		2.64	2.31	.09		.05	.06	320	.44	582,100	35	1.4	478	7.7
Apr. 10-11	1,672, 000		2.15	.89	1.70		2.66	1.94	.09		.06	.06	300	.41	685,500	36	1.4	452	7.8
Apr. 12-13	1,107, 000		1.90	.80	1.78		2.36	2.02	.09		.06	.06	282	.38	420,700	39	1.5	430	7.3
Apr. 14-16	757, 700		2.15	.87	1.87		2.66	2.04	.07		.05	.02	302	.41	310,700	38	1.5	472	7.6
Apr. 17-28	1,810, 000		2.15	.93	2.04		2.66	2.44	.11		.03	.06	324	.44	796,400	39	1.6	497	7.8
Apr. 29-May 14..	1,516, 000		2.05	1.16	2.35		2.69	2.79	.16		.02	.06	366	.50	758,000	42	1.9	528	7.6
May 15-24	708, 500		2.00	1.00	2.04		2.46	2.42	.14		.02	.07	296	.40	283,400	40	1.7	489	7.8
May 25-31	511, 700		2.00	1.24	2.48		2.52	3.00	.18		.06	.13	366	.50	255,900	43	1.9	549	7.6
June 1-5	453, 400		2.40	1.26	2.31		2.77	3.08	.23		.04	.09	366	.50	226,700	38	1.7	590	7.7
June 6-7	172, 400		3.39	1.73	3.13		3.13	4.87	.31		.07	.11	522	.71	122,400	37	2.0	793	7.7
June 8-10	246, 000		2.55	1.25	2.48		2.69	3.50	.21		.04	.19	410	.56	137,800	39	1.8	620	7.7
June 11-14	369, 500		2.10	1.10	1.91		2.48	2.48	.18		.03	.11	318	.43	158,900	37	1.5	511	7.5
June 15-17	370, 500		2.05	1.03	1.70		2.52	2.19	.16		.03	.24	302	.41	151,900	35	1.4	470	7.7
June 18-26, 1952.	755, 900		1.95	.82	1.48		2.33	1.85	.14		.03	.11	264	.36	272,100	34	1.3	426	7.7
June 27	69, 020		2.79	1.05	2.65		2.72	3.62	.17		.06	.08	432	.59	40,720	40	1.9	578	7.4
June 28-29	165, 400		2.55	1.09	2.48		2.52	3.41	.20		.03	.13	406	.55	90,970	40	1.8	600	7.6
June 30-July 3 ...	274, 500		2.45	.95	2.39		2.43	3.19	.20		.03	.16	364	.50	137,300	41	1.8	569	7.7

a Not included in total or weighted average.

July 4-9.....	365,800	1.90	.88	2.13	2.29	2.56	.17	.02	.12	312	.42	153,600	42	1.8	494	7.4
July 10-20.....	565,700	2.10	1.03	2.35	2.44	2.98	.20	.02	.12	360	.49	277,200	42	1.9	553	7.8
July 21-23.....	109,500	2.15	1.18	2.31	2.49	3.06	.23	.01	.11	358	.49	53,660	40	1.8	557	8.2
July 24-29.....	291,200	2.10	1.10	2.35	b 2.51	2.89	.20	.01	.12	352	.48	139,800	42	1.9	543	8.2
July 30-Aug. 9...	498,600	2.45	1.21	2.70	2.51	3.69	.23	.03	.11	404	.55	274,200	42	2.0	625	8.2
Aug. 10-15.....	343,100	2.45	1.44	2.57	2.72	3.54	.25	.02	.16	408	.55	188,700	39	1.8	623	8.0
Aug. 16-20.....	312,200	2.50	1.40	2.44	b 2.69	3.44	.25	.01	.25	402	.55	171,700	38	1.7	606	8.3
Aug. 21-31.....	611,100	2.55	1.49	2.52	2.79	3.58	.27	.01	.13	420	.57	348,300	38	1.8	619	8.0
Sept. 1-30.....	1,658,000	2.70	1.54	2.57	2.92	3.66	.27	.01	.11	426	.58	961,600	37	1.8	650	8.0
Total or weighted average c	24,340,000	2.50	1.23	2.22	2.74	3.04	0.18	0.03	0.10	375	0.51	12,420,000	37	1.6	568	--
Total or weighted average d	26,490,000	2.54	1.32	2.26	2.79	3.16	0.19	0.03	0.10	385	0.52	13,770,000	37	1.6	583	--

b Includes 0.17 equivalents per million of carbonate (CO₃).

c Represents 92 percent of runoff for water year October 1951 to September 1952.

d Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT NEBRASKA CITY, NEBR.

LOCATION--At gaging station at Waubensie Highway Bridge at Nebraska City, Otoe County.
DRAINAGE AREA--414,400 square miles, approximately.

RECORDS AVAILABLE--Chemical analyses: January 1951 to September 1952.

Water temperatures: May 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 931 micromhos Dec. 27; minimum daily, 408 micromhos June 28.
Percent sodium: Maximum, 37 June 14-19; minimum, 26 Jan. 1-10.

EXTREMES, January 1951 to September 1952.--Specific conductance: Maximum daily, 931 micromhos Dec. 27, 1951; minimum daily, 361 micromhos Mar. 29, 1951.

Percent sodium: Maximum, 37 June 14-19, 1952; minimum, 18 Mar. 27-29, 1951.

REMARKS--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1240.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Per cent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	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, 1951...	3,312,000	--	3.24	1.58	2.26	--	3.38	3.27	0.42	--	0.07	0.18	474	0.64	2,120,000	32	1.5	689	8.0
Nov. 1-30	2,830,000	--	3.44	1.40	2.26	--	3.49	3.23	.42	--	.06	.18	454	.62	1,755,000	31	1.5	678	7.9
Dec. 1-15	997,700	--	3.49	1.91	2.30	--	3.88	3.41	.48	--	.08	.08	498	.68	678,400	29	1.4	728	7.7
Dec. 27-28	46,020	--	3.79	2.13	2.39	--	4.36	3.37	.65	--	.11	.17	530	.72	33,130	28	1.4	786	8.0
Jan. 1-10, 1952..	286,600	--	4.59	2.29	2.57	--	4.98	3.81	.82	--	.11	.08	600	.82	235,000	26	1.4	884	7.8
Jan. 16-Feb. 10.	1,430,000	--	3.54	1.78	2.44	--	3.88	3.35	.59	--	.09	.17	500	.68	972,400	31	1.5	744	7.7
Feb. 11-Mar. 9..	2,565,000	--	3.29	1.65	1.91	--	3.49	2.98	.42	--	.13	.17	440	.60	1,539,000	27	1.2	661	7.8
Mar. 10-30	2,181,000	--	3.19	1.45	1.74	--	3.20	2.77	.45	--	.14	.05	408	.55	1,189,000	27	1.1	617	7.9
Mar. 31-Apr. 5..	1,521,000	--	3.09	1.41	1.70	--	3.00	2.96	.31	--	.12	.05	398	.54	821,300	27	1.1	603	7.8
Apr. 6-9	1,224,000	--	3.19	1.37	2.22	--	2.59	3.93	.28	--	.09	.05	436	.59	722,200	32	1.5	660	7.7
Apr. 10-16	3,130,000	--	2.59	1.11	1.96	--	2.46	3.10	.24	--	.06	.07	364	.50	1,565,000	33	1.4	562	8.0
Apr. 17-18	1,329,000	14	2.30	1.05	1.74	0.12	2.56	2.37	.22	0.01	.05	.07	336	.46	611,300	33	1.3	509	7.7
Apr. 19	773,600	19	2.30	1.08	1.74	.11	2.61	2.37	.19	.01	.06	.06	348	.47	379,100	33	1.3	510	7.9
Apr. 20-23	2,148,000	17	2.30	1.19	1.63	.12	2.65	2.50	.22	.01	.06	.06	350	.48	1,031,000	34	1.4	524	7.9
Apr. 24-May 2...	2,375,000	--	2.69	1.27	2.00	--	2.95	2.89	.25	--	.07	.11	377	.51	1,211,000	32	1.4	583	8.0

May 3-6.....	661,700	--	2.69	1.25	2.04	--	3.01	2.81	.31	--	.06	.09	379	.52	344,100	33	1.5	585	8.3
May 7-22.....	2,321,000	--	2.84	1.38	2.17	--	3.16	2.98	.37	--	.06	.11	426	.58	1,346,000	33	1.5	622	7.7
May 23-June 2...	1,571,000	--	2.84	1.22	1.96	--	3.21	2.82	.34	--	.08	.12	412	.56	879,800	32	1.4	586	7.6
June 3-7.....	644,000	--	2.84	1.32	2.48	--	3.16	3.23	.39	--	.06	.12	468	.64	412,200	36	1.7	655	7.8
June 8-13.....	772,200	--	2.84	1.28	2.22	--	2.87	3.00	.39	--	.05	.17	428	.58	447,900	35	1.6	600	7.9
June 14-19.....	710,900	--	2.99	1.39	2.65	--	2.87	3.85	.42	--	.07	.19	518	.70	497,600	37	1.8	695	7.9
June 20-July 6...	2,422,000	--	2.79	1.07	1.57	--	3.10	2.19	.45	--	.07	.11	343	.47	1,138,000	27	1.1	534	7.5
July 7-8.....	299,900	--	3.54	1.26	2.65	--	3.21	4.08	.31	--	.13	.14	502	.68	203,900	34	1.7	726	7.7
July 9-21.....	1,844,000	--	2.79	.97	1.87	--	2.92	2.42	.34	--	.09	.14	361	.49	658,600	32	1.4	561	7.8
July 22-Aug. 27..	2,534,000	--	2.74	1.30	2.35	--	2.93	3.14	.51	--	.05	.14	416	.57	1,444,000	35	1.7	633	7.8
Aug. 28-Sept. 3..	557,200	--	2.79	1.25	2.09	--	2.92	2.98	.45	--	.02	.14	390	.53	295,300	33	1.5	604	7.7
Sept. 4-30.....	1,785,000	17	2.99	1.51	2.44	--	3.11	3.50	.48	--	.03	.11	440	.60	1,071,000	34	1.6	671	7.8
Total or weighted average b	41,750,000	--	2.94	1.32	2.04	--	3.10	3.00	0.37	--	0.08	0.12	415	0.56	23,600,000	31	1.4	621	--
Total or weighted average c	42,240,000	--	2.94	1.32	2.04	--	3.10	3.00	0.37	--	0.08	0.12	415	0.56	23,650,000	31	1.4	621	--

a Includes 0.13 equivalents per million of carbonate (CO₃).

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

c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

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 1952.

Water temperatures: December 1950 to September 1952.

EXTREMES, 1951-52. --Specific conductance: Maximum daily, 637 micromhos Feb. 4; minimum daily, 142 micromhos June 11.

Percent sodium: Maximum, 35 Sept. 2; minimum, 18 Apr. 27-30, May 5-10, 1951; minimum daily, 140 micromhos June 19, 1951.

EXTREMES, 1950-52. --Specific conductance: Maximum daily, 1,210 micromhos Feb. 2, 1951; minimum daily, 140 micromhos June 19, 1951.

Percent sodium: Maximum, 37 Dec. 1, 1950; minimum, 16 May 20, 1951.

REMARKS. --Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples and periodic phenolic material determinations available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons			
Oct. 1-31, 1951...	313,400		1.90	0.90	1.13	--	2.38	1.50	0.17	0.02	0.15	250	0.34	106,600	28	1.0	395	7.8
Nov. 1-30	263,700		1.95	1.01	1.13	--	2.46	1.58	.19	.03	.15	256	.35	92,300	27	.9	407	7.8
Nov. 5 a.....	10,250		1.80	1.16		1.32	2.46	1.60	.18	.03	--	256	.35	3,580	31	1.1	404	7.6
Dec. 1-31	181,200		2.20	1.16	1.30	--	2.70	1.81	.22	.03	.22	288	.41	74,280	27	1.0	457	7.7
Dec. 3 a.....	7,600		1.95	1.03		1.27	2.43	1.64	.18	--	--	266	.36	2,740	30	1.0	414	7.8
Jan. 1-31, 1952..	162,000		2.35	1.05	1.26	--	2.65	1.79	.23	.04	.27	294	.40	64,800	27	1.0	459	8.1
Jan. 2 a.....	4,300		2.74	1.82		1.97	3.10	3.12	.31	--	--	402	.55	2,370	30	1.3	625	7.4
Feb. 1-29	156,800		2.30	.90	1.26	--	2.47	1.85	.23	.03	.23	284	.39	61,150	28	1.0	446	8.0
Feb. 4 a.....	6,150		2.74	1.88		1.93	2.80	3.33	.42	--	.25	--	--	--	29	1.3	637	7.2
Mar. 1-31	186,100		2.15	1.01	1.35	--	2.46	1.89	.24	.02	.23	282	.38	70,720	29	1.1	448	7.8
Apr. 1-20	211,600		1.85	.99	1.04	--	2.41	1.23	.23	.04	.17	254	.35	74,060	27	.9	378	7.9
Apr. 1 a.....	7,780		1.95	.95		1.32	2.43	1.58	.21	--	--	--	--	--	31	1.1	420	7.6
Apr. 21-26	85,090		1.70	.76	.78	--	2.20	.96	.16	.03	.13	222	.30	25,530	23	.7	318	8.0
Apr. 27-30	112,900		1.35	.53	.43	--	1.74	.52	.08	.05	.10	174	.24	27,100	18	.4	232	7.9

a Not included in total or weighted average.

May 1-4.....	142,200	1.10	.44	.38	--	1.41	.46	.08	.03	.10	130	.18	25,600	19	.4	188	7.3
May 5-10.....	238,400	.95	.41	.33	--	1.26	.44	.08	.03	.06	120	.16	38,140	18	.4	187	7.4
May 7 a.....	39,670	.85	.35	.0.36	--	1.15	.35	.06	--	--	--	--	--	23	.5	154	7.5
May 11-21.....	341,000	1.05	.43	.48	--	1.38	.58	.10	.03	.10	138	.19	64,790	23	.6	196	7.5
May 22-25.....	198,300	1.45	.63	.70	--	1.95	.81	.08	.04	.08	184	.25	48,560	24	.7	272	7.6
May 26-29.....	210,800	1.20	.42	.43	--	1.54	.46	.08	.03	.07	140	.19	40,050	20	.5	202	7.5
May 30-31.....	120,400	1.05	.37	.37	--	1.36	.40	.06	.03	.04	126	.17	20,470	20	.4	178	7.7
June 1-24.....	1,412,000	.90	.34	.37	--	1.23	.37	.06	.03	.10	108	.15	211,800	22	.5	165	7.4
June 2 a.....	56,710	.90	.36	.38	--	1.21	.37	.06	--	--	--	--	--	23	.5	164	7.3
June 25-July 22..	825,700	1.10	.46	.61	--	1.47	.67	.16	.02	.10	139	.19	156,900	28	.7	221	7.5
July 7 a.....	28,960	1.00	.36	.53	--	1.31	.50	.08	--	--	114	.16	4,630	28	.6	189	7.5
July 23-31.....	148,200	1.25	.67	.78	--	1.72	.94	.16	.02	.13	169	.23	34,090	27	.8	275	7.2
Aug. 1-31.....	374,400	1.55	.83	1.09	--	2.13	1.31	.17	.02	.15	211	.29	108,600	30	1.0	341	7.9
Aug. 5 a.....	15,390	1.95	1.35	1.48	--	2.25	2.33	.20	--	--	282	.40	6,180	31	1.2	466	7.2
Sept. 1-30.....	221,400	2.05	1.07	1.39	--	2.64	1.89	.21	.02	.18	285	.39	86,350	29	1.1	447	8.2
Sept. 2 a.....	6,290	1.90	1.08	1.63	--	2.51	1.92	.18	--	--	--	--	--	35	1.3	427	7.7
Total or weighted average b	5,906,000	1.40	.62	.74	--	1.77	0.92	0.13	0.03	0.13	177	0.24	1,433,000	26	0.7	272	--

a Not included in total or weighted average.

b Represents 100 percent of runoff for water year October 1951 to September 1952.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At gaging station at bridge on State Highway 23, 2 miles south of Sidney, Richland County, and 30 miles upstream from mouth. DRAINAGE AREA.--69,450 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1952.

Water temperatures: January 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,270 micromhos Jan. 3; minimum daily, 284 micromhos June 14.

Percent sodium: Maximum, 40 Sept. 12-30; minimum, 26 June 11-13.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 284 micromhos June 14, 1952.

Percent sodium: Maximum, 40 Sept. 12-30; minimum, 26 June 11-13, 1952.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-31, 1951 .	536,800		3.19	1.97	3.17		3.18	4.95	0.31		0.03	0.17	540	0.73	391,900	37	2.0	804	7.5
Nov. 1-23	379,900		3.34	1.96	3.13		3.36	4.83	.31		.03	.18	542	.74	276,700	37	1.9	800	7.7
Nov. 24-Dec. 6 . .	212,200		3.34	2.06	2.91		3.41	4.77	.31		.03	.17	558	.76	161,300	34	1.8	793	7.7
Dec. 7-31.	151,500		4.64	2.76	4.52		4.72	7.14	.45		.05	.24	774	1.05	159,100	37	2.3	1,100	7.8
Jan. 1-29, 1952 .	310,400		4.29	2.55	3.52		4.23	5.61	.42		.05	.24	658	.89	276,300	33	1.9	963	8.1
Jan. 30-Feb. 29 .	421,500		3.09	1.75	2.65		3.02	4.08	.37		.16	.21	480	.65	274,000	35	1.7	734	7.6
Mar. 1-29	354,800		3.54	1.94	2.96		3.29	4.93	.39		.05	.20	542	.74	262,600	34	1.8	808	7.8
Mar. 30-31.	268,800		2.15	.89	1.57		2.61	1.94	.04		.07	.06	287	.39	104,800	34	1.3	464	7.9
Apr. 1	218,200		2.54	.86	1.76		2.59	2.52	.17		.09	.09	336	.46	100,400	33	1.4	528	7.5
Apr. 2	157,100		1.90	.78	1.48		2.29	1.77	.08		.08	.06	268	.36	56,560	35	1.3	429	7.4
Apr. 3-6	331,800		2.20	1.00	1.83		2.49	2.44	.13		.06	.08	320	.44	146,000	36	1.4	503	7.9
Apr. 7-10	209,900		2.45	1.35	2.26		2.59	3.31	.20		.05	.10	389	.53	111,200	37	1.6	601	8.0
Apr. 11-15	131,700		2.74	1.74	2.65		2.88	4.14	.31		.05	.12	468	.64	84,290	36	1.8	694	8.0
Apr. 16-21	128,700		3.09	1.93	2.78		3.21	4.40	.34		.04	.19	509	.69	86,800	35	1.8	759	8.1
Apr. 22-30	222,700		2.79	1.73	2.61		2.97	4.04	.31		.05	.13	467	.64	142,500	35	1.7	701	8.0

	1.75	.81	1.17		1.93	1.79	.13	.04	.05	249	.34	483,800	30	1.0	388	8.0
May 1-28	1,364,000															
May 8 a	86,250	2.40			1.87	--	--	--	--	--	--	--	--	--	342	8.0
May 29-31	221,800				b 2.04	2.89	.14	.04	.06	332	.45	99,810	36	1.4	505	8.3
June 1-9	746,800	.90	1.83		1.90	1.54	.11	.03	.08	286	.31	231,500	28	.9	345	7.5
June 10	111,500	.69	1.00	1.61	2.16	2.37	.14	.03	.09	296	.40	44,600	34	1.3	450	7.7
June 11	325,300	.61	1.00		1.97	1.27	.10	.03	.06	208	.28	91,080	26	.8	323	7.7
June 11-13	325,300	.61			1.97	1.27	.10	.03	.06	208	.28	91,080	26	.8	323	7.7
June 14-27	752,700		1.04	1.04	1.74	1.48	.14	.02	.07	214	.29	218,300	31	1.0	332	7.6
June 28-July 7	433,400															
July 8	31,740	.85	1.57		c 2.00	2.25	.17	.02	.02	282	.38	184,700	35	1.4	432	8.3
July 8	31,740	1.27	2.17		2.43	3.14	.20	.02	.12	374	.51	16,190	37	1.6	563	8.0
July 23-Aug. 9	435,600	.91	1.65		2.02	2.23	.16	.03	.09	282	.38	165,500	37	1.4	435	7.9
July 23-Aug. 9	361,800	2.30	1.48	2.22	2.52	3.41	.23	.02	.13	386	.52	188,100	36	1.6	591	7.7
Aug. 10-Sept. 11	458,200	2.54	1.78	2.91	2.84	4.39	.27	.02	.17	472	.64	293,200	39	2.0	705	7.9
Sept. 12-30	213,600	3.04	2.10	3.57	3.21	5.39	.31	.02	.19	562	.76	162,300	40	2.2	833	7.9
Total or																
Weighted average d	9,486,000	2.40	1.32	2.04	2.54	3.08	0.21	0.04	0.11	371	0.50	4,776,000	35	1.5	561	--

a Not included in total or weighted average.

^b Includes 0.07 equivalents per million of carbonate (CO₃).

c Includes 0.10 equivalents per million of carbonate (CO₃);

d Represents 100 percent of runoff for water year October 1951 to September 1952.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT THERMOPOLIS, WYO.

LOCATION.--At Broadway Street bridge at Thermopolis, Hot Springs County, upstream from principal hot springs inflow and half a mile downstream from small tributary. Water discharge measurements made at this site.

DRAINAGE AREA.--8,080 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: April 1947 to September 1952.

Water temperatures: April 1947 to September 1952.

Sediment records: March 1946 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 997 micromhos Oct. 1, 2; minimum daily, 487 micromhos July 2, 6.

Percent sodium: Maximum, 38 Sept. 30; minimum, 31 Oct. 1-31, Nov. 1-30, Feb. 1-29, Mar. 1-31.

EXTREMES, 1947-49, 1950-52.--Specific conductance: Maximum daily, 1,270 micromhos Apr. 26, 1947; minimum daily, 245 micromhos, June 10, 1948.

Percent sodium: Maximum, 47 Aug. 1-31, Sept. 1-30, 1948; minimum, 13 May 21-30, 1947.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples and periodic phenolic material determinations available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH		
			Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion				Tons per acre- foot	Total tons
Oct. 1-31, 1951..	39,680		5.71	2.61	--	--	--	--	--	--	--	554	0.75	29,910	31	1.5	791	
Nov. 1-30.....	26,530		4.20	1.87	--	--	--	--	--	--	--	404	.55	14,590	31	1.3	596	
Nov. 5 a.....	575		2.74	1.48	1.91	2.51	3.12	0.48	--	--	--	372	.51	51	293	31	1.3	581
Dec. 1-31.....	31,660		4.96	2.52	--	--	--	--	--	--	--	476	.65	20,580	34	1.6	708	
Dec. 5 a.....	1,020		2.94	1.56	2.40	2.74	3.79	.37	--	--	--	432	.59	602	35	1.6	657	
Jan. 1-31, 1952..	27,410		5.24	2.57	--	--	--	--	--	--	--	501	.66	18,640	33	1.6	735	
Jan. 8 a.....	982		3.29	1.79	2.66	3.10	4.27	.37	--	--	--	494	.67	638	34	1.7	730	
Jan. 31 a.....	770		3.44	1.90	2.55	3.24	4.23	.42	0.09	--	--	--	--	--	32	1.6	761	
Feb. 1-29.....	15,880		5.64	2.52	--	--	--	--	--	--	--	518	.70	11,120	31	1.5	765	
Mar. 1-31.....	16,620		5.82	2.65	--	--	--	--	--	--	--	548	.75	12,470	31	1.6	804	
Mar. 4 a.....	545		3.84	1.96	2.71	3.44	4.56	.51	--	--	--	--	--	--	32	1.6	805	
Apr. 1-30.....	26,010		5.60	3.00	--	--	--	--	--	--	--	574	.78	20,290	34	1.6	837	
Apr. 2 a.....	565		4.04	2.24	3.22	3.51	5.43	.56	--	--	--	--	--	--	34	1.6	898	
May 1-31.....	52,190		5.34	2.83	--	--	--	--	--	--	--	500	.68	35,490	35	1.7	728	
May 13 a.....	1,750		3.09	1.81	2.84	2.85	4.52	.37	--	--	--	--	--	--	37	1.6	739	
May 13 a.....	1,750		3.09	1.81	2.84	2.85	4.52	.37	--	--	--	--	--	--	37	1.6	739	

a Not included in total or weighted average.

June 1-30	72,860	3.70	1.96	--	--	--	--	--	373	.51	37,160	35	1.4	561	--
June 10 a.....	2,960	2.64	1.40	2.35	--	2.46	--	3.62	--	--	--	37	1.7	616	7.5
July 1-31.....	88,300	3.28	1.76	--	--	--	--	--	327	.44	38,850	35	1.4	505	--
July 2 a.....	2,240	2.25	1.09	1.73	--	2.06	--	2.77	--	--	--	34	1.3	502	7.3
Aug. 1-31.....	77,020	3.52	1.91	--	--	--	--	--	352	.48	36,970	35	1.4	538	--
Aug. 3 a.....	2,660	2.40	1.04	1.92	--	2.15	--	2.98	.04	.47	1,250	36	1.5	525	7.4
Sept. 1-30.....	67,910	3.90	2.04	--	--	--	--	--	388	.53	35,990	34	1.5	583	--
Sept. 2 a.....	2,020	2.45	1.13	2.04	--	2.25	--	3.10	.05	--	--	36	1.5	546	7.4
Sept. 30 a.....	2,040	2.54	1.30	2.34	--	2.39	--	3.52	--	--	--	38	1.7	594	7.8
Total or weighted average b	542,300	4.34	2.22	--	--	--	--	--	423	0.58	312,100	34	1.5	630	--

a Not included in total or weighted average.

b Represents 100 percent of runoff for water year October 1951 to September 1952.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At bridge on U.S. Highway 10 and 12, three-quarters of a mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 3½ miles downstream from gaging station near Custer.

RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1952.

Water temperatures: April 1949 to September 1951.

Sediment records: July 1947 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,250 micromhos Apr. 15, 16; minimum daily 460 micromhos May 7.

Percent sodium: Maximum, 49 May 23-28; minimum, 32 May 7.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 1,270 micromhos Feb. 2, 1951; minimum daily, 235 micromhos Feb. 11, 1951.

Percent sodium: Maximum, 49 May 23-28, 1952; minimum, 29 Feb. 11, 1951.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples and periodic phenolic material determinations available in regional office at Lincoln, Nebr. No appreciable inflow between gaging station and sampling point except small amounts of irrigation waste water. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1951...	197,300		3.89	3.11	5.22	--	3.34	8.54	0.45	0.05	0.16	825	1.12	221,000	42	2.8	1,140	7.9	
Nov. 1-30.....	161,800		4.59	2.65	4.44	--	3.69	7.70	.45	.05	.14	776	1.06	171,500	37	2.3	1,090	8.3	
Dec. 1-14.....	65,650		3.14	2.70	4.26	--	2.38	7.49	.42	.04	.13	691	.94	61,900	41	2.5	970	8.2	
Dec. 7 b.....	4,880		4.59	2.65	4.23		3.70	7.35	.42	--	--	744	1.01	4,930	37	2.2	1,060	7.7	
Jan. 4-7, 1952...	16,110		4.74	2.96	4.27		4.17	7.35	.45	--	--	774	1.05	16,920	36	2.2	1,070	8.4	
Jan. 8-24.....	69,460		4.59	2.49	3.57	--	3.83	6.52	.42	.05	.14	696	.95	85,990	33	1.9	946	8.0	
Feb. 4-7.....	19,800		4.34	2.16	3.51		3.52	6.10	.39	--	.13	--	--	--	35	1.9	946	7.4	
Feb. 8-29.....	96,630		4.49	2.83	3.83	--	3.77	6.77	.42	.05	.14	720	.98	94,700	35	2.0	1,010	8.1	
Mar. 1-19.....	96,930		4.34	2.54	3.74	--	3.64	6.83	.42	.05	.15	706	.96	93,050	34	2.0	997	8.1	
Mar. 18 b.....	6,740		4.19	2.45	4.08		3.43	6.87	.42	--	--	--	--	--	38	2.2	991	7.8	
Mar. 20-23.....	26,180		3.99	2.41	3.91	--	3.34	6.72	.37	.06	.11	685	.93	24,350	37	2.2	973	8.2	
Mar. 24-28.....	42,050		4.19	2.49	4.00	--	3.38	6.97	.42	.05	.12	719	.98	41,210	37	2.2	1,000	8.4	
Mar. 29-Apr. 28.	217,700		4.09	2.45	4.17	--	3.44	6.93	.39	.06	.12	718	.98	213,300	39	2.3	1,000	8.3	

a Includes 0.13 equivalents per million of carbonate (CO₃).

b Not included in total or weighted average.

c Includes 0.30 equivalents per million of carbonate (CO₃).

Apr. 1 b.....	9,340	3.49	2.03	3.35	3.08	5.45	.34	--	--	--	38	2.0	849	7.7
Apr. 29-30.....	25,670	3.04	1.64	2.87	d 2.84	4.56	.25	.07	.06	.69	37	1.9	733	8.4
May 1 22.....	227,000	2.54	1.36	2.22	--	3.54	.20	.05	.08	.62	36	1.6	598	8.1
May 7 b.....	14,340	2.15	1.05	1.48	--	2.44	.14	--	--	--	32	1.2	460	7.8
May 23-28.....	105,300	3.09	1.51	4.52	--	5.93	.28	.11	.09	.91	49	3.0	885	8.1
May 29-June 6...	136,200	2.50	1.40	2.46	--	3.79	.20	.04	.08	.63	38	1.8	621	8.1
June 3 b.....	14,840	2.69	1.33	2.38	--	3.66	.20	--	--	--	37	1.7	619	7.7
June 7-17.....	167,100	2.30	1.22	2.13	--	3.25	.20	.03	.08	.56	37	1.6	553	7.7
June 18-30.....	88,090	3.39	1.89	3.48	--	5.68	.28	.05	.14	.60	39	2.1	846	8.0
July 1-31.....	169,900	3.89	2.01	4.04	--	6.87	.34	.05	.10	.91	39	2.4	946	7.8
July 7 b.....	3,770	4.39	2.25	4.48	--	7.49	.37	--	--	.98	40	2.5	1,030	7.8
Aug. 1-31.....	140,600	4.04	2.44	4.91	--	8.08	.42	.04	.18	.767	42	2.7	1,070	8.0
Aug. 5 b.....	4,780	4.14	2.32	4.98	--	7.87	.39	--	--	.756	44	2.8	1,080	7.8
Sept. 1-30.....	150,800	4.44	2.56	5.26	--	8.70	.45	.04	.16	.822	42	2.8	1,140	7.8
Sept. 2 b.....	4,280	4.64	2.80	5.92	--	9.37	.45	--	--	--	44	3.1	1,200	7.7
Total or weighted average e	2,220,000	3.64	2.14	3.87	--	6.37	0.34	f 0.05	f 0.12	f 663	39	2.3	915	--
Total or weighted average g	2,340,000	3.69	2.22	3.87	--	6.39	0.37	0.05	0.12	666	39	2.3	919	--

b Not included in total or weighted average.

d Includes 0.20 equivalents per million of carbonate (CO₃).

e Represents 95 percent of runoff for water year October 1951 to September 1952.

f Includes estimated data for missing periods.

g Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

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 1952.

Water temperatures: June 1950 to September 1951.

Sediment records: June 1946 to September 1951.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,380 micromhos Aug. 30; minimum daily, 305 micromhos, June 13.

Percent sodium: Maximum, 64 Aug. 30; minimum, 19 June 1-15.

EXTREMES, January 1951 to September 1952.--Specific conductance: Maximum daily, 1,380 micromhos Aug. 30, 1952; minimum daily, 305 micromhos June 13, 1952.

Percent sodium: Maximum, 64 Aug. 30, 1952; minimum, 19 June 8-11, 1951, June 1-15, 1952.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons			
Oct. 1-31, 1951..	20,190		2.99	2.91	1.83		3.98	3.83	0.08	0.03	0.08	466	0.63	12,720	23	1.1	716	7.9
Nov. 1-5.....	1,650		3.64	3.74	3.35		5.38	5.41	.13	.01	.12	650	.88	1,450	31	1.7	974	8.0
Nov. 6-10.....	5,750		3.04	3.10	2.17		4.24	4.12	.08	.03	.10	510	.69	3,970	26	1.2	759	8.2
Nov. 11-30.....	24,190		3.34	2.98	1.67		4.51	4.27	.06	.01	.10	506	.69	16,690	21	1.1	767	8.2
Dec. 1-24.....	9,730		2.30	3.30	2.39		3.61	4.37	.16	.03	.09	489	.67	6,520	29	1.4	746	7.9
Dec. 25-Jan. 15, 1952.....	6,180		2.84	4.36	2.91		4.41	5.64	.14	.02	.12	622	.85	5,250	29	1.5	916	8.1
Jan. 16-Feb. 9...	6,950		3.24	3.80	2.83		4.65	5.25	.13	.04	.09	600	.82	5,700	28	1.5	895	7.9
Feb. 10-18.....	3,340		1.50	1.26	1.65		2.39	2.02	.03	.04	.08	286	.39	1,300	37	1.4	447	7.2
Feb. 20-28.....	3,330		3.69	3.83	2.96		5.36	5.27	.13	.04	.10	641	.87	2,900	27	1.5	950	--
Mar. 1-19.....	6,250		3.24	3.58	2.70		4.79	4.77	.13	.05	.07	576	.78	4,880	28	1.5	879	7.9
Mar. 20-25.....	2,180		2.00	2.00	2.04		3.11	3.04	.04	.04	.05	384	.52	1,130	33	1.4	600	7.5
Mar. 26-28.....	1,410		1.55	.89	1.43		2.39	1.60	.04	.02	.03	264	.36	508	35	1.3	401	7.6
Mar. 29.....	992		1.25	.87	1.26		2.23	.90	.14	.08	.13	214	.29	288	38	1.3	319	7.3
Mar. 30-Apr. 1..	29,300		1.75	1.03	1.35		2.70	1.52	.03	.03	.05	268	.36	10,550	32	1.1	408	7.6

a Includes 0.23 equivalents per million of carbonate (CO₃).

Apr. 2-3.....	11,130	2.15	1.17	1.30	2.84	1.85	.03	.05	0.06	294	.40	4,450	27	1.0	453	7.7
Apr. 4-23.....	62,280	2.74	2.60	1.74	3.36	3.77	.11	.07	.05	456	.62	38,610	24	1.1	673	7.8
Apr. 24-May 4....	8,320	3.39	4.07	3.52	4.77	6.39	.17	.02	.10	688	.94	7,820	31	1.8	1,000	8.2
May 5-17.....	31,740	2.10	1.98	1.13	2.82	2.42	.07	.03	.04	326	.44	13,970	21	.8	504	8.1
May 18-26.....	13,780	1.95	1.65	1.22	2.67	2.19	.06	.03	.05	300	.41	5,650	25	.9	470	8.1
May 27-31.....	17,670	1.80	1.46	.87	2.43	1.71	.03	.03	.02	258	.35	6,180	21	.7	402	7.9
June 1-15.....	49,800	1.75	1.17	.70	2.29	1.39	.03	.02	.07	221	.30	14,940	19	.6	351	8.0
June 16-30.....	12,980	2.15	1.61	1.70	3.02	2.48	.06	.03	.10	332	.45	5,840	30	1.2	521	8.0
July 1-17.....	5,720	2.69	2.11	2.39	3.62	3.64	.08	.03	.10	445	.61	3,490	32	1.5	677	7.8
July 18-31.....	11,580	2.40	1.88	1.65	3.20	2.75	.07	.03	.13	355	.48	5,560	27	1.1	551	8.5
Aug. 1-29.....	5,710	2.89	2.95	2.91	4.39	4.75	.11	.03	.11	538	.73	4,170	31	1.7	809	8.1
Aug. 30.....	424	2.50	1.98	9.83	4.90	10.26	.17	.05	.19	974	1.32	560	64	6.6	1,360	7.3
Aug. 31-Sept. 30.	7,350	3.14	3.16	2.83	4.46	4.71	.14	.02	.14	546	.74	5,440	30	1.6	831	7.8
Total or weighted average b	359,900	2.40	2.22	1.65	3.29	3.06	0.08	0.04	0.07	390	0.53	190,500	26	1.1	592	--

a Includes 0.23 equivalents per million of carbonate (CO₃).

b Represents 100 percent of runoff for water year October 1951 to September 1952.

YELLOWSTONE RIVER BASIN--Continued
POWDER RIVER NEAR LOCATE, MONT.

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

RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1952.

Water temperatures: March 1951 to September 1952.

Sediment records: March 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,460 micromhos July 23; minimum daily, 407 micromhos Feb. 14.

Percent sodium: Maximum, 51 Aug. 30; minimum, 26 July, 22-26.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 2,590 micromhos Aug. 16, 1951; minimum daily, 407 micromhos Feb. 14, 1952.

Percent sodium: Maximum, 53 Aug. 25, 1951; minimum, 24 Aug. 16, 1951.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium ratio	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total						
													Parts per million	Tons per acre-foot					
Oct. 1-21, 1951...	11,090		6.69	4.17	6.96		2.97	13.74	1.02		0.08	0.17	1,240	1.69	18,740	39	3.0	1,600	8.2
Dec. 7-31.....	18,480		5.14	3.86	6.83		3.39	11.41	.85		.05	.14	1,070	1.46	26,980	44	3.2	1,430	8.0
Jan. 1-31, 1952...	5,010		8.43	6.15	8.83		5.36	17.07	1.27		.07	.14	1,600	2.18	10,920	37	3.3	2,010	8.1
Feb. 1-10.....	3,390		7.14	4.58	7.57		4.90	13.22	1.04		.06	.11	1,300	1.77	6,000	39	3.1	1,700	7.8
Feb. 11-14.....	2,920		1.50	.90	1.91		1.56	2.54	.18		.07	.10	302	.41	1,200	44	1.7	451	7.2
Feb. 15-29.....	6,080		4.44	2.82	4.22		3.13	7.91	.73		.05	.13	784	1.07	6,510	36	2.2	1,100	7.7
Mar. 1-13.....	4,840		7.88	4.84	7.00		4.90	13.70	1.44		.05	.16	1,350	1.84	8,910	35	2.8	1,710	8.0
Mar. 14-21.....	4,620		4.44	2.72	4.35		3.15	8.12	.76		.06	.09	778	1.06	4,900	36	2.3	1,080	8.0
Mar. 22-27.....	4,940		2.89	1.79	2.74		a 2.29	4.98	.42		.05	.10	489	.68	3,360	35	1.8	731	8.4
Mar. 28.....	992		2.35	1.33	2.35		a 1.93	4.06	.25		.06	.04	410	.56	556	37	1.7	600	8.3
Mar. 29.....	13,880		1.45	.71	1.87		a 1.74	2.33	.11		.08	.05	278	.38	5,270	44	1.8	409	8.3
Mar. 30.....	43,830		1.70	.70	1.78		b 2.13	2.14	.06		.04	.05	282	.38	16,660	41	1.6	420	8.4
Mar. 31-Apr. 1..	59,310		2.15	.95	1.91		c 2.12	2.89	.14		.08	.06	334	.45	26,690	37	1.5	506	8.3
Apr. 2-3.....	26,080		2.89	1.33	2.35		2.44	3.96	.23		.05	.08	434	.59	15,390	35	1.6	635	8.1
Apr. 4-7.....	24,910		3.29	1.69	3.44		2.52	5.45	.59		.06	.10	572	.78	19,430	40	2.2	831	8.1
Apr. 8-30.....	36,240		5.84	3.62	6.31		3.49	11.66	.90		.05	.13	1,080	1.47	53,270	39	2.9	1,430	8.1

a Includes 0.13 equivalents per million of carbonate (CO₃).

b Includes 0.20 equivalents per million of carbonate (CO₃).

c Includes 0.10 equivalents per million of carbonate (CO₃).

May 1-2.....	5,930	4.74	2.82	4.22	3.24	8.02	.66	.03	.18	808	1.10	6,520	35	2.2	1,090	8.2
May 5-12.....	22,120	3.29	1.59	2.30	2.70	4.25	.34	.06	.04	508	.69	15,260	31	1.5	702	8.0
May 14-24.....	15,790	6.89	3.57	7.48	3.52	13.32	1.41	.06	.12	1,250	1.70	26,840	41	3.3	1,650	7.6
May 25-26.....	21,060	9.03	4.41	6.87	3.87	15.82	1.10	.04	.13	1,430	1.94	40,660	33	2.7	1,780	7.7
May 27-30.....	20,150	10.58	5.18	9.83	3.20	21.86	1.04	.02	.17	1,660	2.53	50,960	38	3.5	2,210	7.7
May 31-June 15...	44,970	4.74	2.50	4.61	2.33	8.95	.68	.05	.06	860	1.17	52,610	38	2.4	1,130	7.7
June 16-30.....	11,830	5.19	2.67	5.83	2.97	10.37	.73	.03	.09	1,000	1.36	16,220	41	2.9	1,290	8.0
July 1-16.....	7,610	8.28	5.22	8.96	3.52	16.32	1.38	.03	.16	1,560	2.15	16,790	39	3.4	1,990	7.9
July 17-21.....	11,150	5.69	3.27	5.00	2.93	10.41	.71	.03	.11	950	1.29	14,380	36	2.4	1,270	7.4
July 22-26.....	6,680	13.42	6.30	7.13	3.43	23.11	.87	.10	.16	1,960	2.67	17,840	26	2.3	2,220	6.9
July 27-Aug. 29...	8,350	9.53	5.15	8.09	3.11	19.47	.96	.04	.14	1,620	2.20	18,370	34	3.0	1,960	7.7
Aug. 30.....	4,411	4.04	1.68	6.81	4.10	8.54	.34	.02	.25	832	1.13	464	51	3.8	1,150	7.3
Aug. 31-Sept. 11.	1,630	7.84	4.96	9.26	3.80	17.80	.90	.02	.17	1,510	2.05	3,750	41	3.7	1,960	7.7
Sept. 12-30.....	1,740	7.56	5.66	10.22	4.21	19.36	.83	.01	.17	1,620	2.20	3,630	42	4.0	2,070	7.6
Total or weighted average d	446,500	4.79	2.63	4.61	2.80	8.83	0.62	0.05	0.10	839	1.14	509,500	37	2.4	1,110	--
Total or weighted average e	486,800	4.84	2.71	4.74	2.84	8.97	0.62	0.05	0.10	853	1.16	564,700	38	2.4	1,120	--

d Represents 92 percent of runoff for water year October 1951 to September 1952.

e Includes estimated data for missing periods. Represents 100 percent of discharge for water year October 1951 to September 1952.

GRAND RIVER BASIN

GRAND RIVER NEAR WAKPALA, S. DAK.

LOCATION.--At gaging station at bridge on U.S. Highway 12, 5 miles west of Wakpala, Corson County, 8 miles upstream from Deep Bank Creek, and 21 miles upstream from mouth.

DRAINAGE AREA.--5,510 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,090 micromhos Jan. 8; minimum daily, 308 micromhos Apr. 1.

Percent sodium: Maximum, 82 Aug. 22-29; minimum, 45 Mar. 31.

EXTREMES, March 1951 to September 1952.--Specific conductance: Maximum daily, 2,090 micromhos Jan. 8, 1952; minimum daily, 181 micromhos Mar. 24, 1951.

Percent sodium: Maximum, 82 Aug. 22-29, 1952; minimum, 41 Mar. 24-25, 1951.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Total tons					
													Parts per million	Tons per acre-foot				
Oct. 1-4, 1951...	415		2.75	1.41	7.57	4.90	6.77	0.21	0.01	0.12	772	1.05	436	64	5.2	1,120	8.1	
Oct. 5-12.....	5,820		.95	.41	.44	3.43	2.46	.12	.02	.09	388	.53	3,080	74	5.4	591	7.9	
Oct. 13-15.....	470		1.55	.61	5.57	4.03	3.83	.11	.02	.11	514	.70	329	70	5.4	772	8.0	
Oct. 16 to Nov. 1.	2,170		2.50	1.24	7.04	5.21	5.75	.24	.02	.13	726	.99	2,150	63	5.1	1,090	8.0	
Nov. 2-16.....	1,560		3.39	1.63	9.18	6.79	7.41	.27	.02	.15	914	1.24	1,930	63	5.8	1,320	8.1	
Nov. 17-21.....	407		3.04	2.08	12.21	7.51	9.58	.40	.02	.16	1,150	1.56	635	70	7.6	1,560	7.7	
Nov. 22-24.....	208		3.09	1.95	12.39	7.54	9.66	.34	.02	.17	1,120	1.52	316	71	7.8	--	7.8	
Nov. 25 to Dec. 3	585		3.89	1.95	10.26	7.38	8.70	.31	.02	.14	1,040	1.41	825	63	6.0	1,510	8.0	
Dec. 4-7.....	218		5.54	2.72	12.96	10.29	10.31	.09	.01	.66	1,420	1.93	421	63	6.4	1,840	7.2	
Dec. 8-12.....	228		5.34	2.96	13.35	12.83	8.37	.20	.01	.74	1,340	1.82	415	62	8.6	1,870	7.3	
Jan. 1-12, 1952..	5.4		6.49	4.39	13.18	9.85	13.74	.40	.08	.27	1,510	2.05	11	55	5.6	2,020	7.8	
Mar. 31.....	1,980		1.50	.44	1.57	2.39	1.04	.01	.02	.05	.236	.32	634	45	1.6	309	7.3	
Apr. 1-9.....	253, 100		1.30	.45	1.52	2.39	.81	.03	.02	.05	.218	.30	75,930	46	1.6	334	7.2	
Apr. 10-25.....	173, 700		1.45	.61	2.83	2.88	2.02	.04	.02	.12	310	.42	72,950	57	2.8	484	8.1	
Apr. 26 to May 2.	55,020		1.35	.45	2.57	2.57	1.79	.03	.03	.08	290	.39	21,460	58	2.7	425	7.8	

May 3-7.....	23,400	1.30	.60	2.96	2.87	2.10	.06	.04	.10	308	.42	9,830	61	3.0	479	7.8
May 8-17.....	19,350	1.85	.40	4.57	3.31	3.31	.11	.03	.11	434	.59	11,420	67	4.3	663	7.8
May 18-22.....	4,120	1.90	.85	5.52	4.00	4.21	.11	.02	.11	524	.71	2,930	66	4.7	806	7.9
May 23 to June 8..	6,710	2.00	1.00	5.87	a 4.37	4.60	.14	.01	.15	572	.78	5,230	64	4.8	876	8.3
June 9-27.....	3,630	2.40	1.22	7.48	4.90	6.33	.18	.02	.16	714	.97	3,720	65	5.6	1,060	8.1
June 23-30.....	2,260	2.00	1.04	7.22	4.00	6.02	.14	.02	.19	708	.96	2,170	70	5.9	983	8.0
July 1-3.....	1,710	1.20	.42	6.61	4.10	3.85	.16	.02	.20	528	.72	1,230	80	7.3	794	7.8
July 4.....	337	1.40	.52	7.74	4.49	4.83	.09	.06	.20	652	.89	300	80	7.9	937	7.9
July 5.....	327	1.30	.58	6.87	3.83	4.68	.17	.06	.22	556	.76	249	78	7.1	846	7.8
July 6-18.....	2,680	1.70	.64	7.31	4.49	5.21	.14	.02	.20	614	.84	2,260	74	6.8	932	7.9
July 19-31.....	1,300	2.20	1.01	9.31	5.51	6.73	.20	.02	.27	784	1.07	1,390	74	7.3	1,160	8.0
Aug. 1-12.....	484	2.40	1.50	9.65	5.02	8.39	.23	.01	.21	880	1.20	581	71	6.9	1,290	7.9
Aug. 13-21.....	290	2.35	1.78	10.52	5.08	9.66	.31	.01	.24	978	1.33	386	70	7.3	1,410	8.1
Aug. 22-29.....	615	1.50	.60	9.70	4.79	6.50	.25	.01	.27	750	1.02	627	82	9.5	1,110	8.1
Aug. 30 to Sept. 6	355	2.20	1.08	11.65	b 5.97	8.60	.31	.02	.33	940	1.28	454	78	9.1	1,390	8.3
Sept. 7-10.....	153	1.95	.77	9.22	4.82	6.66	.27	.03	.19	736	1.00	153	77	7.9	1,120	8.2
Sept. 11-24.....	329	2.40	1.62	10.87	5.69	9.16	.28	.01	.24	968	1.32	434	72	7.7	1,430	8.1
Sept. 25-30.....	81	2.65	2.15	11.92	5.59	11.26	.31	.01	.26	1,090	1.48	120	69	7.7	1,570	8.2
Total or weighted average c	564,600	1.40	0.54	2.57	2.75	1.71	0.05	0.02	0.09	293	0.40	225,200	57	2.6	447	--

a Includes 0.13 equivalents per million carbonate (CO₂).b Includes 0.33 equivalents per million carbonate (CO₂).

c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

CHEYENNE RIVER BASIN

CHEYENNE RIVER NEAR EAGLE BUTTE, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 63, half a mile upstream from Hermaphrodite Creek, and 21 miles south of Eagle Butte, Dewey County.

DRAINAGE AREA.--24,500 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: October 1951 to September 1952.

EXTREMES 1951-52.--Specific conductance: Maximum daily, 2,980 micromhos Jan. 23; minimum daily, 701 micromhos Apr. 4.

Percent sodium: Maximum, 52 June 30 to July 2; minimum, 26 Oct. 1-3, Mar. 2-16.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 3,080 micromhos Feb. 1, 1951; minimum daily, 701 micromhos Apr. 4, 1952.

Percent sodium: Maximum, 55 June 25, 1951; minimum, 25 Mar. 1-19, 1951.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1239.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million							Dissolved solids				So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH		
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion				Tons per acre-foot	Total tons
Oct. 1-3, 1951...	1,910		10.48	6.62	6.13	2.43	19.99	0.79		0.05	0.22	1,650	2.24	4,280	26	2.1	1,900	7.7
Oct. 5-10.....	6,710		7.74	3.94	5.22	2.49	14.16	.56		.06	.17	1,220	1.66	11,140	30	2.2	1,520	7.9
Oct. 12-Nov. 1...	8,720		9.73	6.83	7.22	2.84	14.57	1.04		.04	.22	1,700	2.31	20,140	30	2.5	1,950	7.7
Nov. 2-5.....	1,030		12.48	9.30	10.31	--	26.86	--		.02	.27	--	--	--	32	3.1	--	--
Nov. 6-10.....	1,710		11.38	8.02	8.09	--	23.11	--		.01	.21	--	--	--	29	2.6	--	--
Nov. 12-16.....	2,220		10.18	6.96	6.44	--	19.15	--		.01	.19	--	--	--	27	2.2	--	--
Nov. 17-29.....	3,030		12.13	8.67	8.83	--	24.77	--		.01	.23	--	--	--	30	2.7	--	--
Nov. 30-Dec. 8..	2,260		10.73	8.27	7.61	3.82	21.24	1.24		.06	.21	1,890	2.57	5,810	29	2.5	2,150	7.5
Dec. 9-16.....	972		12.68	7.96	9.09	4.20	23.73	1.33		.05	.21	2,110	2.87	2,790	31	2.8	2,440	7.7
Dec. 17-Jan. 24,	1,300		12.53	11.07	11.13	5.03	27.90	1.50		.03	.25	2,510	3.41	4,430	32	3.2	2,760	7.7
Jan. 25-Feb. 8...	222		13.72	7.48	9.87	4.34	25.40	1.30		.02	.20	2,230	3.03	6,873	32	3.0	2,580	7.7

Feb. 10-17.....	27,990	5.39	2.71	4.52	2.20	9.37	.56	0.09	894	1.13	31,630	36	2.2	1,110	7.4
Feb. 18.....	1,970	3.74	2.02	2.91	1.74	6.45	.28	.07	628	.85	1,670	34	1.7	898	7.2
Feb. 22-24.....	2,880	5.89	3.01	5.74	2.36	11.39	.68	.07	1,390	1.28	3,690	39	2.7	1,320	7.5
Feb. 26-Mar. 1...	4,260	8.33	5.07	6.78	3.21	15.20	1.19	.08	1,330	1.81	7,710	34	2.6	1,710	7.4
Mar. 2-16.....	10,350	9.68	4.98	5.26	3.47	15.61	1.35	.04	1,450	1.97	20,390	26	1.9	1,690	7.6
Mar. 18-21.....	3,570	7.74	3.66	5.13	2.90	12.66	.83	.05	1,180	1.60	5,710	31	2.1	1,550	7.7
Mar. 22-28.....	7,800	6.19	3.01	5.39	2.70	10.70	.79	.06	980	1.33	10,370	37	2.5	1,310	7.5
Mar. 31-Apr. 3...	233,500	5.04	1.56	3.44	3.05	6.83	.17	.02	660	.90	210,200	34	1.9	935	7.3
Apr. 4-9.....	231,900	4.14	1.14	2.48	2.57	5.10	.17	.06	524	.71	164,600	31	1.5	740	7.6
Apr. 11.....	7,930	4.89	2.01	4.35	2.56	8.60	.31	.05	--	732	1,000	38	2.3	1,040	7.5
Apr. 14-23.....	29,780	6.29	2.91	6.31	2.72	11.83	.59	.03	1,040	1.41	41,990	41	2.9	1,350	7.6
Apr. 24-May 22...	36,370	8.73	4.67	9.53	2.95	18.36	1.16	.03	1,530	2.08	75,650	42	3.7	1,920	7.8
May 23.....	9,820	9.48	3.92	9.39	3.34	18.32	.86	.03	1,540	2.09	20,500	41	3.6	1,940	7.9
May 26-31.....	36,440	4.99	1.87	2.74	2.69	6.62	.25	.07	648	.88	32,070	28	1.5	903	7.6
June 1-8.....	26,740	4.79	2.13	4.96	2.98	8.64	.40	.05	800	1.09	29,150	41	2.7	1,090	7.6
June 9-18.....	12,730	7.29	3.87	6.09	2.52	14.24	.65	.02	1,180	1.60	20,370	35	2.6	1,480	7.7
June 19-27.....	9,090	8.88	6.02	7.48	2.36	19.05	.79	.01	1,480	2.01	18,270	33	2.7	1,820	7.5
June 28-29.....	11,050	8.38	2.86	6.57	2.56	14.45	.51	.03	1,210	1.65	18,230	37	2.8	1,520	7.6
June 30-July 2...	8,130	5.09	1.55	7.78	2.61	11.83	.46	.09	1,040	1.41	11,460	52	4.3	1,390	7.8
July 3-7.....	6,140	8.48	4.62	6.65	2.49	16.24	.76	.03	1,370	1.86	11,420	34	2.6	1,680	7.6
July 8-12.....	4,330	8.98	5.82	7.18	2.11	19.46	.99	.02	1,520	2.07	8,960	32	2.6	1,810	7.5
July 13-15.....	3,400	8.88	4.92	7.00	2.13	17.65	.96	.06	1,450	1.97	6,700	34	2.7	1,750	7.7
July 16-21.....	10,380	7.29	3.27	7.13	2.57	14.39	.56	.03	1,230	1.66	17,230	40	3.1	1,540	7.6
July 22-26.....	3,520	8.78	4.72	7.31	2.07	17.38	1.04	.03	1,400	1.90	6,680	35	2.8	1,750	7.6
July 27-Aug. 2....	3,770	9.93	5.77	6.31	2.07	20.47	1.21	.02	1,670	2.27	8,560	35	3.0	1,980	7.5

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

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Aug. 3-19	12,230		9.98	6.22	7.83		1.98	20.61	1.07	.01	.20	1,700	2.31	28,250	33	2.8	1,950	7.6
Aug. 20	1,410		8.23	2.95	10.22		3.47	14.66	2.93	.00	.32	1,420	1.93	2,720	48	4.3	1,910	7.3
Aug. 21-30	11,140		9.63	6.03	7.35		1.93	19.53	1.04	.01	.27	1,610	2.19	24,400	32	2.6	1,910	7.7
Aug. 31	2,060		7.49	2.81	5.87		2.29	13.28	.62	.09	.18	1,070	1.46	3,010	36	2.6	1,420	7.4
Sept. 1-30	19,130		10.58	6.30	7.83		2.15	21.03	1.07	.02	.24	1,700	2.31	44,190	32	2.7	2,030	7.6
Total or weighted average a	819,900		5.84	2.47	4.44		b2.74	9.58	b0.42	0.04	b0.10	b866	b1.18	b965,300	35	2.2	b1,140	--
Total or weighted average c	893,500		5.84	2.47	4.48		2.75	9.56	0.42	0.04	0.10	865	1.18	1,054,000	35	2.2	1,140	--

a Represents 92 percent of runoff for water year October 1951 to September 1952.

b Includes estimated data for missing periods.

c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

PLATTE RIVER BASIN

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.

LOCATION (revised).--At gaging station 1.1 miles downstream from Guernsey Dam and 1 mile northwest of Guernsey, Platte County. DRAINAGE AREA.--16,200 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: April to September 1952.

Sediment records: April 1947 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Minimum daily, 433 micromhos May 8.

Percent sodium: Maximum, 39 Oct. 1-23, Apr. 17-24; minimum, 28 May 2-10, May 25-July 1.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1240.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH	
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total						
													Parts per mil-lion	Tons per acre-foot	tons				
Oct. 1-12, 1951..	10,980		3.24	1.96	3.26		2.98	4.62	0.54		0.03	0.08	534	0.73	8,020	39	2.0	780	7.8
Oct. 13-23.....	7,020		4.09	2.55	4.26		3.57	6.62	.68		.03	.12	698	.95	6,670	39	2.3	982	7.6
Oct. 24-31.....	4,710		4.74	2.66	4.61		a 4.20	7.12	.71		.02	.13	780	1.06	4,990	38	2.4	1,070	8.3
Jan. 3, 1952.....	20		6.39	3.05	5.13		4.98	8.43	.93		.06	.10	932	1.27	25	35	2.4	1,230	7.7
Feb. 5.....	40		5.64	3.00	4.70		4.54	8.22	.82		.04	.10	838	1.14	46	35	2.3	1,170	7.6
Mar. 4.....	325		5.94	3.42	5.26		4.72	8.64	.96		.07	.12	942	1.28	416	36	2.4	1,280	7.5
Mar. 20.....	329		5.44	3.68	5.13		4.59	8.70	.93		.07	.12	926	1.26	415	36	2.4	1,260	7.5
Apr. 1-6.....	6,490		4.64	3.88	4.83		4.16	8.27	.79		.07	.11	858	1.17	7,590	36	2.3	1,190	7.6
Apr. 7-16.....	19,590		4.59	2.57	4.35		3.54	7.10	.82		.04	.08	726	.99	19,390	38	2.3	1,050	7.8
Apr. 17-24.....	16,650		3.99	2.01	3.78		3.02	6.02	.65		.02	.05	626	.85	15,850	39	2.2	891	7.8
Apr. 25-27.....	9,100		3.14	1.66	2.70		2.59	4.52	.48		.02	.06	490	.67	6,100	35	1.7	712	7.7
Apr. 28-May 1..	27,050		2.60	1.28	1.83		2.29	3.04	.62		.02	.05	368	.50	13,530	31	1.3	550	7.5
May 2-10.....	63,480		2.20	.99	1.31		2.15	2.31	.23		.02	.04	306	.42	26,660	28	1.0	444	7.4
May 11-24.....	93,330		2.44	1.19	1.48		2.36	2.54	.25		.01	.04	326	.44	41,070	29	1.1	499	7.5
May 25-July 1..	429,300		2.50	1.30	1.52		2.43	2.73	.28		.02	.04	340	.46	197,500	28	1.1	514	7.9
July 2-4.....	21,650		2.60	1.31	1.70		2.52	2.87	.27		.02	.06	352	.48	10,390	30	1.2	539	7.6
July 5-10.....	54,830		2.75	1.41	1.78		2.59	2.89	.31		.01	.06	362	.49	26,670	30	1.2	562	7.7

a Includes 0.33 equivalents per million of carbonate (CO₃).

PLATTE RIVER BASIN--Continued
NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH		
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million				Tons per acre-foot	Total tons
July 11-Aug. 2, 1952.....	226,500		2.55	1.41	1.65		2.49	2.79	0.31		0.02	0.06	352	0.48	108,700	29	529	7.4
Aug. 3-31.....	274,400		2.45	1.33	1.61		2.46	2.64	.38		.01	.07	334	.45	123,500	30	515	7.6
Sept. 1-23.....	180,000		2.45	1.36	1.61		2.48	2.62	.28		.01	.03	330	.45	81,000	30	514	7.8
Sept. 24-30.....	43,150		2.55	1.38	1.70		2.56	2.73	.31		.01	.05	348	.47	20,280	30	532	7.9
Total or weighted average b	1,491,000		2.54	1.40	1.70		2.49	2.87	0.31		0.01	0.05	356	0.48	719,000	30	538	--
Total or weighted average c	1,514,000		2.59	1.40	1.74		2.54	2.96	0.31		0.02	0.05	363	0.49	745,700	30	548	--

b Represents 98 percent of runoff for water year October 1951 to September 1952.

c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1951 to September 1952.

PLATTE RIVER BASIN--Continued
PLATTE RIVER AT BRADY, NEBR.

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

DRAINAGE AREA--56,900 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,060 micromhos Apr. 15, 16; minimum daily, 520 micromhos Oct. 6.

Percent sodium: Maximum, 43 July 31 to Aug. 29; minimum, 33 Dec. 1-14.

REMARKS.--Daily samples for chemical analyses composited by discharge. Composite periods identical to those of Supply Canal (Tri-county Division) 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 1951 to September 1952 given in Water-Supply Paper 1240.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So- dium adsorp- tion ratio	Specific conductance (micro-mhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons		
Oct. 1-31, 1951 .	16,490		2.79	1.15	2.30	3.43	2.58	0.45	0.03	0.10	426	0.58	9,560	35	619	7.9	
Nov. 1-30	18,560		3.04	1.14	2.35	3.46	2.81	.45	.03	.11	460	.63	11,690	35	645	8.0	
Dec. 1-14	8,810		3.09	1.13	2.22	3.46	2.75	.45	.04	.10	462	.63	5,550	33	638	8.0	
Dec. 15-31	24,080		3.09	1.43	3.17	3.28	4.06	.65	.04	.12	534	.73	17,580	39	774	8.2	
Jan. 1-31	34,960		3.04	1.28	2.48	3.62	2.96	.51	.03	.09	468	.64	22,370	35	677	7.8	
Feb. 1-29	109,200		2.94	1.28	2.83	3.79	3.04	.51	.02	.14	478	.65	70,980	38	699	7.8	
Mar. 1-26	119,100		3.24	1.18	3.04	3.87	3.27	.54	.02	.22	492	.67	79,800	39	737	8.2	
Mar. 27 to Apr. 14	51,220		3.19	1.45	3.04	3.74	3.56	.59	.03	.15	506	.69	35,340	38	739	8.2	
Apr. 15-20	12,030		4.14	1.94	3.52	3.74	5.35	.76	.04	.14	646	.88	10,590	36	907	7.9	
Apr. 21 to May 25	33,480		2.84	1.30	2.70	3.64	2.77	.51	.03	.12	452	.61	20,420	39	664	7.8	
May 26 to June 1.	10,700		3.34	1.48	3.00	3.65	3.85	.59	.03	.10	526	.72	7,700	37	772	7.8	
June 2-8	23,960		4.19	1.99	3.57	3.69	5.52	.76	.05	.13	656	.89	21,320	36	923	7.8	
June 9-30	51,070		2.74	1.36	3.13	3.95	3.08	.56	.02	.13	476	.65	33,200	41	707	7.8	
July 1-30	68,970		2.64	1.32	3.09	3.87	2.94	.54	.02	.11	470	.64	44,140	42	687	8.3	
July 31 to Aug. 29	35,690		2.50	1.30	2.96	3.69	2.69	.51	.02	.15	448	.61	21,770	43	668	8.0	
Sept. 3-30	10,080		2.54	1.24	2.74	3.54	2.81	.48	.01	.13	430	.58	5,850	40	648	7.6	
Total or weighted average b	630,300		3.04	1.32	2.96	3.74	3.25	0.54	0.03	0.14	488	0.66	419,100	39	715	-	

a Includes 0.17 equivalents per million of carbonate (CO₃).

b Includes estimated data for missing periods. Represents 100 percent of runoff for water October 1951 to September 1952.

PLATTE RIVER BASIN--Continued

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

LOCATION --At gaging station at Parshall flume in section 28, township 13 N., range 29 W., near Maxwell, Lincoln County.

RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,210 micromhos Mar. 26, Apr. 6, 14, 15; minimum daily, 677 micromhos Sept. 21.

Percent sodium: Maximum, 43 Oct. 1-31, July 31 to Aug. 29; minimum, 36 Mar. 27 to Apr. 14, May 26 to June 8.

REMARKS.--Daily samples for chemical analyses composited by discharge. Composite periods identical to Platte River at Brady, Nebr.

Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in report of State Engineer.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH	
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot				Total tons
Oct. 1-31, 1951...	120,200		2.94	1.52	3.52		3.46	4.08	0.62	0.03	0.13	542	0.74	88,950	43	2.3	782	7.9
Nov. 1-30.....	111,500		3.49	1.67	3.65		3.72	4.58	.68	.03	.15	582	.79	88,090	41	2.3	856	7.9
Dec. 1-14.....	49,310		3.84	1.84	3.87		3.90	5.16	.76	.03	.14	636	.86	42,410	39	2.3	922	8.0
Dec. 15-31.....	37,150		4.09	1.87	4.04		4.24	5.35	.79	.04	.15	660	.90	33,440	39	2.3	968	8.0
Jan. 1-31, 1952...	105,200		3.74	1.82	3.87		3.93	5.04	.76	.03	.17	630	.86	90,470	40	2.3	916	8.1
Feb. 1-29.....	109,700		3.99	1.81	3.78		4.03	5.00	.76	.03	.16	634	.86	94,340	38	2.2	928	7.8
Mar. 1-26.....	96,500		4.64	2.24	4.17		4.18	6.22	.85	.04	.16	740	1.01	97,470	37	2.2	1,040	8.0
Mar. 27-Apr. 14..	73,560		4.89	2.51	4.35		4.06	6.97	.96	.05	.17	802	1.09	80,170	36	2.3	1,090	8.1
Apr. 15-20.....	24,240		4.29	2.29	4.09		3.80	6.18	.85	.05	.16	716	.97	23,510	38	2.3	1,010	8.1
Apr. 21-May 25..	139,000		3.39	1.63	3.39		3.67	4.25	.68	.04	.13	556	.76	105,600	39	2.1	814	8.0
May 26-June 1...	28,400		4.99	2.29	4.44		3.77	7.39	.96	.05	.15	798	1.09	30,960	36	2.3	1,100	8.0
June 2-8.....	28,320		5.09	2.37	4.30		3.57	7.56	.90	.05	.16	783	1.07	30,300	36	2.2	1,090	7.9
June 9-30.....	89,140		3.69	2.07	3.78		3.70	5.43	.79	.04	.17	635	.86	76,660	38	2.2	927	7.7
July 1-30.....	122,000		3.39	1.95	3.70		3.61	5.00	.73	.03	.17	603	.82	100,000	39	2.3	883	7.7
July 31-Aug. 29..	119,900		2.54	1.46	3.26		3.59	3.44	.59	.03	.12	484	.66	79,130	43	2.3	720	7.8
Aug. 30-Sept. 2..	15,710		2.54	1.26	3.13		3.82	3.19	.54	.03	.14	462	.63	9,900	41	2.3	696	8.3
Sept. 3-30.....	101,300		2.54	1.34	3.04		3.64	3.19	.54	.02	.14	454	.62	62,810	41	2.2	693	7.9
Total or weighted average b	1,371,000		3.59	1.61	3.70		3.77	4.87	0.73	0.03	0.15	608	0.83	1,134,000	39	2.3	880	--

a Includes 0.20 equivalents per million of carbonate (CO₃).

b Represents 100 percent of runoff for water year October 1951 to September 1952.

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on State Highway 51, half a mile east of Julesburg, Sedgwick County, and 4 miles upstream from Colorado-Nebraska State line.

DRAINAGE AREA.--22,800 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1952.

Water temperatures: October 1945 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,110 micromhos Dec. 9; minimum daily, 1,120 micromhos May 31, June 1, 4.

Percent sodium: Maximum, 42 May 16-17; minimum, 34 Dec. 1-17, Jan. 18 to Mar. 31, May 1-15, Aug. 27-31.

EXTREMES, 1945-52.--Specific conductance: Maximum daily, 2,140 micromhos Dec. 30, 1946; minimum daily, 635 micromhos Aug. 5, 1950.

Percent sodium: Maximum, 82 Mar. 1-12, 1947; minimum, 30 Mar. 15, 20, 1948.

REMARKS.--Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1240.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million						Boron (B) ppm	Dissolved solids		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	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, 1951.	21,610	--	12.96	7.61	--	--	--	--	--	--	--	--	--	--
Nov. 1, Chan. 1 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 1, Chan. 2 a	605	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 1, Chan. 4 a	141	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 1-30	22,510	--	14.20	7.52	--	--	--	--	--	--	--	--	--	--
Dec. 1, Chan. 1a	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 1, Chan. 2 a	581	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 1, Chan. 4 a	123	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec. 1-17	10,470	34	10.03	4.41	7.74	0.61	5.72	14.95	1.83	0.03	0.09	1,520	2.07	21,670
Dec. 18-Jan. 17, 1952	26,100	--	12.64	7.48	--	--	--	--	--	--	--	--	--	--
Jan. 18-Feb. 28	44,000	--	13.76	7.00	--	--	--	--	--	--	--	1,430	1.94	85,360
Feb. 29-Mar. 31	49,160	--	13.58	7.00	--	--	--	--	--	--	--	1,400	1.90	93,400
Apr. 1-30	39,000	--	13.20	7.00	--	--	--	--	--	--	--	1,390	1.88	73,710

a Not included in total or weighted average.

PLATTE RIVER BASIN--Continued
SOUTH PLATTE RIVER AT JULESBURG, COLO.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons		
Apr. 18, 1952	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,780	--
Chan. 1 a	1,140	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,780	--
Apr. 18, Chan. 2 a	303	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,770	--
Apr. 18, Chan. 4 a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May 1-15	17,020	--	11.24	5.87	--	--	--	--	--	--	--	--	1,180	1.60	27,230	2.5	1,550
May 16-17	2,860	--	8.00	5.74	--	--	--	--	--	--	--	--	955	1.30	3,720	2.9	1,320
May 18-20	6,700	--	11.20	6.96	--	--	--	--	--	--	--	--	1,270	1.73	11,590	2.9	1,870
May 21-23	8,210	23	6.89	3.59	0.31	3.90	11.66	1.49	0.04	0.07	0.19	--	1,180	1.58	12,970	2.8	1,550
May 24-27	7,590	--	12.36	7.26	--	--	--	--	--	--	--	--	1,360	1.85	14,040	2.9	1,760
May 28-June 7 ..	60,380	--	8.40	4.44	--	--	--	--	--	--	--	--	870	1.18	71,250	2.2	1,190
June 8-15	9,110	--	9.88	5.26	--	--	--	--	--	--	--	--	1,050	1.43	13,030	2.4	1,390
June 16-July 12 ..	4,750	--	11.16	6.04	--	--	--	--	--	--	--	--	1,210	1.65	7,840	2.6	1,590
July 13-26	1,560	--	11.02	6.04	--	--	--	--	--	--	--	--	1,200	1.63	2,540	2.6	1,590
July 27-Aug. 26 ..	2,290	--	10.90	6.09	--	--	--	--	--	--	--	--	1,210	1.65	3,780	2.6	1,570
Aug. 27-31	807	31	9.18	3.68	4.1	4.49	13.95	1.69	0.04	.12	.22	--	1,360	1.85	1,490	2.7	1,740
Sept. 1-30	3,580	--	11.68	6.57	--	--	--	--	--	--	--	--	1,260	1.71	6,120	2.7	1,650
Total or weighted average b	337,700	--	12.08	6.52	--	--	--	--	--	--	--	--	c1,290	c1.75	591,000	2.7	c1,870

a Not included in total or weighted average.

b Represents 100 percent of runoff for water year October 1951 to September 1952.

c Includes estimated data for missing periods.

KANSAS RIVER BASIN

REPUBLICAN RIVER AT CAMBRIDGE, NEBR.

LOCATION.--At bridge on State Highway 47, half a mile south of Cambridge, Furnas County, a quarter of a mile upstream from Medicine Creek, and about 1 mile upstream from gaging station at Cambridge.

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: December 1950 to September 1952.

EXTREMES 1951-52.--Specific conductance: Maximum daily, 830 micromhos Aug. 21; minimum daily, 285 micromhos July 14.

Percent sodium: Maximum, 29 June 25 to July 4, Aug. 5-29; minimum, 11 July 14-15.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 830 micromhos Aug. 21, 1952; minimum daily, 285 micromhos July 14, 1952.

Percent sodium: Maximum, 29 Apr. 15-27, 1951, June 25 to July 4, Aug. 5-29, 1952; minimum, 11 July 14-15, 1952.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Water discharge computed by subtracting the discharge of Medicine Creek at Cambridge, Nebr., from that of the Republican River at Cambridge, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1240.

Chemical analyses, water year October 1951 to September 1952.

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1951.	18,770	--	2.99	1.51	1.74		34.79	1.42	0.31	--	0.05	0.10	426	0.58	10,890	26	1.2	605	8.3
Nov. 1-30.....	20,850	--	3.04	1.56	1.52		34.76	1.33	.28	--	.06	.11	410	.56	11,880	24	1.0	589	8.2
Dec. 1-31.....	12,200	--	2.84	1.74	1.61		34.51	1.29	.31	--	.06	.12	426	.58	7,080	25	1.1	599	8.2
Jan. 1-31, 1952.	15,520	--	2.99	1.52	1.39		4.64	1.12	.28	--	.06	.10	404	.55	8,540	23	.9	571	8.0
Feb. 1-29.....	29,190	--	2.79	1.27	1.26		4.20	1.04	.24	--	.08	.03	341	.46	13,430	23	.9	519	7.9
Mar. 1-31.....	36,270	--	2.79	1.41	1.39		4.31	1.12	.25	--	.07	.07	356	.48	17,410	24	1.0	544	7.9
Apr. 1-30.....	36,010	--	2.89	1.43	1.48		34.48	1.27	.31	--	.06	.08	374	.51	18,370	24	1.0	563	8.3
May 1-26.....	34,300	--	2.69	1.29	1.39		4.23	1.08	.25	--	.05	.09	353	.49	16,810	25	1.0	537	8.0
May 27.....	2,190	--	2.45	.99	.74		3.67	.54	.08	--	.01	.04	262	.36	878	17	.6	413	7.8
May 28 to June 24	10,410	--	2.50	1.32	1.48		4.06	1.21	.28	--	.05	.07	360	.49	5,100	26	1.1	538	8.1
June 25 to July 4	393	--	2.05	1.45	1.57		4.03	1.08	.34	--	.02	.14	352	.48	189	29	1.2	511	8.2
July 5-13.....	3,380	--	1.95	.89	.91		3.34	.48	.20	--	.04	.08	258	.35	1,180	22	.8	385	7.3
July 14-15.....	2,260	--	1.95	.59	.32		2.80	.08	.03	--	.02	.07	196	.27	616	11	.3	288	7.5
July 16-23.....	1,280	--	2.45	1.11	1.30		3.97	1.02	.28	--	.03	.12	348	.47	602	25	1.0	495	7.7
July 24 to Aug. 4	50	--	2.89	1.67	1.96		5.01	1.52	.37	--	.03	.15	438	.60	30	28	1.3	637	7.7

a Includes 0.20 equivalents per million of carbonate (CO₃).

b Includes 0.17 equivalents per million of carbonate (CO₃).

KANSAS RIVER BASIN--Continued
 REPUBLICAN RIVER AT CAMBRIDGE, NEBR.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH	
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- (B) ppm	Boron	Parts per mil- lion	Tons per acre- foot	Total tons				
Aug. 5-29, 1952	460	--	2.45	1.45	1.74		4.42	1.23	0.37	--	0.01	0.16	378	0.51	235	29	1.2	565	7.5
Aug. 30 to Sept. 4	756	35	2.40	.68	.83		3.47	.58	.16	0.03	.05	.11	264	.36	272	19	.7	405	7.7
Sept. 5-9	89	35	2.45	1.03	1.22		3.93	.87	.28	.04	.04	.11	312	.42	37	24	.9	482	7.8
Sept. 10-30	0	33	2.94	1.38	1.61		4.74	1.27	.37	.04	.04	.13	378	.51	0	25	1.1	593	7.5
Total or weighted average c	224,400	--	2.79	1.40	1.43		4.39	1.17	0.27	--	0.06	0.08	371	0.50	113,300	24	1.0	550	--

c Represents 100 percent of runoff for water year October 1951 to September 1952.

KANSAS RIVER BASIN--Continued
SALINE RIVER AT TESCOOTT, KANS.

LOCATION.--At gaging station at highway bridge, half a mile upstream from Dry Creek, and half a mile south of Tescott, Ottawa County.
DRAINAGE AREA.--2,820 square miles.

RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1952.

Water temperatures: April 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 4,440 micromhos Sept. 30; minimum daily, 339 micromhos June 1.

Percent sodium: Maximum 73 Sept. 1-30; minimum, 13 June 1.

EXTREMES, 1949-52.--Specific conductance: Maximum daily, 4,940 micromhos May 6, 1950; minimum daily, 253 micromhos June 8, 1951.

Percent sodium: Maximum, 75 May 5, 1950; minimum, 11 June 8-10, 1951.

REMARKS.--Daily samples for chemical analyses composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1240.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Oct. 1-31, 1951	24,850		8.83	2.73	14.78		6.00	7.35	13.09	0.26	0.24	1,640	2.23	55,420	55	6.1	2,580	8.0
Nov. 1-30	18,610		9.18	2.82	14.35		6.21	7.66	12.86	.29	.23	1,850	2.24	41,690	53	5.9	2,580	7.9
Dec. 1-30	12,220		8.78	3.70	15.57		6.38	8.08	13.62	.37	.28	1,750	2.38	29,080	55	6.2	2,720	7.8
Dec. 31 to Jan. 31, 1952	12,010		9.28	2.82	14.57		6.29	7.49	12.92	.32	.23	1,670	2.27	27,260	54	5.9	2,630	8.0
Feb. 1 to Mar. 3	11,720		8.78	2.86	15.57		5.80	7.60	13.88	.26	.22	1,710	2.33	27,310	57	6.5	2,710	8.0
Mar. 4-26	10,350		8.43	2.57	13.44		5.18	7.39	11.93	.23	.20	1,540	2.09	21,630	54	5.7	2,420	7.9
Mar. 27 to Apr. 10	8,230		8.18	2.46	10.35		4.46	7.45	9.31	.23	.17	1,370	1.86	15,310	48	4.5	2,050	8.3
Apr. 11-12	3,190		6.79	2.13	9.13		3.65	6.20	8.18	.18	.15	1,180	1.60	5,100	50	4.3	1,770	8.0
Apr. 13-14	3,890		5.19	.97	2.74		3.05	3.68	2.23	.14	.11	634	.86	3,350	30	1.6	881	7.7
Apr. 15-29	22,720		7.49	1.81	4.44		4.03	5.93	3.92	.16	.11	908	1.23	27,950	32	2.1	1,320	7.9
Apr. 30 to May 30	25,240		8.13	2.35	7.87		4.16	7.29	7.33	.16	.16	1,190	1.62	40,800	42	3.4	1,790	8.0
May 31	988		6.04	1.68	5.22		3.51	4.93	4.54	.14	.13	838	1.14	1,130	40	2.7	1,270	8.3
June 1	1,900		2.89	.35	.48		2.59	.94	.28	.02	.06	248	.34	646	13	.4	368	8.0
June 2	756		4.84	.96	3.91		3.05	3.37	3.58	.02	.07	632	.86	650	39	2.3	1,000	7.5
June 3	603		7.34	2.22	9.91		4.29	6.62	9.14	.16	.17	1,270	1.73	1,040	49	4.5	1,970	8.0

a Includes 0.20 equivalents per million of carbonate (CO₃).

KANSAS RIVER BASIN--Continued
SALINE RIVER AT TESCOTT, KANS.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids		Per cent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot				
June 4-14, 1952	5,470		7.73	2.55	13.05		4.10	7.77	11.87		0.14	0.19	1,490	2.03	55	5.8	2,350	7.8
June 15-26	4,080		7.58	2.98	18.31		4.23	8.39	16.30		.10	.25	1,800	2.45	63	8.0	2,860	7.7
June 27 to July 20	5,870		7.14	3.66	26.53		4.15	9.78	23.89		.05	.32	2,310	3.14	70	11	3,740	7.6
July 21-24	815		5.34	2.10	11.74		3.67	5.93	10.10		.09	.20	1,220	1.66	59	6.1	1,970	7.6
July 25 to Aug. 1	1,960		6.39	3.43	24.00		3.61	8.95	21.94		.03	.30	2,120	2.88	70	11	3,450	7.4
Aug. 2-8	1,680		5.09	1.99	10.70		4.13	4.89	9.28		.10	.18	1,130	1.54	58	5.7	1,840	7.8
Aug. 9	1,740		2.10	.44			2.65	.54	.56		.05	.06	.222	.30	27	.9	358	7.7
Aug. 10-11	2,240		2.89	.79	4.65		2.64	1.92	4.06		.04	.09	530	.72	54	3.4	896	7.7
Aug. 12	5,040		2.40	.52	2.48		2.44	1.04	2.23		.03	.07	348	.47	43	2.1	579	7.8
Aug. 13	2,880		2.10	.36	1.35		2.26	.81	1.04		.01	.06	252	.34	33	1.2	403	7.7
Aug. 14	641		2.74	.44	2.70		2.47	1.33	2.40		.04	.08	394	.52	43	2.1	634	7.7
Aug. 15	365		2.79	.51	2.91		2.39	1.48	2.62		.09	.07	410	.56	44	2.3	671	7.7
Aug. 16-31	5,310		4.89	1.71	12.26		3.54	4.56	11.25		.16	.30	1,180	1.60	63	6.7	1,990	7.7
Sept. 1-30	4,100		6.29	3.75	28.18		4.51	8.85	25.33		.05	.30	2,370	3.22	73	13	3,900	7.7
Total or weighted average b	199,500		7.63	2.47	11.78		4.82	6.75	10.52		0.19	0.19	1,360	1.88	53	5.2	2,160	--

b Represents 100 percent of runoff for water year October 1951 to September 1952.

Part 7. LOWER MISSISSIPPI RIVER BASIN

ARKANSAS RIVER BASIN

ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, COLO.

LOCATION.--At gaging station just upstream from Caddoa Creek and 1½ miles downstream from John Martin Dam, Bent County. DRAINAGE AREA.--18,935 square miles.

RECORDS AVAILABLE.--Chemical analyses: August 1942 to August 1943, October 1945 to July 1949 (intermittent and weekly samples) January 1951 to September 1952 (daily samples).

EXTREMES 1951-1952.--Specific conductance: Maximum daily, 4 620 micromhos Jan. 29; minimum daily, 830 micromhos June 19.

Percent sodium: Maximum, 41 Mar. 11-20; minimum, 28 Sept. 14-16.

EXTREMES, January 1951 to September 1952.--Specific conductance: Maximum daily, 4 620 micromhos Jan. 29, 1952; minimum daily, 830 micromhos June 19, 1952.

Percent sodium: Maximum, 41 Mar. 11-20, 1952; minimum, 28 Sept. 14-16, 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 1951 to September 1952 given in Water-Supply Paper 1241.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per mil-lion	Tons per acre-foot					
Oct. 1-10, 1951...	9,630	3.3	9.73	5.43	7.04	0.21	2.64	18.51	1.10	0.03	0.05	0.27	1,450	1.97	18,970	31	2.6	1,870	7.7
Oct. 11-20	8,330	2.2	10.53	6.17	7.17	.20	2.77	19.84	1.21	.03	.05	.21	1,540	2.09	17,410	30	2.5	1,980	7.7
Oct. 21-31	7,310	3.2	11.13	6.58	7.39	.20	2.82	21.03	1.30	.04	.05	.28	1,630	2.22	16,230	29	2.5	2,070	7.8
Nov. 1-10	228	25	17.17	12.01	16.22	.20	4.46	37.47	2.99	.03	.08	.87	2,940	4.00	912	36	4.2	3,470	7.8
Nov. 11-20	103	17	16.77	13.49	18.05	.25	4.92	40.18	3.19	.03	.05	.66	3,140	4.27	440	37	4.6	3,710	7.6
Nov. 21-30.....	79	17	17.17	14.06	19.09	.23	5.36	41.43	3.27	.04	.06	.60	3,250	4.42	349	38	4.8	3,800	7.7
Dec. 1-10.....	81	17	18.56	14.56	18.96	.26	5.72	42.68	3.41	.03	.07	.63	3,360	4.57	370	36	4.7	3,920	7.8
Dec. 11-20.....	77	18	18.46	15.13	20.18	.24	6.16	43.51	3.50	.03	.08	.67	3,450	4.69	361	37	4.9	4,010	7.9
Dec. 21-31.....	84	17	18.58	14.56	17.92	.19	5.87	41.85	3.30	.03	.08	--	3,290	4.47	371	35	4.4	3,880	7.7
Jan. 1-10, 1952 ..	97	13	17.76	14.47	17.96	.19	6.05	41.85	3.24	.03	.05	.55	3,280	4.46	433	36	4.5	3,840	7.8
Jan. 11-20	63	18	17.96	14.39	19.96	.18	5.93	42.26	3.33	.04	.10	.57	3,350	4.56	378	38	5.0	3,930	7.7
Jan. 21-31	87	24	18.96	13.98	19.31	.33	5.90	43.10	3.67	.03	.05	.70	3,410	4.64	404	37	4.8	4,080	7.7
Feb. 1-10	79	23	19.46	14.80	18.65	.33	5.72	43.51	3.64	.04	.08	.85	3,430	4.66	368	35	4.5	4,110	7.6
Feb. 11-20	79	20	18.26	14.47	20.31	.19	6.05	42.89	3.38	.05	.09	.75	3,410	4.64	367	38	5.0	3,940	7.6
Feb. 21-29	69	19	16.77	14.47	17.96	.18	6.26	40.18	3.22	.04	.06	.64	3,190	4.34	299	36	4.5	3,770	7.7

ARKANSAS RIVER BASIN--Continued

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

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent adsorption ratio	Specific conductance (micro-mhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons		
Mar. 1-10, 1952	85	20	17.56	14.39	21.74	0.19	5.64	44.14	3.55	0.04	0.07	0.72	3,470	4.72	401	40	4,040
Mar. 11-20	79	21	16.97	14.64	21.74	.19	6.28	43.10	3.50	.04	.07	.69	3,440	4.68	370	41	4,030
Mar. 21-31	139	22	17.17	14.39	21.09	.19	6.21	42.26	3.41	.04	.07	.79	3,380	4.60	639	40	3,990
Apr. 1-6	58	15	16.97	12.83	19.35	.19	5.26	40.18	3.16	.04	.07	.84	3,170	4.31	250	39	3,750
Apr. 7-20	13,490	9.7	14.27	9.79	14.26	.18	3.28	32.06	2.23	.05	.05	.40	2,480	3.37	45,460	37	3,040
Apr. 21-30	9,820	10	13.97	9.95	14.61	.18	3.38	32.48	2.20	.05	.05	.36	2,500	3.40	32,710	38	3,040
May 1-10	8,750	11	13.92	9.95	14.18	.19	3.31	32.06	2.20	.05	.05	.40	2,470	3.36	29,400	37	3,010
May 11-20	13,140	9.5	14.07	10.12	14.61	.19	3.34	33.52	2.26	.06	.04	.40	2,550	3.47	45,600	37	3,070
May 21-31	14,170	10	13.02	9.46	13.61	.18	2.98	31.44	2.14	.05	.05	.40	2,390	3.25	46,050	38	2,910
June 1-2	2,250	11	10.53	8.06	10.96	.16	2.46	24.98	1.69	.05	.04	--	1,920	2.61	5,870	37	2,420
June 3-10	7,720	14	6.34	4.19	5.39	.13	2.41	12.43	.87	.05	.07	.28	1,030	1.40	10,810	34	1,410
June 11-20	15,940	16	5.14	3.21	3.91	.12	2.29	9.26	.56	.04	.07	.18	792	1.08	17,220	32	1,110
June 21-30	12,160	14	5.14	2.96	3.83	.11	2.05	8.83	.62	.03	.07	.15	763	1.04	12,650	32	1,080
July 1-10	9,270	13	6.09	3.54	4.87	.12	2.34	11.16	.82	.03	.07	.15	935	1.27	11,770	33	1,280
July 11-20	7,940	15	6.69	3.95	5.22	.12	2.51	12.22	.85	.04	.07	.27	1,020	1.39	11,040	33	1,380
July 21-31	5,190	15	9.58	6.00	7.91	.14	2.98	19.07	1.27	.04	.09	.34	1,520	2.07	10,740	33	1,960
Aug. 1-10	8,780	15	7.48	4.19	5.31	.15	2.65	13.16	.87	.04	.08	.22	1,090	1.48	12,990	31	1,480
Aug. 11-20	3,480	15	8.98	5.35	7.22	.14	2.92	17.15	1.21	.04	.09	.31	1,390	1.89	6,580	33	1,810
Aug. 21-31	7,550	14	9.63	5.76	7.31	.16	3.02	18.38	1.13	.04	.08	.29	1,470	2.00	15,100	32	1,880
Sept. 1-5	2,090	15	11.13	6.17	8.00	.17	3.38	20.32	1.30	.04	.16	.29	1,640	2.23	4,660	31	2,060
Sept. 6-10	635	20	16.12	9.70	14.52	.18	4.56	32.89	2.43	.05	.15	.60	2,620	3.56	2,620	36	3,130
Sept. 11-13, 17-20	1,540	17	15.37	9.70	14.09	.19	4.06	32.27	2.26	.04	.14	.53	2,540	3.45	5,310	36	2,990
Sept. 14-16	4,080	15	9.68	5.51	5.96	.19	3.47	16.70	.79	.03	.02	.26	1,360	1.85	7,550	28	1,720
Sept. 21-30	2,280	16	13.27	8.39	11.83	.16	4.21	21.27	1.82	.04	.13	.45	2,180	2.96	6,750	35	2,650
Total or weighted average	176,900	11	10.08	6.58	8.96	0.16	2.90	21.03	1.41	0.04	0.06	0.30	1,660	2.26	399,800	35	2,100

ARKANSAS RIVER BASIN--Continued
ARKANSAS RIVER AT ARKANSAS CITY, KANS.

LOCATION.--At gaging station at Chestnut Avenue highway bridge, 5 miles upstream from Walnut River, and half a mile west of Arkansas City, Cowley County.

DRAINAGE AREA.--43,475 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1952.

Water temperatures: October 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,960 micromhos Aug. 3; minimum daily, 736 micromhos Oct. 8.

Percent sodium: Maximum, 75 Aug. 2-8; minimum, 53 Mar. 11-12.

REMARKS.--Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1241.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons	Percent solid		
Oct. 1-10, 1951..	74,500	--	2.60	0.99	4.85	2.49	2.08	3.81	0.06	--	--	--	501	0.68	50,810	57	862	7.5
Oct. 11-12.....	15,000	--	3.39	1.73	7.02	2.85	3.02	6.20	--	--	--	--	734	1.00	14,980	58	1,230	7.8
Oct. 13-20.....	38,380	--	4.99	2.14	9.20	4.10	4.12	8.04	--	--	--	--	984	1.34	51,410	56	1,620	8.0
Oct. 21-31.....	50,700	21	5.49	2.30	9.78	4.42	4.50	8.52	0.03	--	0.09	0.09	1,090	1.43	72,460	55	1,720	7.9
Nov. 1-3, 10.....	25,690	--	4.89	2.22	8.84	4.12	4.14	7.62	--	--	--	--	958	1.30	33,500	55	1,560	8.3
Nov. 4-9.....	35,010	--	5.39	2.55	9.88	4.24	4.60	8.88	--	--	--	--	1,070	1.46	50,990	55	1,790	8.0
Nov. 11-20.....	55,990	21	5.69	2.55	10.22	4.38	5.87	8.12	0.02	--	0.06	0.06	1,190	1.56	87,650	55	1,840	7.8
Nov. 21-30.....	50,040	22	6.19	2.88	11.00	4.57	6.52	8.74	0.02	0.13	0.07	0.07	1,260	1.71	85,830	54	1,960	8.0
Dec. 1-10.....	43,810	19	6.29	2.88	11.70	4.56	6.83	9.31	0.03	--	0.09	0.07	1,300	1.77	77,540	56	2,050	7.9
Dec. 11-20.....	33,900	--	6.49	3.12	13.88	4.87	6.77	11.70	--	--	0.15	0.12	1,380	1.88	63,680	59	2,220	8.1
Dec. 21, 24-31...	30,390	--	6.24	2.80	13.07	5.02	5.54	11.42	--	--	0.15	0.05	1,290	1.75	53,360	59	2,160	8.2
Dec. 22-23.....	4,990	--	7.68	3.54	18.22	5.29	6.52	15.51	--	--	0.12	0.07	1,600	2.18	10,840	59	2,680	8.2
Jan. 1-10, 1952..	35,310	17	6.19	2.80	11.78	4.57	5.77	9.81	0.03	0.13	0.08	0.12	1,290	1.75	62,000	56	2,040	8.1
Jan. 11-20.....	45,120	--	5.99	2.88	11.91	4.29	7.02	9.36	--	--	0.11	0.06	1,230	1.67	75,550	57	2,030	7.7
Jan. 21-31.....	43,380	18	6.94	3.45	13.09	4.49	8.99	10.10	0.03	0.11	0.08	0.11	1,400	2.03	87,980	55	2,250	7.8
Feb. 1-10.....	36,990	16	6.69	3.29	13.05	4.42	8.43	10.10	0.03	0.11	0.07	0.11	1,440	1.96	72,510	56	2,230	7.9
Feb. 11-20.....	37,630	19	6.59	3.29	12.86	4.41	8.10	10.72	0.03	0.10	0.22	0.22	1,490	1.97	74,270	58	2,260	7.9
Feb. 21-29.....	31,200	17	6.09	2.88	12.87	4.42	6.50	10.49	0.02	0.10	0.25	0.25	1,340	1.82	56,910	59	2,160	7.9

ARKANSAS RIVER BASIN--Continued
ARKANSAS RIVER AT ARKANSAS CITY, KANS.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- dium	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25° C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
Mar. 1-10, 1952.	42,860	15	5.59	2.63	11.74	0.13	4.15	5.20	9.93	0.02	0.09	0.24	1,180	1.60	68,850	58	2,030	7.8	
Mar. 11-12.....	27,290	--	2.89	1.32	4.81		2.52	2.25	4.09	--	.16	--	561	.76	20,840	53	3,945	7.6	
Mar. 13-14.....	15,710	--	3.59	1.97	7.16		3.02	3.41	6.20	--	.09	--	800	1.09	17,110	56	1,310	7.5	
Mar. 15-20.....	31,060	--	4.99	2.63	10.45		3.93	5.06	8.97	--	.11	--	1,140	1.55	48,200	58	1,840	7.6	
Mar. 21-31.....	49,570	20	5.69	2.71	11.70	.15	4.44	6.16	9.64	.03	.10	.21	1,240	1.69	83,670	58	2,010	7.8	
Apr. 1-10.....	38,840	16	6.04	2.96	12.39	.16	4.34	7.10	10.10	.03	.08	.21	1,320	1.80	69,780	57	2,120	7.9	
Apr. 11-12, 14, 16, 20.....	23,050	--	5.09	2.47	11.14		4.00	4.91	9.73	--	.06	--	1,170	1.59	36,710	60	1,920	7.6	
Apr. 13, 15-17, 19	27,050	--	4.69	2.14	9.90		3.95	4.20	8.52	--	.06	--	1,020	1.39	37,560	59	1,700	7.8	
Apr. 21.....	6,090	--	4.99	2.22	10.64		4.07	4.16	9.53	--	.09	--	1,120	1.52	9,280	60	1,820	8.4	
Apr. 22-24, 29-30	55,160	--	3.69	1.64	7.33		3.31	3.10	6.20	--	.05	--	780	1.06	58,570	58	1,300	7.7	
Apr. 25-28.....	45,440	--	3.04	1.15	5.72		2.97	2.02	4.85	--	.07	--	605	.82	37,420	58	1,030	8.2	
May 1-10.....	55,020	--	4.74	2.14	9.15		3.62	4.39	7.76	--	.06	--	998	1.36	74,750	57	1,620	7.8	
May 11-20.....	40,880	17	4.74	2.22	10.70	.17	3.57	5.20	9.53	.03	.04	.18	1,130	1.54	62,880	60	1,850	7.5	
May 21, 24-28, 31	33,220	--	3.64	1.73	8.23		2.93	3.50	7.11	--	.06	--	830	1.13	37,540	61	1,410	7.6	
May 22-23, 29-30	20,230	--	3.84	2.06	10.58		3.26	4.37	8.80	--	.05	--	1,020	1.39	28,090	64	1,710	7.6	
June 1, 6, 9-10.....	21,160	--	3.69	1.64	8.95		2.90	3.87	7.47	--	.04	--	840	1.14	24,200	63	1,440	7.7	
June 2-4.....	12,220	--	4.69	1.97	11.34		3.52	4.41	10.01	--	.06	--	1,070	1.46	17,800	63	1,830	8.2	
June 5, 7-8.....	23,430	--	2.70	1.07	6.02		2.26	2.42	5.08	--	.03	--	573	.78	19,830	61	1,020	7.5	
June 11-15.....	12,890	--	4.59	2.38	12.55		3.41	4.89	11.14	--	.08	--	1,180	1.60	20,710	64	1,990	7.9	
June 16-20.....	9,430	--	5.19	2.80	15.27		3.49	5.60	14.10	--	.07	--	1,400	1.90	17,970	66	2,350	7.8	
June 21-22.....	4,540	--	4.14	2.38	12.40		3.21	4.68	10.94	--	.09	--	1,140	1.55	7,050	66	1,940	8.0	
June 23-30.....	11,190	--	4.89	2.88	17.30		3.18	5.58	16.22	--	.09	--	1,500	2.04	22,850	69	2,540	7.9	
July 1-4, 6-10.....	10,520	--	4.44	2.55	16.40		2.88	4.93	15.51	--	.07	--	1,400	1.90	20,040	70	2,460	7.5	
July 5.....	1,320	--	3.99	1.97	12.16		3.04	4.27	10.72	--	.09	--	1,080	1.47	1,940	67	1,860	8.4	
July 11-20.....	11,220	10	4.24	2.55	16.00	.21	2.80	4.75	15.51	.03	.03	.33	1,390	1.89	21,230	70	2,480	7.1	
July 21-31.....	10,700	11	3.79	2.47	18.00	.22	2.46	4.68	17.20	.03	.05	.34	1,490	2.03	21,700	74	2,620	7.0	

Aug. 1, 10.....	1,970	--	3.44	2.30	14.53	2.47	4.16	13.54	--	.10	--	1,210	1.65	3,230	72	8.6	2,130	7.6
Aug. 2-8.....	5,830	--	3.79	2.71	19.89	2.47	4.50	19.32	--	.10	--	1,580	2.15	12,530	75	11	2,770	7.4
Aug. 9.....	1,400	--	3.19	1.73	10.28	2.56	3.25	9.31	--	.08	--	900	1.22	1,720	68	6.6	1,600	8.0
Aug. 11-12.....	5,610	--	2.50	1.23	7.31	2.62	1.75	6.63	--	.04	--	657	.89	5,020	66	5.4	1,180	8.0
Aug. 13, 15-16..	5,480	--	3.09	1.40	9.19	2.60	2.42	8.40	--	.06	--	827	1.12	6,180	67	6.1	1,460	8.0
Aug. 14, 17-20..	7,210	--	3.89	1.73	13.46	3.02	3.44	12.55	--	.07	--	1,150	1.56	11,280	71	8.0	2,010	7.9
Aug. 21-28, 30-31	9,400	--	4.19	2.22	15.12	3.16	3.77	14.52	--	.08	--	1,300	1.77	16,630	70	8.5	2,240	7.6
Aug. 29.....	1,030	--	4.09	1.81	7.59	3.31	3.06	6.77	--	.35	--	842	1.15	1,180	56	4.4	1,390	8.4
Sept. 1-10.....	6,300	14	4.59	2.55	16.92	3.33	3.83	16.64	0.03	.06	0.40	1,410	1.92	12,090	70	9.0	2,470	7.8
Sept. 11-20.....	5,020	10	5.29	2.55	17.00	3.93	3.68	16.50	.03	.09	.39	1,490	2.03	10,180	68	8.6	2,570	7.9
Sept. 21-30.....	4,710	8.4	5.39	2.47	17.18	3.97	3.62	16.78	.02	.12	.27	1,500	2.04	9,610	68	8.6	2,560	7.7
Total or weighted average.	1,384,000	--	4.99	2.30	10.57	3.83	5.04	8.91	--	0.09	--	1,090	1.48	2,054,000	59	5.5	1,790	--

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT RALSTON, OKLA.

LOCATION.--At gaging station at bridge on State Highway 18 at Ralston, Pawnee County, 2 miles downstream from Salt Creek, and 2 miles upstream from Grayhorse Creek.

DRAINAGE AREA.--54,227 square miles.

RECORDS AVAILABLE.--Chemical analyses: January 1950 to September 1952.

Water temperatures: January 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 3,420 micromhos Aug. 11; minimum daily, 492 micromhos June 7.

Percent sodium: Maximum, 75 Aug. 27-28; minimum, 40 June 7.

EXTREMES, January 1950 to September 1952.--Specific conductance: Maximum daily, 4,070 micromhos Jan. 5, 1951; minimum daily, 319 micromhos July 16, 1951.

Percent sodium: Maximum, 75 Aug. 27-28, 1952; minimum, 36 July 18-20, 1950.

REMARKS.--Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1241.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)		
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons					
Oct. 1-3, 10, 1951	58,210	--	3.94	1.64	6.19	3.13	3.13	2.73	5.87	--	0.04	--	712	0.97	56,420	53	3.7	1,190	8.0	
Oct. 4-8.....	66,190	--	4.79	2.14	8.72	3.66	3.73	8.24	3.73	8.24	--	0.05	--	922	1.25	83,070	56	4.6	1,580	7.7
Oct. 11-13.....	42,410	--	3.34	1.40	7.08	2.88	2.54	6.35	--	--	0.02	--	699	0.95	40,350	60	4.6	1,190	7.5	
Oct. 14-20.....	71,190	--	4.19	1.89	9.76	3.84	3.35	8.80	--	--	0.05	--	954	1.30	92,450	62	5.6	1,620	7.9	
Oct. 21-31.....	95,110	16	5.44	2.22	10.13	4.10	3.68	9.87	0.00	0.00	0.04	0.07	1,070	1.46	136,500	56	5.2	1,790	7.9	
Nov. 1-5.....	61,690	--	4.89	2.14	8.15	3.74	3.27	8.12	--	--	0.05	--	900	1.22	75,570	54	4.4	1,540	7.9	
Nov. 6-10.....	52,400	--	5.54	2.55	9.99	4.11	3.89	10.01	--	--	0.07	--	1,050	1.43	74,900	55	5.0	1,820	7.8	
Nov. 11-20.....	146,600	16	4.94	2.06	6.30	3.80	3.62	7.84	0.02	0.02	0.06	0.06	915	1.24	185,000	54	4.4	1,530	8.1	
Nov. 21-25.....	51,530	--	5.74	2.30	10.61	4.46	4.77	9.36	--	--	0.06	--	1,100	1.50	77,160	57	5.3	1,830	8.2	
Nov. 26-30.....	72,750	--	4.59	1.89	8.10	3.67	3.66	7.19	--	--	0.06	--	856	1.16	84,770	56	4.5	1,470	7.8	
Dec. 1-10.....	95,460	18	6.19	2.71	10.78	4.65	5.02	9.64	0.00	0.00	0.05	0.11	1,190	1.62	154,600	54	5.1	1,920	8.2	
Dec. 11-20.....	78,350	17	6.54	2.96	11.65	4.88	5.35	10.58	0.02	0.02	0.06	0.04	1,260	1.71	134,400	55	5.3	2,070	8.1	
Dec. 21-31.....	67,120	--	6.64	2.80	13.32	5.23	4.91	12.55	--	--	0.07	--	1,320	1.80	120,600	59	6.1	2,210	8.0	
Jan. 1-10, 1952..	72,910	19	6.44	2.80	12.13	4.75	4.79	11.42	0.02	0.10	0.22	0.22	1,300	1.77	139,000	56	5.7	2,110	8.0	
Jan. 11-20.....	87,890	--	6.29	2.88	12.89	4.42	5.27	12.27	--	--	0.10	--	1,280	1.74	153,100	58	6.0	2,180	8.1	
Jan. 21-31.....	82,550	18	6.89	3.21	13.31	4.57	6.64	11.56	0.02	0.07	0.34	0.34	1,440	1.96	161,800	57	5.9	2,270	7.9	

Feb. 1-10.....	68,070	18	6.59	3.12	12.65	.13	4.49	6.31	11.00	.02	.07	.18	1,370	1.86	126,900	56	5.7	2,180	8.1
Feb. 11-20.....	58,540	--	6.14	3.54	13.05	.14	4.39	6.43	11.64	--	.07	--	1,400	1.90	113,500	57	5.9	2,260	7.8
Feb. 21-29.....	52,220	14	6.59	3.12	14.00	.14	4.39	5.68	12.97	.02	.04	.22	1,440	1.96	102,400	59	6.4	2,340	7.9
Mar. 1-9.....	77,360	--	5.54	2.68	11.69		3.95	4.16	12.13	--	.07	--	1,240	1.69	130,600	59	5.8	2,080	7.7
Mar. 10.....	31,740	--	3.59	1.81	6.43		2.80	2.50	6.43	--	.10	--	732	1.00	31,620	54	3.9	1,240	8.1
Mar. 11-14.....	156,100	--	2.89	1.32	4.26		2.29	1.64	4.46	--	.08	--	547	.74	117,700	50	2.9	919	7.5
Mar. 15.....	19,240	--	3.49	1.97	6.22		2.66	2.66	6.26	--	.10	--	742	1.01	19,430	53	3.8	1,240	8.0
Mar. 16-20.....	75,730	--	4.59	2.30	9.14		3.47	3.60	8.88	--	.08	--	1,000	1.36	103,100	57	4.9	1,670	7.5
Mar. 21-31.....	120,000	16	5.44	2.38	11.00	.13	4.31	4.48	10.21	.02	.09	.23	1,150	1.56	187,900	58	5.8	1,920	8.2
Apr. 1-10.....	87,010	14	5.49	2.63	11.96	.13	3.93	4.93	11.14	.02	.03	.00	1,220	1.66	144,500	59	5.9	2,040	8.1
Apr. 11-20.....	92,890	--	4.89	2.38	11.28		3.72	4.20	10.58	--	.05	--	1,160	1.58	146,700	61	5.9	1,830	8.2
Apr. 21-23, 28-30	129,800	--	4.99	2.38	12.20		3.21	4.41	11.90	--	.05	--	1,210	1.65	202,200	62	6.3	2,030	7.6
Apr. 24-27.....	135,900	--	5.89	1.97	9.54		2.54	3.64	9.17	--	.05	--	968	1.32	178,200	62	5.6	1,620	7.5
May 1-10.....	134,300	16	5.89	2.63	11.83	.15	3.57	5.85	11.14	.03	.03	.17	1,290	1.75	235,800	58	5.7	2,070	8.1
May 11-20.....	84,000	15	5.79	2.71	11.61	.15	3.52	5.98	11.00	.03	.02	.20	1,280	1.74	146,400	57	5.6	2,050	8.1
May 21-22, 24, 29-31.....	50,820	--	5.19	2.71	11.60		3.08	5.70	10.66	--	.06	--	1,180	1.60	81,630	59	5.8	1,960	8.0
May 23, 25-28...	59,250	--	3.99	2.06	8.00		2.57	3.50	7.90	--	.08	--	863	1.17	69,600	57	4.6	1,460	8.0
June 1-4.....	32,150	--	5.39	2.47	11.17		2.92	5.48	10.58	--	.05	--	1,160	1.58	50,770	59	5.6	1,940	8.1
June 5-6.....	55,360	--	3.59	1.48	6.87		2.26	2.75	6.71	--	.02	--	716	.97	53,960	57	4.2	1,240	7.8
June 7.....	39,370	--	2.00	.82	1.90		1.54	.98	2.14	--	.06	--	309	.42	16,770	40	1.6	492	7.8
June 8-10.....	62,040	--	2.70	1.15	4.77		2.08	2.37	4.12	--	.05	--	512	.70	43,240	55	3.4	897	7.7
June 11-12.....	18,130	--	3.99	1.81	7.90		2.66	3.50	7.47	--	.07	--	848	1.13	20,980	58	4.6	1,420	7.9
June 13-20.....	42,090	--	5.19	2.55	12.41		3.57	4.81	11.70	--	.07	--	1,250	1.70	71,620	62	6.3	2,040	8.1
June 21-30.....	33,520	15	5.39	2.71	13.91	.19	3.59	4.66	13.96	.02	.01	.31	1,350	1.84	61,600	63	6.9	2,330	8.1
July 1-10.....	29,400	11	4.59	2.55	14.31	.19	2.93	4.41	14.10	.02	.01	.27	1,320	1.80	52,620	66	7.6	2,290	7.8
July 11-20.....	25,880	13	4.89	2.55	15.13	.17	2.98	4.60	15.37	.03	.02	.33	1,410	1.92	49,680	67	7.9	2,400	7.6
July 21-31.....	20,390	--	3.94	2.96	17.29		1.88	4.60	17.63	--	.08	--	1,530	2.08	42,470	71	9.3	2,610	7.2

ARKANSAS RIVER BASIN--Continued
ARKANSAS RIVER AT RALSTON, OKLA.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Aug. 1-7, 9-10, 1952.....	16,140	--	3.89	2.71	17.98		1.87	4.58	18.05	--	0.08	--	1,480	2.01	32,510	73	9.9	2,590	7.2
Aug. 8.....	2,220	--	3.74	2.30	13.07		1.99	3.35	13.68	--	0.09	--	1,200	1.83	3,630	68	7.5	2,110	8.3
Aug. 11.....	2,580	--	5.99	3.12	23.30		2.20	4.41	25.72	--	0.08	--	2,000	2.72	7,020	72	11	3,420	8.2
Aug. 12.....	3,190	--	5.34	3.04	20.56		2.39	5.27	21.15	--	0.13	--	1,800	2.45	7,820	71	10	2,980	8.2
Aug. 13.....	3,090	--	4.69	2.88	17.11		2.18	4.64	17.77	--	0.09	--	1,520	2.07	6,400	69	8.8	2,550	8.2
Aug. 14-20.....	19,340	--	3.39	1.81	11.42		2.64	3.25	10.66	--	0.07	--	993	1.35	26,140	69	7.1	1,750	7.8
Aug. 21-22, 29-31	10,740	--	3.99	2.55	15.08		2.39	3.66	15.51	--	0.06	--	1,340	1.82	19,590	73	8.4	2,280	7.8
Aug. 23-25.....	7,820	--	4.09	2.55	18.12		2.36	3.87	18.47	--	0.06	--	1,520	2.07	16,180	70	10	2,810	7.7
Aug. 27-28.....	4,150	--	4.49	3.04	22.95		2.23	5.06	23.13	--	0.06	--	1,840	2.50	10,380	75	12	3,160	8.0
Sept. 1-4.....	6,720	--	3.79	2.47	14.34		2.56	3.48	14.52	--	0.04	--	1,270	1.73	11,620	70	8.1	2,180	7.5
Sept. 5-10.....	8,280	--	4.34	2.88	18.50		2.61	4.31	18.76	--	0.04	--	1,560	2.12	17,580	72	9.7	2,680	7.5
Sept. 11-20.....	11,780	12	4.59	2.96	19.13	0.21	2.74	4.31	19.32	0.03	0.01	0.41	1,580	2.15	25,360	71	9.8	2,770	7.6
Sept. 21-30.....	9,850	8.8	4.99	2.96	19.74	.20	3.05	4.12	19.74	.02	.03	.33	1,680	2.28	22,530	71	9.9	2,860	7.6
Total or weighted average.	3,097,000	--	5.04	2.38	10.44		3.59	4.25	9.87	--	0.06	--	1,080	1.47	4,554,000	58	5.4	1,800	--

ARKANSAS RIVER BASIN--Continued

ARKANSAS RIVER AT VAN BUREN, ARK.

LOCATION.--At gaging station at Van Buren, Crawford County, 1½ miles downstream from Lee Creek and 8½ miles downstream from Poteau River.

DRAINAGE AREA.--150,218 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1952.

Water temperatures: October 1945 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 4,900 micromhos July 21; minimum daily, 412 micromhos Apr. 14.

Percent sodium: Maximum, 69 July 22, 24-25, Aug. 17-18, 22-23; minimum, 44 Nov. 17-20.

EXTREMES, 1945-52.--Specific conductance: Maximum daily, 4,900 micromhos July 21, 1952; minimum daily, 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 1951 to September 1952 given in Water-Supply Paper 1241.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				Percent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH	
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot					Total tons
Oct. 1-6, 1951 ..	333,000	--	2.30	0.65	2.78	--	1.90	0.85	3.02	--	0.06	--	358	0.49	183,200	49	614	7.7	
Oct. 7-10	146,200	--	2.94	.90	4.35	--	2.34	1.17	4.68	--	.08	--	518	.70	103,700	53	3.1	866	7.9
Oct. 11-20	327,700	14	3.29	1.32	5.48	0.14	2.62	1.50	6.06	0.02	0.12	0.06	726	.86	281,800	54	3.6	1,090	7.8
Oct. 21-22, 26 ..	103,700	--	3.59	1.32	6.87	--	2.72	1.71	7.61	--	.08	--	726	.99	102,700	58	4.4	1,260	7.7
Oct. 23-25, 27 ..	182,100	--	3.09	.90	--	3.28	2.10	1.10	4.03	--	.04	--	438	.60	109,300	45	2.3	770	7.6
Oct. 28-31	363,200	--	1.90	.71	2.52	--	1.57	.73	2.90	--	.04	--	321	.44	199,600	49	2.2	557	7.4
Nov. 1-2, 8	280,900	--	1.95	.77	3.30	--	1.51	.67	3.64	--	.03	--	375	.51	143,300	55	2.8	620	7.9
Nov. 3-7, 9-10 ..	539,700	14	2.30	.90	4.09	.11	1.70	.90	4.74	.02	.03	.08	464	.63	340,000	55	3.2	802	7.6
Nov. 11-16	515,100	--	2.79	.90	4.44	--	2.13	1.04	4.77	--	.07	.00	482	.67	345,100	55	3.3	837	7.6
Nov. 17-20	572,200	--	2.30	.77	2.44	--	2.05	.85	2.51	--	.04	.00	342	.47	268,900	44	2.0	569	7.7
Nov. 21-24, 28-30	672,800	--	2.45	.80	3.17	--	2.02	.96	3.41	--	.04	.00	402	.55	370,000	49	2.5	673	7.7
Nov. 25-27	333,800	--	1.85	.64	2.48	--	1.54	.77	2.54	--	.03	--	319	.43	143,500	50	2.2	520	7.8
Dec. 1-10	735,900	--	2.70	.99	3.78	--	2.10	1.10	4.06	--	.05	.11	458	.62	456,300	51	2.8	756	7.8
Dec. 11-17	377,300	--	2.89	1.07	4.44	--	2.23	1.37	4.68	--	.06	.13	519	.71	287,900	53	3.2	856	8.0
Dec. 18-31	424,700	10	3.94	1.23	6.57	.13	2.80	1.69	6.83	.01	.04	--	711	.97	412,000	55	4.1	1,180	8.0
Jan. 1-10, 1952 ..	372,700	11	3.44	1.32	6.48	.11	2.46	1.39	7.28	.01	.05	.00	694	.94	350,300	57	4.2	1,160	8.1
Jan. 11-13	122,800	--	4.54	1.73	10.35	--	2.57	1.79	11.79	--	.06	--	1,010	1.37	168,200	62	5.8	1,650	8.2

ARKANSAS RIVER BASIN--Continued
ARKANSAS RIVER AT VAN BUREN, ARK.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- ad- sorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons			
Jan. 14-20, 1952	275,300	--	4.09	1.48	8.13	--	2.79	2.25	8.97	--	0.05	822	1.12	308,300	59	4.9	1,380	7.9
Jan. 21-22, 27-28	125,200	--	3.89	1.48	7.70	--	a 2.77	2.06	8.04	--	.04	787	1.07	134,000	59	4.7	1,300	8.3
Jan. 23-26, 29-31	210,800	--	4.14	1.56	9.22	--	2.79	2.16	9.73	--	.05	895	1.22	257,200	62	5.5	1,490	7.7
Feb. 1-3	93,220	--	4.39	1.73	8.78	--	b 2.80	2.66	9.53	--	.05	892	1.21	112,800	59	5.0	1,480	8.3
Feb. 4-9	322,100	--	3.49	1.32	6.70	--	2.29	1.71	7.33	--	.07	690	.94	302,800	58	4.3	1,170	7.7
Feb. 10-20	466,900	12	3.24	1.32	5.52	0.11	2.29	1.67	5.87	0.01	.05	596	.81	378,200	54	3.6	1,010	7.7
Feb. 21-28	360,000	--	3.49	1.40	7.65	--	2.29	1.92	7.84	--	.05	733	1.00	360,000	61	4.9	1,230	7.8
Feb. 29-Mar. 1-3	232,900	--	3.89	1.64	10.18	--	2.02	1.52	11.90	--	.05	1,020	1.39	323,700	65	6.1	1,670	7.4
Mar. 4-10	745,600	--	2.40	.99	4.44	--	1.75	1.06	4.94	--	.06	501	.68	507,000	57	3.4	853	7.4
Mar. 11-21	1,793,000	--	2.10	.78	2.44	--	1.70	.94	2.62	--	.04	331	.45	806,800	46	2.0	561	8.0
Mar. 22-31	818,800	12	2.99	1.07	4.52	.09	2.31	1.35	4.85	.01	.06	538	.75	597,700	52	3.2	894	7.9
Apr. 1-10	718,800	11	2.89	.99	4.52	.09	2.03	1.31	4.94	.02	.05	536	.73	524,700	53	3.2	881	7.1
Apr. 11-12, 16-20	734,700	--	2.35	.99	3.70	--	1.74	1.04	4.00	--	.03	439	.60	440,800	53	2.9	741	7.7
Apr. 13-15	497,300	--	1.80	.72	2.35	--	1.25	.87	2.65	--	.03	297	.40	198,900	50	2.2	501	7.7
Apr. 21, 24-27	973,100	--	2.10	1.07	3.26	--	1.87	.85	3.53	--	.03	398	.54	525,500	51	2.6	671	7.8
Apr. 22-23, 28-30	857,900	--	2.79	.90	5.52	--	2.08	1.15	5.92	--	.07	600	.82	703,500	60	4.1	987	7.4
May 1-8	703,700	--	3.04	1.15	6.22	--	2.20	1.73	6.49	--	.05	688	.94	661,500	60	4.3	1,100	7.0
May 9-15	287,000	12	4.29	1.73	10.39	.15	2.88	2.58	10.38	.02	.05	1,010	1.37	393,200	63	6.0	1,680	7.1
May 16-20	182,700	--	3.89	1.56	7.17	--	2.62	2.46	7.19	--	.04	805	1.09	199,100	57	4.4	1,280	7.8
May 21-23	143,000	--	3.79	1.97	11.35	--	2.39	1.85	13.40	--	.04	1,190	1.62	231,700	66	6.7	1,860	7.7
May 24-27	315,400	--	3.29	1.32	6.70	--	2.33	1.56	7.19	--	.05	712	.97	305,900	59	4.4	1,180	7.7
May 28-31	253,700	--	2.70	.99	4.74	--	2.03	1.21	5.22	--	.04	548	.75	190,300	56	3.5	897	7.1
June 1, 5-9	381,000	--	2.50	1.23	4.91	--	1.90	1.37	5.13	--	.05	572	.78	297,200	54	3.6	912	8.1
June 2-4, 10	227,300	--	2.99	1.40	6.61	--	2.15	1.44	7.14	--	.06	716	.97	220,500	58	4.5	1,170	7.6
June 11-20	346,500	--	3.04	1.23	5.26	--	2.43	1.37	5.53	--	.06	610	.83	287,600	49	3.6	1,000	7.5

a Includes 0.13 equivalents per million of carbonate (CO₃).

b Includes 0.10 equivalents per million of carbonate (CO₃).

June 21-30	145,800	12	3.64	1.56	7.48	.14	2.38	1.89	8.46	.02	.02	.15	811	1.10	160,400	58	4.6	1,360	7.5
July 1-7	58,830	17	3.69	1.89	9.61	.17	c 2.64	1.98	10.44	.01	.03	.30	934	1.27	74,710	63	5.7	1,620	8.3
July 8-12	49,750	--	4.49	2.88	13.78	--	2.38	2.60	16.78	--	.04	.35	1,380	1.88	93,530	65	7.2	2,320	7.7
July 13-16	38,040	--	3.39	1.73	7.57	--	2.38	1.81	8.46	--	.04	--	811	1.10	41,840	58	4.7	1,310	7.5
July 17-19	37,920	--	3.84	1.73	10.22	--	2.44	1.94	11.28	--	.03	.29	959	1.30	49,300	65	6.1	1,660	7.7
July 20-21, 23, 26-27	71,250	--	4.28	2.22	13.78	--	2.20	1.60	16.30	--	.03	.23	1,239	1.67	119,000	68	7.6	2,140	7.6
July 22, 24-25	40,070	--	5.29	2.47	17.31	--	2.28	1.48	21.01	--	.05	.25	1,530	2.08	83,350	69	8.8	2,620	7.8
July 28-31	42,010	--	2.99	1.40	6.35	--	2.31	1.25	6.99	--	.04	.15	636	.86	36,130	59	4.3	1,140	7.3
Aug. 1-5, 7-9	69,940	--	3.19	1.56	7.22	--	2.23	1.54	8.18	--	.05	.00	728	.99	69,240	60	4.7	1,260	8.2
Aug. 6, 10-16	69,260	12	3.89	1.73	10.18	.18	b 2.13	1.52	11.85	.02	.04	.10	980	1.33	92,120	64	6.1	1,690	8.3
Aug. 17-18, 22-23	38,000	--	3.89	2.14	13.44	--	2.00	1.96	15.23	--	.03	.05	1,230	1.67	63,460	69	7.8	2,100	7.8
Aug. 19-21, 24, 29-31	57,200	--	3.59	1.81	9.65	--	2.23	1.69	11.00	--	.02	.10	932	1.27	72,640	64	5.9	1,610	7.5
Aug. 25-28	28,560	--	3.34	1.64	7.35	--	2.29	1.52	8.12	--	.04	.05	734	1.00	28,560	60	4.6	1,300	7.7
Sept. 1-8	46,140	10	3.84	1.89	10.22	.17	b 2.38	1.54	11.79	.02	.04	.00	979	1.33	61,370	63	6.1	1,660	8.3
Sept. 9-14	42,660	--	3.84	2.06	11.48	--	2.36	1.85	13.68	--	.06	.00	1,060	1.44	61,430	66	6.7	1,940	7.7
Sept. 15-20	40,880	--	3.49	1.48	7.65	--	2.51	1.67	8.74	--	.03	.00	772	1.05	42,920	61	4.8	1,390	8.1
Sept. 21, 23	16,520	--	4.59	2.22	14.13	--	c 2.50	1.29	16.58	--	.03	--	1,290	1.75	28,910	67	7.7	2,210	8.3
Sept. 22-25, 27	35,800	--	3.14	1.23	5.44	--	2.56	1.48	5.87	--	.02	--	602	.82	29,360	55	3.7	1,040	8.0
Sept. 26, 29-30 ..	19,340	--	3.69	1.64	7.83	--	2.52	1.46	9.53	--	.03	.00	830	1.13	21,850	59	4.8	1,480	8.1
Weighted average	19,419,690	--	2.79	1.07	4.96	--	2.08	1.27	5.42	--	0.05	--	556	0.76	14,759,000	56	--	928	--

b Includes 0.10 equivalents per million of carbonate (CO₃).c Includes 0.07 equivalents per million of carbonate (CO₃).

ARKANSAS RIVER BASIN--Continued

CIMARRON RIVER AT MANNFORD, OKLA.

LOCATION.--At county highway bridge 1½ miles downstream from House Creek, 18 miles upstream from mouth, and half a mile north of Mannford, Creek County.

DRAINAGE AREA.--18,822 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1952.

Water temperatures: October 1949 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 34,200 micromhos Sept. 20; minimum daily, 1,480 micromhos Mar. 12.

Percent sodium: Maximum, 86 Jan. 17-20; minimum, 68 May 24.

EXTREMES, 1949-52.--Specific conductance: Maximum daily, 34,200 micromhos Sept. 20, 1952; minimum daily, 964 micromhos Sept. 10, 1951.

Percent sodium: Maximum, 88 Apr. 8, 1951; minimum, 63 Sept. 10, 1951.

REMARKS.--Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. No discharge records available for this station.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million							Dissolved solids			Per-centage of sodium	So-dium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH			
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm					Parts per million	Tons per acre-foot	Total tons
Oct. 1-5, 1951...		--	12.82	5.84	96.30	2.74	2.20	3.32	6.39	105.76	0.07	--	6,680	9.08		84	31	10,300	7.9
Oct. 6-10.....		--	6.44	2.96	42.94	2.20	2.90	4.77	46.54	--	.08	--	3,080	4.19		82	20	5,510	7.5
Oct. 11-13.....		--	9.78	5.10	72.39	2.90	4.77	79.53	--	--	.07	--	5,150	7.00		83	27	8,500	7.5
Oct. 14-15, 19-20		--	13.12	5.76	94.21	3.02	6.50	103.51	--	--	.06	--	6,580	8.95		83	31	10,700	7.4
Oct. 16, 18.....		--	8.68	3.70	51.15	2.56	5.08	55.84	--	--	.05	--	3,860	5.25		81	21	6,640	7.3
Oct. 17.....		--	4.59	1.97	22.84	1.74	2.52	25.10	--	--	.04	--	1,820	2.48		78	13	3,180	7.5
Oct. 21-26.....		--	15.52	7.32	101.22	3.08	6.43	114.50	--	--	.05	--	7,200	9.79		82	30	11,400	7.9
Oct. 27.....		--	3.49	1.56	11.74	1.95	1.12	13.68	--	--	.04	--	1,260	1.71		70	7.4	1,860	7.7
Oct. 28-29.....		--	9.53	4.93	59.49	2.52	4.79	66.56	--	--	.08	--	4,480	6.09		80	22	7,440	7.9
Oct. 30-31.....		--	6.89	3.62	41.01	2.24	2.96	46.25	--	--	.07	--	3,940	4.13		80	18	5,210	7.8
Nov. 1-2.....		--	5.39	2.14	26.90	2.33	2.14	29.90	--	--	.06	--	1,990	2.71		78	14	3,650	7.7
Nov. 3-4.....		--	6.49	2.80	40.85	2.52	3.83	43.71	--	--	.08	--	2,920	3.97		81	19	4,990	7.8
Nov. 5-10.....		--	9.78	4.19	63.19	2.92	5.89	68.25	--	--	.10	--	4,550	6.19		82	24	7,730	7.6
Nov. 11, 18-20...		--	11.63	5.59	95.29	3.82	6.81	101.81	--	--	.07	--	6,550	8.91		85	32	10,500	7.9
Nov. 12.....		--	3.24	1.15	13.53	1.85	1.35	14.87	--	--	.05	--	1,050	1.43		76	9.1	2,000	7.7
Nov. 13-15.....		--	5.69	2.88	39.98	2.43	3.18	42.87	--	--	.07	--	2,820	3.84		82	19	5,030	7.6
Nov. 16-17.....		--	9.88	4.44	70.13	3.16	5.08	76.15	--	--	.06	--	4,900	6.66		83	26	8,060	7.7
Nov. 21-24, 29...		--	12.92	5.59	95.33	4.36	6.74	102.66	--	--	.08	--	6,620	9.00		84	31	10,700	8.1
Nov. 25-28, 30...		--	8.98	4.11	56.98	3.44	4.79	61.77	--	--	.07	--	4,210	5.73		81	22	7,060	7.9

Dec. 1-5.....	9.98	4.60	63.06	3.57	5.75	68.25	--	.07	--	4,510	6.13	81	23	7,610	7.9
Dec. 6-10.....	13.87	7.07	94.70	4.41	7.93	103.22	--	.08	--	6,720	9.14	82	29	10,900	7.8
Dec. 11-20.....	16	15.57	7.07	4.78	7.97	108.30	0.02	.05	0.11	7,400	10.08	81	29	12,100	8.0
Dec. 21-31.....	16	16.87	7.73	4.98	7.66	110.84	.02	.07	.13	7,730	10.51	80	29	12,500	8.1
Jan. 1-10, 1952..	17	15.17	7.24	4.77	8.06	108.86	.00	.06	.44	7,230	9.88	82	31	12,300	8.2
Jan. 11-16.....	--	12.33	5.76	4.52	7.24	101.81	.00	.07	--	6,520	9.00	84	32	10,200	8.0
Jan. 17-20.....	--	13.42	6.58	4.44	9.45	133.68	.00	.08	--	8,520	11.72	86	40	13,000	7.7
Jan. 21-31.....	16	14.27	6.83	4.64	7.31	99.84	.00	.05	.42	6,830	9.29	81	29	11,200	8.1
Feb. 1-10.....	12	14.32	4.16	99.14	3.98	7.85	106.33	.00	.44	7,360	10.01	82	30	11,900	8.0
Feb. 11-20.....	9.7	14.12	7.32	96.53	3.82	7.50	102.66	.00	.46	7,210	9.81	82	30	11,700	7.9
Feb. 21-24.....	--	14.12	7.57	105.69	3.88	8.10	115.35	.05	--	7,400	10.06	83	32	12,000	8.0
Feb. 25-29.....	--	8.18	4.77	56.38	3.26	4.54	61.48	--	--	4,110	5.59	81	22	7,040	7.5
Mar. 1, 7.....	--	9.23	5.76	62.78	3.90	5.58	68.25	.04	--	4,590	6.24	81	23	7,730	8.0
Mar. 2-3, 5-6...	--	6.69	4.03	42.79	3.03	3.89	46.54	.05	--	3,200	4.35	80	18	5,530	7.8
Mar. 4, 10.....	--	4.89	2.80	26.03	2.70	2.50	28.49	.03	--	1,990	2.71	77	13	3,500	7.6
Mar. 8-9.....	--	10.33	6.50	96.28	4.00	7.27	101.81	.03	--	6,580	8.95	85	33	11,000	7.6
Mar. 11-12.....	--	2.79	1.40	10.93	2.54	1.27	11.28	.03	--	910	1.24	72	7.5	1,630	7.9
Mar. 13.....	--	3.74	1.81	14.58	3.13	1.71	15.23	.06	--	1,190	1.62	72	8.7	2,150	8.3
Mar. 14, 18-19..	--	4.84	2.71	30.73	2.64	3.14	32.43	.07	--	2,320	3.02	80	16	3,940	7.9
Mar. 15, 20.....	--	5.29	2.96	40.55	2.82	3.60	42.30	.08	--	2,880	3.92	83	20	5,150	7.9
Mar. 16-17.....	--	7.19	4.36	62.23	3.34	5.50	64.87	.07	--	4,300	5.85	84	26	7,350	8.0
Mar. 21-22.....	--	6.04	3.70	42.54	3.13	3.96	45.13	.06	--	3,040	4.13	81	19	5,370	8.0
Mar. 23-27.....	--	8.88	5.10	61.21	4.20	6.06	64.87	.06	--	4,420	6.01	81	23	7,590	7.9
Mar. 28-31.....	--	11.28	6.25	82.78	4.31	7.08	88.84	.06	--	5,830	7.93	83	28	9,570	8.0
Apr. 1-10.....	12	10.73	6.17	75.66	3.79	6.77	84.61	.00	.72	5,780	7.86	81	26	9,640	7.8
Apr. 11-19.....	--	11.88	7.32	80.64	4.16	7.08	88.56	.04	--	6,120	8.32	81	26	10,100	7.9
Apr. 20.....	--	8.58	5.26	61.41	2.87	5.18	67.12	.08	--	4,800	6.26	82	23	7,670	7.7
Apr. 21-22, 24..	--	5.29	3.12	37.67	2.90	3.35	39.77	.06	--	2,780	3.78	82	18	4,890	7.8
Apr. 23.....	--	4.79	2.63	24.34	2.56	2.02	27.13	.05	--	1,860	2.53	77	13	3,290	8.2
Apr. 25, 29-30..	--	9.53	4.77	76.11	2.87	9.06	78.40	.08	--	5,530	7.52	84	28	9,240	7.8
Apr. 26-28.....	--	6.89	3.45	52.00	2.61	7.18	52.46	.09	--	5,770	5.13	83	23	6,390	7.7

ARKANSAS RIVER BASIN--Continued
CIMARRON RIVER AT MANNFORD, OKLA.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million							Dissolved solids			Per-cent so-lidum	So-lidum adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH	
			Cal-cium (Ca)	Magne-sium (Mg)	So-lidum (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm					Parts per mil-lion
May 1, 6-7, 1952.		--	7.78	4.03	62.54	2.93	7.89	63.46	--	0.07	--	4,460	6.07	84	26	7,420	7.9
May 2-4, 8-10 . . .		--	7.28	3.62	47.38	3.11	7.14	47.95	--	.08	--	3,610	4.91	81	20	5,920	8.0
May 5		--	3.24	1.73	23.28	2.54	3.39	22.22	--	.10	--	1,770	2.41	82	15	3,050	8.3
May 11-15, 19-20		--	9.53	5.26	61.43	3.64	8.20	64.30	--	.08	--	4,590	6.24	81	23	7,620	8.2
May 16-18 . . .		--	11.43	5.84	72.36	3.62	9.24	76.71	--	.06	--	5,660	7.70	81	25	9,310	8.2
May 21-22, 30-31		--	8.03	4.69	54.73	3.05	7.64	56.69	--	.07	--	4,140	5.63	81	22	6,830	8.2
May 23, 29 . . .		--	4.79	2.30	22.84	2.21	3.10	24.54	--	.08	--	1,860	2.53	76	12	3,220	8.2
May 24		--	2.89	1.23	8.76	2.11	.42	10.29	--	.06	--	858	1.17	68	6.1	1,500	8.1
May 25-28		--	3.69	1.97	17.99	2.34	2.46	18.76	--	.09	--	1,420	1.93	76	11	2,550	7.9
June 1-4		--	9.48	4.28	45.08	2.49	8.33	47.95	--	.07	--	3,550	4.83	77	17	5,950	8.1
June 5-6		--	4.84	2.30	29.63	2.29	3.41	31.02	--	.05	--	2,170	2.95	81	16	3,900	7.9
June 7-8		--	2.89	1.40	11.33	2.18	1.40	11.99	--	.05	--	950	1.29	73	7.7	1,720	8.1
June 9-10		--	3.79	1.89	22.25	2.06	2.66	23.13	--	.08	--	1,670	2.27	80	13	3,010	8.1
June 11		--	4.89	2.38	25.29	2.09	1.98	28.20	--	.09	--	2,010	2.73	78	13	3,370	8.2
June 12-13		--	7.28	3.29	36.75	2.75	2.83	41.74	--	--	--	3,080	4.19	78	16	4,980	8.0
June 14		--	8.98	4.44	49.84	2.82	4.04	56.40	--	--	--	4,040	5.49	79	19	6,500	8.4
June 15-17		--	11.23	5.67	67.68	2.77	5.66	76.15	--	--	--	5,440	7.40	80	23	8,770	8.2
June 18-20		--	13.27	7.32	92.97	2.10	7.39	104.07	--	--	--	7,290	9.91	82	29	11,400	8.0
June 21-24, 26 . . .		--	16.17	8.80	116.52	1.66	8.12	131.71	--	--	--	8,880	12.08	82	33	13,800	8.1
June 25, 27-30 . . .		--	23.15	11.35	136.09	2.05	8.06	160.48	--	--	--	11,400	15.50	80	33	17,200	8.1
July 1, 7-10		--	27.69	12.58	153.77	1.98	6.68	185.58	--	--	--	13,000	17.68	79	34	18,800	7.9
July 2-6		--	19.61	8.96	114.23	1.92	5.50	135.38	--	--	--	9,270	12.61	80	30	14,000	8.1
July 11-14		--	24.20	11.02	136.17	1.98	6.68	162.73	--	--	--	11,100	15.10	79	32	16,300	8.0
July 15-18		--	15.12	6.91	82.32	1.97	3.39	98.99	--	--	--	6,690	9.10	79	25	10,200	8.0
July 19		--	4.89	2.38	25.50	2.23	1.92	28.49	--	.13	--	2,120	2.88	78	13	3,610	8.1
July 20		--	4.29	1.89	18.85	1.61	1.06	22.28	--	.08	--	1,720	2.34	75	11	2,790	8.2
July 21		--	8.18	3.45	34.47	1.69	.98	43.43	--	--	--	3,130	4.26	75	14	4,940	8.3
July 22		--	12.13	5.10	53.40	1.82	1.69	67.12	--	--	--	4,750	6.46	76	18	7,720	8.2
July 23-24		--	17.91	7.73	83.99	1.59	2.56	105.48	--	--	--	7,230	9.63	77	23	11,000	8.1
July 25-28		--	26.60	11.51	133.47	1.85	4.18	165.55	--	--	--	11,200	15.23	78	31	16,500	8.2
July 29-31		--	33.83	14.39	166.49	1.95	5.18	207.58	--	--	--	14,300	19.45	78	34	20,500	8.1

Aug. 1, 6.....	13.37	5.92	68.69	1.54	1.83	84.61	--	--	--	5,430	7.38	78	22	8,780	8.0	
Aug. 2, 7-8.....	--	10.73	4.93	55.85	1.47	2.35	67.69	--	--	--	4,680	6.36	78	20	7,310	8.1
Aug. 3, 5, 9.....	--	17.96	7.48	88.14	1.47	2.12	109.99	--	--	--	7,040	9.57	78	25	11,200	8.2
Aug. 4.....	--	28.29	11.92	143.62	1.58	4.29	177.96	--	--	--	11,300	15.37	78	32	18,000	8.3
Aug. 10.....	--	8.43	4.19	44.31	1.98	2.77	52.18	--	--	--	3,570	4.86	78	18	5,950	8.4
Aug. 11, 13-14.....	--	7.14	3.21	33.15	2.18	2.12	39.20	--	--	--	2,720	3.70	76	15	4,690	8.1
Aug. 12, 15.....	--	8.58	4.44	46.97	2.15	2.56	55.28	--	--	--	3,870	5.26	78	18	6,460	8.2
Aug. 16.....	--	12.82	5.26	62.55	2.23	2.25	76.15	--	--	--	5,240	7.13	78	21	8,530	8.3
Aug. 17.....	--	14.92	6.58	82.78	1.07	2.52	100.69	--	--	--	6,710	9.13	79	25	10,800	8.0
Aug. 18-19.....	--	19.71	8.31	106.55	1.18	3.37	130.02	--	--	--	8,600	11.70	79	28	13,500	7.7
Aug. 20.....	--	24.30	10.77	127.52	1.39	3.83	157.37	--	--	--	10,600	14.42	78	30	16,200	8.0
Aug. 21-22, 28 ..	--	28.09	12.09	141.49	1.69	3.71	176.27	--	--	--	11,400	15.50	78	32	17,400	7.8
Aug. 23-24, 29-31	--	31.94	13.32	154.76	1.61	3.81	194.60	--	--	--	12,700	17.27	77	33	19,400	7.9
Aug. 25-26.....	--	15.42	6.91	78.74	1.80	3.10	96.17	--	--	--	6,390	8.69	78	24	10,300	7.8
Aug. 27.....	--	19.91	8.72	101.02	1.52	3.19	124.94	--	--	--	8,150	11.08	78	27	12,700	8.2
Sept. 1-10.....	11	26.75	11.02	172.20 1.05	1.69	10.43	191.78 0.01	--	--	0.86	12,800	17.41	82	40	19,600	8.0
Sept. 11-12.....	--	32.88	14.31	180.64	1.16	6.97	219.70	--	--	--	14,000	19.04	79	37	21,800	7.8
Sept. 13-15.....	--	41.32	17.43	209.40	.95	6.04	261.16	--	--	--	16,800	22.58	78	39	24,900	7.7
Sept. 16-18.....	--	46.81	19.41	237.40	1.20	6.29	296.13	--	--	--	18,700	25.43	78	41	27,700	7.5
Sept. 19.....	--	50.90	21.38	259.51	1.29	6.18	324.34	--	--	--	20,400	27.74	78	43	30,000	7.2
Sept. 20.....	--	57.39	23.19	282.07	1.38	5.91	355.36	--	--	--	22,400	30.46	78	44	34,200	7.8
Sept. 21-30.....	10	51.40	20.89	254.82 2.15	1.51	5.12	321.52 .00	--	--	1.3	20,000	27.20	77	42	29,400	7.5

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR TASCOSA, TEX.

LOCATION --At Boy's Ranch near Tascosa, Oldham County, 20 miles upstream from gaging station near Amarillo, Potter County. DRAINAGE AREA.--19,287 square miles, (above gaging station). RECORDS AVAILABLE.--Chemical analyses: June 1948 to September 1952.

Water temperatures: February 1949 to September 1952. EXTREMES, 1951-52.--Specific conductance: Maximum daily, 3,400 micromhos Mar. 18; minimum daily, 540 micromhos July 13.

Percent sodium: Maximum, 87 Mar. 9-10, minimum, 59 Jan. 3-5.

EXTREMES, June 1948-52.--Specific conductance (1950-52): Maximum daily, 3,600 micromhos Mar. 2, 1951; minimum daily, 416 micromhos May 14, 1951.

Percent sodium: Maximum, 87 Mar. 9-10, 1952; minimum, 11 Nov. 11-20, 1948.

REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residue on evaporation and for concentrations more than 1,000 ppm are sum of determined constituents unless noted otherwise. Records of specific conductance of daily samples available in District office at Austin, Tex. Discharge records for gaging station near Amarillo for water year October 1951 to September 1952 given in Water-Supply Paper 1241. Total acre feet values reported are adjusted to reflect small discharge of sewage effluent entering Canadian River between sampling point and gaging station. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)			
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot			Total tons	Per- cent so- dium	
Oct. 17-21, 26-31, 1951.....	294	13	4.24	3.37	12.60	3.33	3.33	8.58	8.24	0.03	0.03		1,240	1.69	497	62	6.4	1,970	7.8
Nov. 1-10.....	1,140	11	3.79	3.12	10.82	3.43	3.43	7.99	6.35	.03	.03		1,090	1.48	1,690	61	5.9	1,750	7.9
Nov. 11-30, Dec. 1-5.....	651	14	4.19	3.70	12.25	4.23	4.23	8.18	7.67	.03	.03		1,220	1.66	1,080	61	6.1	1,950	8.1
Dec. 18, 19, 22-24, 26-31.....	97	20	2.79	2.63	7.71	5.20	4.02	4.02	3.84	.05	.02		777	1.06	103	59	4.7	1,280	8.2
Jan. 7-10, 1952..	54	16	3.14	3.54	12.75	4.79	6.70	6.70	7.90	.03	.01		1,160	1.58	85	66	7.0	1,950	8.0
Jan. 11-20.....	121	18	3.39	3.70	13.28	4.39	6.56	6.56	9.36	.04	.02		1,220	1.66	201	65	7.0	2,050	8.0
Jan. 22, 24, 27, 29-30.....	12	20	1.60	2.14	6.53	4.18	3.33	3.33	2.68	.04	.04		a 611	.83	10	64	4.7	987	7.9
Feb. 12-13.....	6.0	14	1.35	1.40	6.39	5.42	2.77	2.77	.93	.02	.00		a 534	.73	4.4	4.4	5.4	845	7.8
Feb. 17.....	4.0	16	2.00	2.38	6.49	4.42	3.41	2.99	2.99	.05	.00		a 638	.87	3.5	60	4.4	1,040	8.1
Feb. 27-29.....	12	13	1.30	1.40	6.45	5.21	2.89	2.89	1.02	.03	.00		536	.73	8.8	70	5.5	863	8.3

a Sum of determined constituents.

Mar. 1-8.....	46	13	1.90	1.97	6.54	4.82	3.31	2.43	.03	0.02	a 611	.83	38	63	4.7	986	8.0
Mar. 9-10.....	24	14	.50	.43	6.45	4.00	1.81	1.47	.03	.07	456	.82	15	87	9.4	697	8.1
Mar. 11-14, 17...	24	17	2.40	4.19	16.80	5.70	9.54	8.04	.06	.05	1,420	1.93	46	72	9.2	2,260	8.3
Mar. 15-16, 24-25.....	14	16	1.20	1.73	8.63	5.51	4.06	1.95	.03	.01	a 689	.94	13	75	7.1	1,110	8.3
Mar. 18-19, 21-22, 26-27.....	20	18	3.94	6.33	23.15	5.01	15.41	12.92	.05	.03	2,060	2.60	56	69	10	3,140	8.3
Apr. 2, 5, 6, 10-13, 15-17, May 4-7, 15-23, 27	139	19	2.79	3.29	15.15	4.03	8.14	8.97	.04	.05	1,290	1.75	243	71	8.7	2,140	8.0
Apr. 18-30, May 1-8, 9-14, June 1-8.....	5,160	17	1.70	1.56	8.74	2.59	4.31	5.04	.03	.03	a 738	1.00	5,160	73	6.8	1,250	7.8
July 2, 8-15, 27-29, 31.....	264	20	2.99	2.14	13.23	3.52	6.31	8.40	.05	.08	1,120	1.52	401	72	8.3	1,850	8.1
July 16-21.....	11,660	20	1.15	.76	5.43	2.90	2.19	2.14	.04	.07	a 450	.61	7,110	74	5.5	766	8.1
July 22-26.....	3,580	19	1.90	1.23	8.20	3.11	3.44	4.65	.04	.09	a 691	.94	3,370	72	6.6	1,190	8.2
Aug. 21-24.....	12,310	30	2.89	2.14	9.96	6.08	2.89	5.92	.04	.06	a 878	1.19	14,850	66	6.3	1,540	7.3
Aug. 25-31.....	14,880	19	1.95	1.32	6.81	3.15	3.46	3.38	.04	.05	a 615	.84	12,500	68	5.3	1,050	7.8
Sept. 8-14, 16, 18-25.....	159	18	3.84	3.54	14.17	3.51	8.31	9.65	.04	.04	1,310	1.78	283	66	7.4	2,140	7.6
Sept. 26-30.....	40	16	4.39	3.54	14.77	3.39	8.97	10.29	.04	.01	1,390	1.89	76	65	7.4	2,230	8.0
Total or weighted average..	59,580	21	2.25	1.64	7.74	3.80	3.52	4.29	0.05	0.05	705	0.96	57,200	67	5.5	1,210	--

a Sum of determined constituents.

ARKANSAS RIVER BASIN--Continued

CANADIAN RIVER NEAR WHITEFIELD, OKLA

LOCATION.--At gaging station at bridge on State Highway 2, 5½ miles upstream from Snake Creek, and three-quarters of a mile north of Whitefield, Haskell County.

DRAINAGE AREA.--47,576 square miles.

RECORDS AVAILABLE.--Chemical analyses: September 1944 to February 1945, September 1946 to September 1952.

Water temperatures: September 1944 to February 1945, September 1946 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 13,600 micromhos July 18; minimum daily, 573 micromhos Apr. 23.

Percent sodium: Maximum, 78 Nov. 1; minimum, 53 Apr. 23-24, 26.

EXTREMES, 1944-45, 1946-52.--Specific conductance: Maximum daily, 14,500 micromhos Jan. 22, 1949; minimum daily, 71.7 micromhos Jan. 2, 1948.

Percent sodium: Maximum, 80 Nov. 6-14, 1947; minimum, 37 Feb. 3-5, 1948.

REMARKS.--Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1241.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per-cent sodium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-2, 1951 ..	1,430	--	6.59	3.04	27.10	2.06	0.77	33.84	--	0.06	--	2,350	3.20	4,570	74	12	4,060	7.8	
Oct. 3-10	4,600	--	7.83	3.86	38.33	2.29	.87	46.82	--	.04	--	3,130	4.26	19,610	77	16	5,220	7.6	
Oct. 11-19	5,260	--	9.13	4.19	42.99	2.41	.85	53.02	--	.03	--	3,480	4.73	24,900	76	17	5,700	7.6	
Oct. 20	1,350	--	5.54	3.29	20.42	2.52	.73	25.95	--	.05	--	1,830	2.49	3,360	70	9.7	3,160	7.7	
Oct. 21-23	2,120	--	6.84	3.66	27.23	2.75	.75	34.41	--	.02	--	2,240	3.05	6,470	72	12	3,800	8.0	
Oct. 24-26, 31 ..	7,240	--	8.58	4.28	34.92	1.90	.71	45.13	--	.04	--	3,010	4.09	29,660	73	14	5,070	7.8	
Oct. 27-28	13,530	--	2.79	1.32	8.89	1.48	.35	11.14	--	.03	--	822	1.12	15,140	68	6.2	1,490	7.7	
Oct. 29-30	9,520	--	4.34	2.06	15.71	1.18	.46	20.45	--	.02	--	1,410	1.92	18,270	71	8.8	2,450	7.4	
Nov. 1	8,810	--	12.38	5.02	63.09	1.20	.79	78.40	--	.10	--	4,620	6.28	55,380	78	21	7,820	7.7	
Nov. 2-3	18,090	--	3.89	1.64	15.46	1.16	.46	19.32	--	.05	--	1,260	1.71	31,030	74	9.3	2,360	7.5	
Nov. 4-6	15,430	--	5.09	1.97	20.17	1.21	.56	25.38	--	.08	--	1,670	2.27	35,080	74	11	3,020	7.5	
Nov. 7, 9-10	7,100	--	6.54	2.80	27.35	1.82	.64	34.13	--	.10	--	2,110	2.87	20,400	75	13	3,800	7.5	
Nov. 8	2,340	--	7.88	3.45	35.55	1.49	.73	44.56	--	.10	--	2,840	3.86	9,050	76	15	5,100	7.8	
Nov. 11-18	12,340	--	6.59	2.71	24.65	2.23	.62	31.02	--	.08	--	1,990	2.71	33,420	73	11	3,560	7.6	
Nov. 19-20	1,770	--	8.03	3.29	31.53	2.51	.77	39.48	--	.09	--	2,520	3.43	6,060	74	13	4,460	7.6	
Nov. 21-23	2,790	--	8.43	3.62	31.29	2.67	.85	39.77	--	.05	--	2,910	3.98	11,040	72	13	4,640	7.9	
Nov. 24	2,180	--	4.99	2.14	18.44	1.57	.69	23.27	--	.04	--	1,700	2.31	5,050	72	9.8	2,850	7.7	
Nov. 25, 27, 29-30	22,790	--	4.69	1.89	18.12	1.31	.79	22.56	--	.04	--	1,660	2.28	52,120	73	10	2,780	7.2	
Nov. 26, 28	14,040	--	3.29	1.32	11.78	1.21	.62	14.52	--	.04	--	1,000	1.36	19,120	72	7.8	1,860	7.3	

Dec. 1-4, 8-9.....	12,440	--	8.88	4.11	39.74	1.62	.83	50.20	--	.08	--	3,130	4.26	53,010	75	16	5,430	7.4
Dec. 5-7, 10.....	5,870	--	7.88	3.54	32.35	1.74	.87	40.89	--	.07	--	2,640	3.59	21,080	74	14	4,630	7.2
Dec. 11-14, 17....	6,580	--	9.78	4.44	42.10	2.11	1.12	53.02	--	.07	--	3,310	4.50	29,640	75	16	5,700	7.4
Dec. 15-16, 18-20..	4,580	--	11.18	5.10	46.48	2.51	.96	59.23	--	.06	--	3,780	5.14	23,560	74	16	6,420	7.4
Dec. 21-26, 29-31	6,680	--	12.87	5.26	53.67	2.82	1.21	67.69	--	.08	--	4,240	5.77	38,560	75	18	7,110	7.5
Dec. 27-28.....	1,520	--	16.27	7.16	68.62	3.10	1.44	67.43	--	.08	--	5,470	7.44	11,310	75	20	9,180	7.6
Jan. 1, 4-7, 1952	10,040	--	10.63	4.60	50.79	2.36	.98	62.61	--	.07	--	4,000	5.44	54,650	77	18	6,450	7.7
Jan. 2-3, 8-10....	12,750	--	16.12	6.58	77.51	2.39	1.29	96.45	--	.08	--	5,840	7.94	101,400	77	23	9,280	7.5
Jan. 11-15.....	11,470	--	13.77	5.76	65.09	2.16	1.12	81.23	--	.11	--	5,070	6.90	79,150	77	21	8,260	7.3
Jan. 16-20.....	7,680	--	10.68	4.93	50.15	1.88	1.21	62.61	--	.06	--	4,070	5.54	42,570	76	18	6,620	7.3
Jan. 21-22, 26....	5,210	--	9.98	4.93	44.76	2.38	2.52	54.71	--	.06	--	3,780	5.14	26,810	75	16	6,140	7.7
Jan. 23-25.....	5,740	--	8.78	4.28	35.52	2.59	2.31	43.71	--	.07	--	3,140	4.27	24,550	73	14	5,080	7.6
Jan. 27-31.....	5,890	--	14.87	6.41	69.50	2.70	2.02	86.02	--	.04	--	5,500	7.48	44,130	77	31	8,780	7.6
Feb. 1, 6.....	4,320	--	18.31	7.40	72.16	2.13	1.46	94.20	--	.08	--	6,290	8.55	36,960	74	20	10,500	7.2
Feb. 2, 7, 9-10...	6,830	--	13.17	5.67	53.52	2.06	1.23	69.10	--	.07	--	4,490	6.11	41,760	74	17	7,690	7.8
Feb. 3-5, 8.....	12,670	--	9.33	4.19	37.73	1.84	1.12	48.23	--	.06	--	3,100	4.22	53,480	74	15	5,520	7.3
Feb. 11-20.....	11,980	10	11.33	5.26	46.53	2.43	1.14	59.23	0.00	.04	0.30	3,960	5.39	64,580	73	16	6,550	7.5
Feb. 21-25, 27-28.	33,290	--	10.73	5.43	44.53	2.06	1.04	57.53	--	.06	--	3,830	5.21	173,600	73	16	6,250	7.4
Feb. 26, 29.....	17,410	--	6.29	3.29	25.25	1.57	.77	32.43	--	.06	--	2,170	2.95	51,440	72	12	3,770	7.2
Mar. 1.....	7,240	--	11.88	6.00	56.96	1.25	.71	72.76	--	.12	--	4,480	6.09	44,150	76	19	7,550	7.6
Mar. 2, 7.....	20,050	--	5.39	2.88	21.28	1.39	.60	27.50	--	.06	--	1,850	2.52	50,500	72	10	3,230	7.2
Mar. 3-4, 10.....	67,440	--	2.79	1.40	7.87	1.54	.58	9.87	--	.07	--	768	1.04	70,500	65	5.4	1,380	7.2
Mar. 5-6, 8-9.....	65,220	--	3.59	1.97	11.45	1.52	.62	14.81	--	.06	--	1,080	1.47	95,880	67	6.8	1,910	7.2
Mar. 11.....	30,740	--	2.15	.90	4.18	1.61	.69	4.88	--	.05	--	468	1.64	19,590	58	3.4	789	7.7
Mar. 12-13.....	43,600	--	3.99	1.89	13.28	1.49	.56	17.06	--	.05	--	1,220	1.66	72,400	69	7.7	2,130	7.2
Mar. 14-20.....	72,040	--	2.60	1.40	6.78	1.61	.73	8.40	--	.04	--	679	.92	66,590	63	4.8	1,210	7.2
Mar. 21.....	9,760	--	3.69	2.14	9.87	1.97	1.31	12.35	--	.07	--	992	1.35	13,180	63	5.8	1,760	8.2
Mar. 22, 25-29, 31	33,440	--	4.89	2.55	14.94	2.41	1.42	16.47	--	.08	--	1,410	1.92	64,190	67	7.8	2,430	7.6
Mar. 23-24, 30....	15,670	--	6.64	3.29	23.21	2.28	1.44	29.33	--	.09	--	2,070	2.82	44,150	70	10	3,520	7.5

ARKANSAS RIVER BASIN--Continued
CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Apr. 1-2, 6, 1952	24,280	--	3.69	1.89	12.14	1.64	0.94	15.09	--	0.05	--	1,150	1.56	38,010	69	1,970	7.5	
Apr. 3, 7-8,	17,400	--	6.54	3.12	24.55	1.59	.98	31.59	--	.05	--	2,330	3.17	55,170	72	3,800	7.5	
Apr. 4-5,	17,950	--	4.19	2.22	14.73	1.49	.85	18.76	--	.04	--	1,460	1.99	35,680	70	2,370	7.7	
Apr. 9-10,	7,120	--	8.33	4.52	34.89	1.66	1.17	44.84	--	.07	--	3,310	4.50	32,080	73	5,030	7.3	
Apr. 11, 16,	25,310	--	5.69	2.88	22.39	1.39	.75	28.77	--	.05	--	2,130	2.90	73,380	72	3,400	7.5	
Apr. 12, 15, 17, 20	74,880	--	2.74	1.32	8.90	1.28	.50	11.14	--	.05	--	874	1.19	89,080	69	1,470	7.5	
Apr. 13,	45,020	--	1.70	.64	3.22	1.26	.33	3.92	--	.04	--	399	.54	24,450	58	649	7.9	
Apr. 14, 18-19, ..	50,240	--	3.39	1.81	13.56	1.52	.56	16.64	--	.04	--	1,190	1.62	81,390	72	1,930	7.3	
Apr. 21-22, 26, 30	178,600	--	2.76	1.32	6.39	1.72	.64	8.12	--	.02	--	714	.97	173,500	61	1,220	7.4	
Apr. 23-24, 26, ..	187,600	--	1.80	.74	2.85	1.46	.29	3.61	--	.03	--	380	.52	97,060	53	602	7.7	
Apr. 25, 27,	60,710	--	2.00	.82	4.02	1.44	.42	4.96	--	.02	--	495	.67	40,910	59	967	7.3	
May 1-2,	23,190	--	3.29	1.73	8.48	2.05	.98	10.44	--	.03	--	848	1.15	26,770	63	1,480	8.0	
May 3, 5, 7-10, ..	30,600	--	6.39	3.29	20.21	2.87	1.81	25.38	--	.03	--	1,930	2.62	80,410	68	3,220	7.9	
May 4,	7,240	--	4.69	2.38	13.52	2.33	1.58	16.64	--	.04	--	1,330	1.81	13,110	66	2,200	8.1	
May 6,	5,450	--	7.64	3.86	26.68	2.50	1.50	34.13	--	.05	--	2,470	3.36	18,340	70	4,000	8.3	
May 11-13, 16-20	40,220	--	6.14	3.45	20.41	2.74	1.83	25.38	--	.05	--	1,980	2.69	106,400	68	3,220	8.0	
May 14-15,	4,560	--	7.09	4.03	25.40	2.82	2.06	31.59	--	.05	--	2,460	3.35	15,280	70	3,890	8.1	
May 21,	11,540	--	6.29	3.12	23.93	1.97	.83	30.46	--	.08	--	2,500	3.40	39,200	72	3,560	7.8	
May 22-25,	54,490	--	4.29	2.30	13.44	2.49	.94	16.50	--	.10	--	1,130	1.54	83,810	67	2,190	7.8	
May 26, 31,	43,800	--	3.34	1.64	9.05	2.13	.83	11.00	--	.07	--	890	1.21	53,060	65	1,560	7.8	
May 27-30,	72,580	--	2.34	1.07	5.18	1.90	.56	6.06	--	.07	--	548	.75	54,140	60	954	7.8	
June 1, 7-9,	39,950	--	2.60	1.40	7.37	1.79	.44	9.08	--	.06	--	738	1.00	40,130	65	1,280	7.6	
June 2, 5-6,	40,280	--	2.10	1.23	5.46	1.82	.38	6.54	--	.05	--	561	.76	30,760	62	988	7.6	
June 3,	22,410	--	4.54	2.22	14.39	1.87	.46	18.75	--	.07	--	1,390	1.89	42,410	68	2,390	8.1	
June 4, 10,	19,120	--	3.29	1.73	9.52	1.57	.48	12.41	--	.08	--	970	1.32	25,250	65	1,650	7.5	
June 11-12,	5,450	--	3.99	2.14	13.31	1.93	.83	16.64	--	.04	--	1,300	1.77	9,650	68	2,120	7.9	
June 13-14,	3,930	--	5.39	3.12	20.41	2.10	.69	28.09	--	.04	--	1,920	2.61	10,270	71	3,190	8.0	
June 15-16,	2,910	--	6.74	4.19	27.61	2.13	.83	35.54	--	.04	--	2,600	3.54	10,300	72	4,110	7.6	
June 17-18,	2,330	--	7.14	4.93	31.10	2.26	.85	40.61	--	.05	--	3,060	4.16	9,720	71	4,760	7.9	
June 19-20,	1,820	--	8.83	4.93	34.31	2.62	.87	44.56	--	.02	--	3,380	4.60	8,390	71	5,230	8.0	
June 21-30,	5,160	13	10.38	5.43	41.87	2.80	.96	55.28	0.00	--	0.39	3,880	5.28	27,260	72	6,160	8.1	

July 1-8	3,440	--	11.08	6.00	47.48	2.92	1.00	60.64	--	--	--	4,140	5.63	19,380	74	16	6,630	8.0
July 9-10	865	--	8.63	5.02	34.99	2.97	.83	44.84	--	--	--	3,290	4.47	3,870	72	13	5,240	7.6
July 11, 17, 19	7,710	--	8.98	5.02	38.77	2.26	.87	49.64	--	--	--	3,690	5.02	38,740	73	15	3,690	7.9
July 12-16	2,430	--	12.92	6.41	55.65	2.74	1.17	71.07	--	--	--	5,150	7.00	17,010	74	18	7,560	7.8
July 18	5,470	--	23.00	10.44	108.48	1.62	.98	139.32	--	--	--	9,730	13.23	72,510	76	27	13,600	8.1
July 20	4,600	--	5.09	2.63	21.73	1.74	.81	26.79	0.11	--	--	2,000	2.72	12,530	74	11	3,120	8.1
July 21	3,970	--	10.13	4.93	45.66	1.41	.65	58.66	--	--	--	3,700	5.03	19,980	75	17	6,360	8.2
July 22	2,860	--	8.53	4.11	35.69	1.95	.69	45.69	--	--	--	3,040	4.13	11,820	74	14	5,250	8.3
July 23-24	5,280	--	5.44	2.88	21.29	2.05	.69	26.79	--	--	--	1,860	2.53	13,360	72	10	3,240	8.3
July 25, 31	3,870	--	4.09	2.55	14.00	2.60	.65	17.34	.05	--	--	1,310	1.78	6,900	68	7	2,270	8.3
July 26-28	6,420	--	2.50	1.56	8.25	1.93	.40	9.93	.05	--	--	.779	1.06	6,810	67	5.8	1,380	8.1
July 29-30	2,150	--	3.09	1.89	10.37	1.92	.42	12.97	.04	--	--	.948	1.29	2,770	68	6.8	1,880	8.1
Aug. 1, 8	1,430	--	4.39	2.30	16.05	1.88	.50	20.31	--	--	--	1,450	1.97	2,820	71	8.8	2,480	8.2
Aug. 2-4, 7	2,600	--	5.39	2.88	21.36	1.88	.58	27.13	.05	--	--	1,850	2.52	6,560	72	10	3,290	7.6
Aug. 5-6, 9-10	3,490	--	6.24	3.37	24.35	1.75	.62	31.59	.04	--	--	2,190	2.98	10,410	72	11	3,710	7.9
Aug. 11-13	2,030	--	6.44	3.62	30.10	1.66	.71	37.79	--	--	--	2,620	3.56	7,250	75	13	4,330	8.0
Aug. 14, 16-19	2,780	--	9.23	4.28	39.76	1.75	.75	50.77	--	--	--	3,490	4.75	13,190	75	15	5,650	7.9
Aug. 15, 20	916	--	8.03	4.03	33.94	1.92	.65	43.43	--	--	--	3,090	4.20	3,850	74	14	4,930	8.0
Aug. 21-23, 27	1,520	--	10.33	5.18	43.44	2.36	.75	55.84	--	--	--	3,710	5.05	7,670	74	16	6,130	8.2
Aug. 24-26, 31	1,050	--	8.48	4.36	35.30	2.72	.58	44.84	--	--	--	3,110	4.23	4,450	73	14	5,070	8.0
Aug. 28	397	--	5.79	2.96	22.00	2.00	.52	28.20	.03	--	--	1,980	2.69	1,070	72	10	3,340	8.3
Aug. 29-30	565	--	7.34	4.11	28.01	2.52	.56	36.38	--	--	--	2,590	3.52	1,990	71	12	4,210	8.0
Sept. 1-10	1,330	12	9.38	4.85	35.35 0.38	3.02	.65	46.54	0.02	--	--	3,050	4.15	5,530	71	13	5,130	8.1
Sept. 11-20	841	13	9.43	4.61	34.44 .41	3.28	.58	44.56	.01	--	--	3,010	4.09	3,450	70	13	5,090	8.0
Sept. 21-22, 26	899	--	7.34	3.78	26.82	2.43	.54	34.97	--	--	--	2,350	3.20	2,870	71	11	4,020	8.1

RED RIVER BASIN

RED RIVER AT DENISON DAM NEAR DENISON, TEX.

LOCATION.--Immediately below dam on Red River, 1½ miles upstream from Shawnee Creek 1½ miles upstream from Sand Creek, 4 miles northwest of Denison, Grayson County, and 3 miles upstream from gaging station near Colbert, Bryan County, Okla.

DRAINAGE AREA.--38,290 square miles above dam, 38,330 square miles above gaging station.

RECORDS AVAILABLE.--Chemical analyses: May 1944 to September 1952.

Water temperatures: October 1945 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,540 micromhos Aug. 14, 16-18; minimum daily, 1,150 micromhos on several days in October.

Percent sodium: Maximum, 54 Oct. 1-31, July 1-31, Aug. 1-31; minimum, 50 Dec. 1-31.

EXTREMES, 1944-52.--Specific conductance (1950-52): Maximum daily, 1,740 micromhos May 31, 1951; minimum daily, 1,150 micromhos on several days in October 1951.

Percent sodium: Maximum, 59 July 3-10, 1944; minimum, 31 Nov. 1-10, 1945.

REMARKS.--Values reported for dissolved solids concentrations are residue on evaporation. Records of specific conductance of daily samples available in district office at Austin, Tex. Discharge records for gaging station near Colbert, Okla., for water year October 1951 to September 1952 given in Water-Supply Paper 1241. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Oct. 1-31, 1951..	113,200	11	3.39	1.89	6.27	2.21	2.21	3.33	5.98	0.03		722	0.98	110,900	54	3.9	1,180	7.8
Nov. 1-30.....	98,770	12	3.94	2.06	6.14	2.26	2.26	3.66	8.20	.02		739	1.01	99,760	51	3.5	1,200	8.1
Dec. 1-31.....	111,600	13	3.99	2.06	6.15	2.26	2.26	3.48	6.43	.03		750	1.02	113,800	50	3.6	1,230	8.1
Jan. 1-31, 1952..	163,200	10	3.59	2.22	6.28	2.28	2.28	3.54	6.26	.01		751	1.02	166,500	52	3.7	1,240	8.0
Feb. 1-29.....	105,700	11	4.19	1.97	6.93	2.29	2.29	3.75	8.99	.06		808	1.10	116,300	53	3.9	1,300	7.7
Mar. 1-31.....	116,500	8.0	4.29	2.06	6.83	2.29	2.29	3.83	6.99	.07		834	1.13	131,600	52	3.8	1,340	7.8
Apr. 1-30.....	180,300	9.8	4.90	2.06	6.96	2.33	2.33	3.85	6.91	.02		824	1.12	201,900	53	4.0	1,370	7.9
May 1-31.....	151,300	9.2	4.19	2.22	6.83	2.38	2.38	3.93	6.91	.02		835	1.14	172,500	52	3.8	1,390	7.9
June 1-30.....	169,200	7.6	4.49	2.14	7.30	2.43	2.43	4.06	7.39	.05		884	1.20	203,000	52	4.0	1,510	8.1
July 1-31.....	166,500	8.0	4.54	2.22	7.88	2.41	2.41	4.18	7.81	.24		882	1.21	201,500	54	4.3	1,530	8.0

RED RIVER BASIN--Continued
RED RIVER AT DENISON DAM NEAR DENISON, TEX.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids			Per cent sodium	So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)		Ni-trate (NO ₃)	Parts per mil-lion	Tons per acre-foot				
Aug. 1-31, 1952 ..	193,100	8.2	4.44	2.22	7.95	2.38	4.16	8.04		0.03		894	1.22	235,600	54	4.3	1,530	7.9
Sept. 1-30,	100,700	10	4.49	2.30	7.76	2.36	4.12	8.04		.03		909	1.17	117,800	53	4.2	1,480	8.0
Total or weighted average..	1,670,070	9.5	4.14	2.14	7.00	2.33	3.85	7.05		0.03		827	1.12	1,880,000	53	3.9	1,380	--

RED RIVER BASIN
WASHITA RIVER NEAR TABLER, OKLA.

LOCATION.--At gaging station at bridge on county highway, 1 mile downstream from Little Washita River, 7½ miles upstream from Winter Creek, and 5 miles south of Tabler, Grady County.

DRAINAGE AREA.--4,760 square miles.

RECORDS AVAILABLE.--Chemical analyses: September 1946 to September 1952.

Water temperatures: September 1946 to September 1952.

EXTREMES 1951-52.--Specific conductance: Maximum daily, 1,980 micromhos Nov. 9; minimum daily, 439 micromhos June 1.

Percent sodium: Maximum, 30 July 11-15, 17; minimum, 9 Apr. 30.

EXTREMES 1946-52.--Specific conductance: Maximum daily, 2,360 micromhos Feb. 26-27, 1947; minimum daily, 238 micromhos July 20, 1950.

Percent sodium: Maximum, 35 Oct. 21-29, 1948; minimum, 1 Aug. 16, 1950, May 17-20, 24-25, 1951.

REMARKS.--Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1241.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons			
Oct. 1-6, 1951....	1,350	--	6.79	4.03	2.16	3.93	7.35	1.66	--	0.04	--	830	1.13	1,520	17	0.9	1,140	7.9
Oct. 7-10.....	893	--	7.98	4.19	3.84	4.52	8.62	2.82	--	.05	--	1,000	1.36	1,220	24	1.6	1,380	7.9
Oct. 11-20.....	2,100	19	8.73	4.44	4.00	0.25	4.76	2.96	0.03	.05	0.98	1,060	1.44	3,030	23	1.6	1,460	8.1
Oct. 21-24, 29, 31	1,310	--	9.38	4.85	4.01	4.87	9.83	3.50	--	.04	--	1,160	1.58	2,070	22	1.5	1,580	7.8
Oct. 25-28, 30....	950	--	8.43	4.44	3.06	4.74	8.66	2.48	--	.04	--	1,010	1.37	1,310	19	1.2	1,370	7.8
Nov. 1-6.....	1,820	--	8.88	3.54	4.73	4.67	9.06	3.38	--	.04	--	1,060	1.44	2,630	26	1.9	1,500	8.2
Nov. 7-10.....	988	--	11.03	4.52	6.36	4.97	11.97	4.91	--	.06	--	1,380	1.88	1,860	29	2.3	1,900	8.2
Nov. 11-20.....	2,270	18	10.03	4.28	3.57	.23	5.26	9.39	3.13	.03	.05	1.37	1,100	3,400	20	1.3	1,510	8.2
Nov. 21-30.....	3,320	21	10.43	4.36	3.96	.12	5.54	9.64	3.58	.03	.04	1.16	1,160	5,250	21	1.5	1,610	8.2
Dec. 1-10.....	3,320	--	10.58	4.60	4.03	5.29	10.41	3.47	--	.04	--	1,220	1.66	5,510	21	1.5	1,640	7.9
Dec. 11-20.....	2,630	18	9.93	4.03	3.65	.09	5.39	9.18	3.10	.02	.05	.18	1,130	4,040	21	1.4	1,510	8.2
Dec. 21-31.....	3,020	--	10.78	4.52	3.84	5.51	10.10	3.47	--	.06	--	1,220	1.66	5,020	20	1.4	1,640	7.9
Jan. 1-10, 1952...	3,540	21	10.63	4.28	3.96	.08	5.49	9.93	3.33	.02	.06	.33	1,200	5,790	21	1.5	1,610	8.0
Jan. 11-20.....	3,940	--	10.48	3.86	4.35	5.20	10.20	3.24	--	.05	--	1,180	1.60	6,330	23	1.6	1,600	7.8
Jan. 21-31.....	4,120	18	10.73	4.19	3.83	.07	5.29	10.33	3.05	.02	.03	.31	1,190	6,670	20	1.4	1,600	7.9
Feb. 1-10.....	3,290	--	10.38	4.60	3.61	5.03	10.26	3.27	--	.03	--	1,200	1.63	5,370	19	1.3	1,610	7.7
Feb. 11-20.....	3,960	17	10.38	4.28	3.87	.07	4.98	10.39	3.02	.02	.03	.29	1,180	6,630	21	1.4	1,580	7.9
Feb. 21-29.....	3,900	16	10.43	4.28	3.65	.08	4.92	10.39	3.07	.02	.02	.32	1,180	6,270	20	1.3	1,570	7.9

RED RIVER BASIN--Continued
WASHITA RIVER NEAR TABLER, OKLA.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million							Dissolved solids			Per- cent so- dium	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH			
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm					Parts per mil- lion	Tons per acre- foot	Total tons
Mar. 1-10, 1952...	4,420	19	10.28	3.86	3.61	0.08	4.84	10.35	2.88	0.03	0.03	0.32	1,160	1.58	6,980	20	1.4	1,520	8.1
Mar. 11-20.....	5,310	--	9.48	4.11	3.44		4.64	9.93	2.42	--	.04	--	1,110	1.51	8,030	20	1.3	1,460	8.0
Mar. 21-31.....	5,050	18	10.33	4.19	3.39	.09	4.70	10.70	2.60	.02	.03	.26	1,200	1.63	8,250	19	1.3	1,530	8.1
Apr. 1-10.....	3,590	--	9.43	3.86		4.16	4.02	10.53	2.88	--	.02	--	1,160	1.58	5,670	24	1.6	1,520	8.1
Apr. 11-19.....	3,520	--	9.58	4.28	3.69		4.39	10.26	2.88	--	.02	--	1,150	1.56	5,510	21	1.4	1,540	8.0
Apr. 20, 26-29...	6,310	--	5.69	2.47	1.57		2.51	6.22	.93	--	.07	--	663	.90	5,690	16	.8	896	7.7
Apr. 21, 25.....	3,110	--	6.64	3.62	2.51		3.74	7.60	1.35	--	.08	--	829	1.13	3,510	20	1.1	1,20	8.2
Apr. 22-24.....	1,690	--	10.13	4.60	3.07		4.31	11.26	2.20	--	.03	--	1,170	1.59	2,690	17	1.1	1,520	8.0
Apr. 30.....	2,160	--	2.79	1.81		.45	2.41	1.98	.51	--	.15	--	365	.50	1,070	9	.3	544	7.9
May 1-3.....	3,740	--	6.19	2.63	1.80		2.56	6.97	1.02	--	.07	--	704	.96	3,580	17	.9	961	7.9
May 4-10.....	4,060	--	8.48	3.62	3.09		3.59	9.26	2.28	--	.06	--	1,010	1.37	5,580	20	1.3	1,340	7.9
May 11-16, 20...	3,040	--	9.13	4.11	2.53		3.90	9.91	2.20	--	.06	--	1,050	1.43	4,350	18	1.1	1,400	8.0
May 17, 19.....	4,890	--	5.39	2.30	1.81		2.21	6.10	1.13	--	.06	--	608	.83	4,040	19	.9	879	7.7
May 18.....	5,490	--	4.29	1.56	1.44		1.82	4.93	.45	--	.09	--	481	.65	3,600	20	.8	614	8.0
May 21-22, 25...	7,030	--	6.54	2.30	2.35		2.43	7.41	1.30	--	.05	--	748	1.02	7,160	21	1.1	1,020	7.8
May 23, 26, 30-31.	10,880	--	4.59	1.81	1.51		2.56	4.48	.82	--	.05	--	508	.69	7,520	19	.8	1,745	7.6
May 24, 27-28...	14,720	--	3.69	1.23	1.01		2.13	3.29	.45	--	.06	--	367	.50	7,350	17	.6	570	7.6
June 1.....	8,510	--	2.70	1.23		.64	2.02	2.16	.28	--	.11	--	304	.41	3,520	14	.5	439	8.3
June 2-3.....	3,530	--	6.14	1.81	1.54		2.44	6.37	.59	--	.09	--	655	.89	3,150	16	.8	836	8.5
June 4-10.....	6,320	--	6.59	2.80	2.42		2.77	7.41	1.58	--	.05	--	792	1.08	6,820	20	1.1	1,060	8.5
June 11-20.....	4,070	--	8.23	3.86	3.47		3.53	9.72	2.28	--	.03	--	1,050	1.43	5,820	22	1.4	1,350	8.3
June 21-30.....	1,930	--	8.33	4.28	4.41		4.24	9.85	2.90	--	.03	--	1,120	1.52	2,940	26	1.8	1,470	8.4
July 1-10.....	1,270	26	7.78	4.36	4.13	.14	3.29	10.51	3.10	.03	.60	.60	1,140	1.55	1,970	25	1.7	1,480	8.0
July 11-15, 17...	2,660	--	7.63	4.77	5.37		3.74	10.89	3.10	--	.04	--	1,160	1.58	4,200	30	2.2	1,520	8.0
July 16, 18-20...	2,420	--	6.39	2.22	2.53		2.79	6.72	1.58	--	.05	--	1,724	.98	2,380	23	1.2	988	8.0
July 21-31.....	1,530	22	6.39	2.30	2.35	.13	3.31	6.06	1.92	.02	.03	.53	710	.97	1,480	21	1.1	1,040	7.9
Aug. 1-10.....	936	--	7.44	4.77	4.64		3.64	10.01	3.16	--	.04	--	1,110	1.51	1,410	28	1.9	1,490	8.4
Aug. 11-20.....	686	--	7.39	5.18	5.22		4.08	10.33	3.33	--	.05	--	1,160	1.58	1,080	29	2.1	1,550	8.5
Aug. 21-31.....	430	--	6.59	5.43	5.09		4.52	9.49	3.05	--	.05	--	1,080	1.47	633	30	2.1	1,500	8.0

Sept. 1-10.....	268	--	6.29	6.00	4.44	5.47	8.86	2.59	--	.01	--	1,070	1.46	390	27	1.8	1,480	8.0
Sept. 11-20.....	41	8.0	6.54	6.17	4.83	6.07	8.37	2.59	0.02	.01	0.65	1,060	1.44	59	27	1.9	1,490	8.4
Sept. 21-27.....	14	--	6.34	6.50	4.73	5.59	9.66	2.31	--	.01	--	1,140	1.55	22	27	1.9	1,560	8.0
Sept. 28-30.....	6.0	--	4.69	5.76	1.28	6.23	4.62	.87	--	.01	--	706	.96	5.7	11	.6	1,140	7.8
Total or weighted average..	170,300	--	7.39	3.12	2.78	3.61	7.70	1.95	--	0.05	--	863	1.17	200,100	21	1.2	1,170	--

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 1952.

Water temperatures: October 1947 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 517 micromhos Nov. 14; minimum daily, 60.0 micromhos Apr. 25.

Percent sodium: Maximum, 77 Nov. 1-15, 21-25; minimum, 52 May 11-19.

EXTREMES, 1945-46, 1947-52.--Specific conductance (1950-52): Maximum daily, 663 micromhos June 22, 1951; minimum daily, 60.0 micromhos Apr. 25, 1952.

Percent sodium: Maximum, 86 Dec. 26-27, 1948; minimum, 27 June 3-7, 10, 1946.

REMARKS.--Values reported for dissolved solids are residue on evaporation unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons			
Oct. 1-2, 6-15, 19, 21, 1951	28,850	17	0.33	0.20	1.01	0.51	0.13	0.87		0.03		114	0.16	4,620	66	1.9	163	6.9
Oct. 3-5, 16-18, 20, 22-31	28,070	16	.40	.22	1.48	.49	.19	1.38		.04		138	.19	5,330	70	2.7	238	6.8
Nov. 1-15, 21-25	38,860	16	.60	.36	3.28	.70	.31	3.22		.01		258	.35	13,600	77	4.8	472	6.8
Nov. 16-20, 26-30	20,810	16	.47	.29	1.90	.56	.25	1.83		.02		168	.23	4,790	71	3.1	312	6.7
Dec. 1-10	27,610	17	.49	.32	2.31	.49	.27	2.34		.02		201	.27	7,450	74	3.6	355	7.4
Dec. 11-14, 18	41,590	13	.44	.30	1.78	.29	.31	1.89		.03		179	.24	9,980	71	3.0	289	6.9
Dec. 15-17, 19-31	121,000	9.4	--	--	.86	.20	.23	.73		.02		100	.14	16,940	73	2.2	129	6.9
Jan. 1-10, 1952 ..	62,160	15	.31	.29	1.25	.25	.37	1.21		.02		132	.18	11,190	68	2.2	207	6.5
Jan. 11-20	44,470	18	.43	.35	1.86	.33	.37	1.92		.02		183	.25	11,120	70	3.0	310	6.6
Jan. 21-31	60,460	19	.48	.37	2.17	.31	.42	2.26		.03		201	.27	16,320	72	3.4	350	6.4

a Sum of determined constituents.

Feb. 1-3, 6-8.	224, 200	16	.39	.35	1.95	.26	.46	1.95	.02	179	.24	53,810	72	3.3	295	6.3
15-16,																
Feb. 4-5, 13-14,	160, 300	8.8	.16	.23	.60	.16	.25	.56	.02	a67	.09	14,430	61	1.4	109	6.2
17, 19-20,																
Feb. 9-12, 18,																
21-29,	351, 300	12	.32	.28	.98	.20	.40	.96	.02	109	.15	52,700	62	1.8	176	6.4
Mar. 1-10,	207, 100	14	.40	.35	1.32	.26	.56	1.21	.04	137	.19	39,350	64	2.1	228	6.7
Mar. 11-15, 26-31	185, 600	14	.44	.35	1.22	.29	.54	1.16	.02	144	.20	37,120	61	1.9	234	6.6
Mar. 16-25,	253, 800	11	.33	.32	.87	.23	.42	.85	.02	106	.14	35,530	57	1.5	172	6.4
Apr. 1-10,	119, 500	16	.48	.39	1.27	.34	.52	1.24	.04	149	.20	23,900	60	2.0	246	6.9
Apr. 11-21,	265, 300	10	.27	.24	.77	.23	.33	.68	.04	94	.13	34,490	60	1.6	139	6.4
Apr. 22-30,	620, 800	6.4	.15	.16	.45	.16	.23	.34	.03	59	.08	49,660	59	1.1	81.5	6.2
May 1-10,	363, 000	11	.31	.25	.76	.29	.35	.65	.03	99	.13	47,190	57	1.4	151	6.3
May 11-19,	216, 200	12	.40	.30	.76	.51	.29	.62	.04	103	.14	30,270	52	1.4	160	6.8
May 20-31,	394, 700	9.0	.25	.20	.70	.25	.23	.62	.05	80	.11	43,420	61	1.5	128	6.4
June 1-22,	459, 600	15	.60	.31	1.12	.77	.33	.90	.03	134	.18	82,730	55	1.6	220	7.4
June 23-30,	52, 940	19	.60	.36	1.27	.85	.31	1.04	.03	151	.21	11,120	57	1.9	243	7.4
July 1-11, 13,	39, 510	23	.60	.38	1.42	.95	.29	1.13	.03	a157	.21	8,300	59	2.0	264	7.5
July 12, 14, 16,																
23-24, 26-27, 30	52, 740	20	.36	.26	1.12	.62	.25	.85	.02	a119	.16	8,440	64	2.0	187	7.4
July 15, 17-22, 25,																
28-29, 31,	113, 600	14	.23	.16	.70	.34	.16	.56	.03	82	.11	12,500	64	1.6	119	7.0
Aug. 1-10,	36, 500	20	.41	.27	1.04	.62	.18	.87	.05	a117	.16	5,840	60	1.7	197	7.1
Aug. 11-20,	22, 320	20	.45	.32	1.39	.79	.17	1.18	.02	144	.20	4,460	64	2.3	227	7.7
Aug. 21-31,	15,480	23	.50	.35	1.66	.85	.17	1.47	.02	165	.22	3,410	66	2.6	268	7.7

a Sum of determined constituents.

SABINE RIVER BASIN--Continued
SABINE RIVER NEAR RULIFF, TEX.--Continued

Chemical analyses, water year October 1951 to September 1952.--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Sept. 1-10, 1952	10,500	24	0.48	0.30	1.50	0.80	0.14	1.33		0.01		165	0.22	2,310	66	2.4	268	7.6	
Sept. 11-20	9,310	24	.44	.29	1.53	.75	.13	1.35		.03		162	.22	2,050	68	2.5	258	7.5	
Sept. 21-30	9,000	22	.38	.24	1.40	.70	.11	1.18		.03		148	.20	1,800	69	2.5	227	7.3	
Total or weighted average	4,657,000	12	0.34	0.26	1.00	0.34	0.33	0.90		0.03		112	0.15	710,000	62	1.8	178	--	

NECHES RIVER BASIN
NECHES RIVER AT EVADALE, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 96, 200 feet upstream from Gulf, Colorado & Santa Fe Railway bridge at Evadale, Jasper County, 600 feet downstream from Mill Creek, 15 miles upstream from Village Creek, and at mile 55.
DRAINAGE AREA.--7,908 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1952.

Water temperatures: October 1947 to September 1952.
EXTREMS, 1951-52.--Specific conductance: Maximum daily, 342 micromhos Jan. 1; minimum daily, 75.9 micromhos Apr. 24-25.

Percent sodium: Maximum, 68 Dec. 1-20; minimum, 44 July 1-10.
EXTREMS, 1947-52.--Specific conductance (1950-52): Maximum daily, 370 micromhos Aug. 29, 1951; minimum daily, 53.7 micromhos Sept. 23, 1951.

Percent sodium: Maximum, 74 Dec. 21-31, 1948; minimum, 14 June 4-18, 1950.

REMARKS.--Values reported for dissolved solids are residue on evaporation unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25° C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm.	Parts per million						
													Per- cent sodium	Total tons	Tons per acre- foot				
Oct. 1-10, 1951.....	17,850	17	0.60	0.45	0.86	0.75	0.27	0.85	0.02	0.02		141	0.19		3,390	45	1.2	208	7.3
Oct. 11-20	6,830	20	.65	.53	1.20	.97	.33	1.04	.02	.02		173	.24		1,640	50	1.6	261	7.4
Oct. 21-31	7,680	20	.85	.32	1.55	.85	.33	1.21	.01	.02		159	.22		1,690	64	2.4	255	7.7
Nov. 1-10	6,810	21	.55	.37	1.60	.85	.42	1.21	.01	.03		166	.23		1,570	64	2.4	263	7.6
Nov. 11-20	7,440	21	.60	.39	1.72	.75	.38	1.55	.01	.02		175	.24		1,790	63	2.4	264	7.6
Nov. 21-30	6,800	22	.55	.30	1.74	.80	.42	1.35	.01	.01		172	.23		1,560	67	2.6	276	7.5
Dec. 1-10	13,730	20	.55	.31	1.83	.77	.46	1.44	.01	.01		180	.24		3,300	68	2.7	290	7.6
Dec. 11-20	39,610	17	.41	.28	1.47	.46	.42	1.24	.02	.02		143	.19		7,530	68	2.6	233	7.2
Dec. 21-31	30,900	19	.42	.32	1.52	.36	.46	1.41	.01	.02		155	.21		6,490	67	2.5	260	7.0
Jan. 1-10, 1952	37,860	18	.42	.33	1.53	.31	.50	1.44	.02	.01		156	.21		7,950	67	2.4	258	6.9
Jan. 11-20	26,560	19	.42	.31	1.16	.34	.46	1.07	.01	.01		139	.19		5,050	61	2.0	223	6.9
Jan. 21-31	37,380	19	.43	.35	1.43	.23	.50	1.44	.02	.02		156	.21		7,650	65	2.2	266	7.1
Feb. 1-2, 4-8	107,400	10	.21	.22	.65	.21	.35	.51	--	.01		85	.12		12,890	60	1.4	112	6.4
Feb. 9, 9-20	113,800	16	.44	.36	1.29	.29	.56	1.21	.02	.01		146	.20		22,760	62	2.1	231	6.5
Feb. 21-29	102,000	17	.42	.37	1.31	.29	.62	1.16	.02	.01		148	.20		20,400	62	2.1	235	6.5

a Sum of determined constituents.

NECHES RIVER BASIN--Continued
NECHES RIVER AT EVADALE, TEX.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per cent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1952.	143,900	16	0.40	0.35	1.13	0.28	0.67	0.90	0.01	0.02		138	0.19	27,340	60	1.8	197	6.6	
Mar. 11-20.....	85,210	16	.42	.35	1.08	.28	.67	.87	.01	.02		138	.19	16,190	58	1.8	209	6.6	
Mar. 21-31.....	201,400	14	.39	.30	.97	.28	.60	.76	.01	.01		120	.16	32,220	58	1.6	177	6.6	
Apr. 1-10.....	115,200	15	.50	.39	1.09	.36	.67	.93	.01	.01		138	.19	21,890	55	1.7	216	6.7	
Apr. 11-19.....	165,400	14	.42	.35	.97	.38	.54	.79	.01	.02		120	.16	26,460	56	1.6	185	6.8	
Apr. 20-30.....	263,900	10	.25	.22	.62	.29	.35	.42	.01	.02		78	.11	29,030	57	1.3	111	6.7	
May 1-10.....	249,200	14	.30	.25	.83	.34	.42	.59	.00	.03		96	.13	32,400	60	1.6	140	6.8	
May 11-20.....	135,600	17	.37	.34	1.03	.43	.46	.82	.01	.02		a118	.16	21,700	59	1.7	184	6.9	
May 21-31.....	318,900	13	.29	.26	.56	.33	.35	.40	.01	.02		82	.11	35,080	50	1.1	110	6.4	
June 1-10.....	195,500	15	.27	.24	.65	.39	.33	.40	.01	.03		88	.12	23,460	56	1.3	124	7.1	
June 11-20.....	57,440	18	.42	.35	1.05	.49	.44	.82	.01	.06		a123	.17	9,760	58	1.6	193	7.3	
June 21-30.....	34,430	18	.47	.37	1.19	.59	.42	.99	.01	.02		a133	.16	6,200	58	1.8	220	7.3	
July 1-10.....	29,790	21	.90	.44	1.04	.72	.44	1.16	.02	.02		a155	.21	6,260	44	1.2	246	7.1	
July 11-20.....	28,920	19	.77	.41	1.04	.75	.42	1.02	.02	.01		a143	.19	5,490	47	1.3	230	7.0	
July 21-31.....	23,010	18	.61	.38	1.04	.75	.31	.93	.02	.02		a131	.18	4,140	51	1.4	220	7.1	
Aug. 1-10.....	28,400	21	.60	.40	1.23	.87	.27	1.07	.01	.02		159	.22	6,250	55	1.7	248	7.5	
Aug. 11-20.....	23,170	22	.60	.40	1.36	.92	.25	1.16	.01	.03		165	.22	5,100	57	2.0	256	7.5	
Aug. 21-31.....	15,710	22	.60	.42	1.40	.90	.27	1.21	.01	.04		165	.22	3,460	58	2.0	266	7.4	
Sept. 1-10.....	11,380	25	.60	.43	1.47	1.02	.23	1.16	.02	.05		170	.23	2,620	59	2.1	274	7.4	
Sept. 11-20.....	5,310	28	.65	.42	1.33	1.20	.17	.99	.01	.03		167	.23	1,220	55	1.8	261	7.5	
Sept. 21-30.....	4,290	26	.65	.37	1.46	1.20	.16	1.07	.01	.04		165	.22	.944	59	2.1	262	7.5	
Total or weighted average	2,699,000	15	0.38	0.30	0.96	0.38	0.46	0.76	0.01	0.02		115	0.16	422,500	59	1.7	174	--	

a Sum of determined constituents.

a Sum of determined constituents.

SAN JACINTO RIVER BASIN

SAN JACINTO RIVER NEAR HUFFMAN, TEX.

LOCATION.--At Sheldon Pumping Plant of City of Houston, 5½ miles downstream from Huffman gaging station 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 (above gaging station).

RECORDS AVAILABLE.--Chemical analyses: October 1945 to July 1948, December 1948 to September 1952.

Water temperatures: January 1949 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 6,340 micromhos Nov. 23; minimum daily, 89.9 micromhos May 19.

Percent sodium: Maximum, 78 Dec. 1-2; minimum, 39 May 18-31, June 1-11.

EXTREMES, 1945-52.--Specific conductance (1950-52): Maximum daily, 6,340 micromhos Nov. 23, 1951; minimum daily, 89.9 micromhos May 19, 1952.

Percent sodium: Maximum, 79 Nov. 16, 18, 26, 1947; minimum, 18 June 3-10, 1950.

REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residue on evaporation unless noted otherwise and for concentrations more than 1,000 ppm are sum of determined constituents. Records of specific conductance of daily samples available in district office at Austin, Tex. During periods of extremely low flow and heavy pumping, salt-water intrusion from Galveston Bay occurs at this station. Some salt-water intrusion occurred during November 1951. Total acre feet reported for Huffman gaging station. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million							Dissolved solids				Percent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)		
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million				Tons per acre-foot	Total tons
Oct. 1-10, 1951..	2,670	19	0.85	0.43	3.98	1.03	0.12	4.09		0.02		336	0.46	1,230	76	5.0	577	7.7
Oct. 11-20	1,640	18	1.15	.47	4.78	1.21	.12	5.05		.02		401	.55	902	75	5.3	704	7.7
Oct. 21-31	2,240	17	1.10	.43	3.74	1.11	.10	4.03		.03		330	.45	1,010	71	4.2	593	7.6
Nov. 1-10	2,840	15	1.00	.44	3.71	1.10	.11	3.92		.02		318	.43	1,220	72	4.4	585	7.6
Nov. 11-15	1,190	14	.85	.40	3.66	.93	.19	3.78		.01		292	.40	1,476	75	4.7	545	7.4
Nov. 16-18	522	14	1.00	.99	5.93	.98	.62	6.29		.03		486	.66	345	75	5.9	873	7.6
Nov. 19-20	383	14	2.50	7.15	31.58	1.18	3.35	38.66		.04		2,380	3.24	1,180	77	14	4,520	7.5
Nov. 21-23, 28..	893	17	2.94	8.39	37.62	1.33	4.16	43.43		.03		2,820	3.84	3,200	77	16	5,240	7.5
Nov. 24-25, 29-30	936	18	1.80	3.54	18.02	1.16	1.73	20.45		.02		1,360	1.85	1,730	77	11	2,550	7.4
Nov. 26-27	440	22	1.45	2.14	11.38	1.15	1.08	12.69		.05		910	1.24	1,546	76	8.6	1,610	7.7
Dec. 1-2	500	26	1.80	3.70	19.02	1.18	1.87	21.43		.04		1,430	1.94	970	78	11	2,640	7.7
Dec. 3, 9-10	1,420	17	1.05	.38	3.72	.98	.21	3.95		.01		331	.45	639	72	4.4	575	7.5
Dec. 4-8	2,850	15	.80	.47	2.65	.85	.23	2.82		.02		256	.35	998	68	3.3	415	7.4

SAN JACINTO RIVER BASIN--Continued
SAN JACINTO RIVER NEAR HUFFMAN, TEX.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per million	Tons per acre-foot	Total tons				
Dec. 11-20, 1951.	3,960	18	1.15	0.43	3.40		1.08	0.16	3.72		0.02		316	0.43	1,700	68	3.8	528	7.4
Dec. 21-31,	3,230	20	1.15	.35	3.63		1.05	.12	3.95		.01		a308	.42	1,360	71	4.2	561	7.4
Jan. 1-10, 1952.	2,670	20	1.20	.35	3.50		1.07	.12	3.84		.02		a303	.41	1,090	69	4.0	555	7.6
Jan. 11-20,	2,510	18	1.20	.35	3.55		1.13	.10	3.86		.01		307	.42	1,050	70	4.1	566	7.5
Jan. 21-26,	1,460	16	1.50	.49	5.73		1.16	.19	6.35		.02		482	.66	964	74	5.7	859	7.3
Jan. 27-31,	3,400	16	1.05	.39	3.91		.98	.23	4.12		.02		327	.44	1,500	73	4.6	599	7.1
Feb. 1-9,	43,320	12	.80	.26	1.71		.72	.16	1.86		.03		186	.25	10,830	62	2.3	309	6.9
Feb. 10-21,	6,680	19	1.20	.40	2.65		1.05	.19	2.99		.02		274	.37	2,460	62	2.9	465	7.1
Feb. 22-29,	12,400	14	1.25	.31	1.75		1.11	.23	1.95		.02		209	.28	3,470	53	2.0	363	7.2
Mar. 1-10,	7,110	18	1.45	.31	2.16		1.25	.21	2.43		.03		255	.35	2,490	55	2.4	433	7.6
Mar. 11-15,	7,700	19	1.55	.20	2.26		1.33	.20	2.45		.03		281	.38	2,930	56	2.5	445	7.2
Mar. 16-22,	10,170	13	.95	.23	1.52		.98	.19	1.52		.03		176	.24	2,440	56	1.9	298	7.3
Mar. 23-31,	4,570	16	1.45	.37	2.29		1.25	.21	2.62		.03		288	.39	1,760	56	2.4	458	6.9
Apr. 1-11,	4,680	17	1.50	.38	3.06		1.29	.17	3.44		.04		327	.44	2,060	62	3.2	555	7.8
Apr. 12-15, 24-28,	202,300	6.4	.47	.25	.51		.48	.20	.51		.04		79	.11	22,250	41	.9	123	7.3
Apr. 16-23, 29-30,	51,520	12	.80	.21	1.11		.79	.16	1.13		.04		146	.20	10,300	52	1.6	232	7.5
May 1-10,	9,040	19	1.20	.35	1.43		1.03	.23	1.69		.03		201	.27	2,440	48	1.6	329	7.1
May 11-17,	3,320	22	1.45	.36	2.19		1.34	.20	2.45		.01		266	.36	1,200	55	2.3	445	6.6
May 18-31,	116,500	7.8	.55	.28	.53		.52	.12	.68		.04		101	.14	16,310	39	.8	146	6.9
June 1-11,	18,500	23	1.20	.43	1.04		1.11	.17	1.38		.01		187	.25	4,620	39	1.2	304	7.7
June 12-20,	5,390	24	1.45	.36	1.99		1.38	.16	2.23		.03		260	.35	1,890	52	2.1	414	7.6
June 21-30,	3,470	27	1.55	.45	2.46		1.47	.18	2.79		.02		297	.40	1,390	55	2.5	490	7.9
July 1-10,	3,510	22	1.25	.36	2.34		1.25	.13	2.54		.03		260	.35	1,230	59	2.6	446	7.5
July 11-19, 31,	3,360	20	1.25	.35	2.62		1.34	.17	2.68		.03		259	.35	1,180	62	2.9	461	7.5
July 20-30,	4,590	17	1.05	.30	2.27		1.13	.16	2.31		.02		226	.31	1,420	63	2.8	401	7.4
Aug. 1-9,	1,960	22	1.10	.32	3.16		1.15	.14	3.27		.02		319	.43	843	69	3.8	528	7.2
Aug. 10-20,	1,510	22	1.25	.32	3.63		1.33	.10	3.95		.02		348	.47	710	71	4.3	623	7.4
Aug. 21-31,	1,540	19	1.25	.34	3.69		1.29	.11	3.86		.02		338	.46	708	70	4.1	607	7.3

a Sum of determined constituents.

Sept. 1-10.....	1,180	20	1.25	.39	3.73	1.41	.10	3.84	.02		354	.48	566	69	4.1	608	7.8
Sept. 11-20.....	2,170	20	1.20	.35	3.43	1.44	.11	3.41	.02		328	.45	976	69	3.9	554	7.7
Sept. 21-30.....	1,960	18	1.00	.31	2.93	1.23	.11	2.88	.02		285	.39	764	69	3.6	475	7.6
Total or weighted average.	564,200	11	0.79	0.31	1.30	0.70	0.18	1.41	0.03		155	0.21	119,000	55	1.8	254	--

BRAZOS RIVER BASIN

BRAZOS RIVER AT RICHMOND, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 59 in Richmond, Fort Bend County, 925 feet downstream from Texas & New Orleans Railroad bridge, and at mile 93.

DRAINAGE AREA.--44,050 square miles, approximately, of which 9,240 square miles is probably noncontributing.

RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1952.

Water temperatures: November 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,850 micromhos Sept. 14; minimum daily, 260 micromhos May 29.

Percent sodium: Maximum, 59 Aug. 11-20, Sept. 11-20; minimum, 20 June 1-10.

EXTREMES, 1945-52.--Specific conductance (1950-52): Maximum daily, 2,540 micromhos Sept. 4, 1951; minimum daily, 260 micromhos May 29, 1952.

Percent sodium: Maximum, 76 Dec. 3-4, 1945; minimum, 18 Aug. 27-31, 1947.

REMARKS.--Values reported for dissolved solids concentrations less than 1,000 ppm are residue on evaporation and for concentrations more than 1,000 ppm are sum of determined constituents unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)		
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per million	Tons per acre-foot					
Oct. 1-5, 14-20, 1951.....	22,400	16	4.69	1.48	8.13	0.24	3.05	3.21	8.35	0.02	0.02	0.50	886	1.20	26,880	56	4.6	1,490	7.5
Oct. 6-13.....	12,990	16	3.24	.90	4.30	.02	2.75	1.77	3.95	.02	.03	.29	514	.70	9,090	51	3.0	885	7.5
Oct. 21-31.....	13,230	15	5.39	1.89	10.13	.02	3.21	3.98	10.41	.02	.02	.39	1,040	1.41	16,650	58	5.3	1,790	7.5
Nov. 1-10.....	11,280	14	4.84	2.06	8.52	.06	3.51	3.23	8.63	.03	.02	.25	940	1.28	14,440	55	4.6	1,540	7.7
Nov. 11-20.....	12,900	11	4.74	2.06	8.65	.12	3.34	3.21	8.71	.03	.02	.25	935	1.27	16,380	56	4.6	1,540	7.8
Nov. 21-30.....	10,890	10	5.29	2.14	9.00	.10	3.64	3.50	9.22	.03	.01	.19	1,000	1.36	14,810	54	4.7	1,630	7.5
Dec. 1-10.....	14,180	14	4.19	1.56	6.61	.02	3.46	2.48	6.20	.02	.02	.30	748	1.02	14,460	53	3.9	1,250	7.9
Dec. 11-20.....	11,810	17	4.29	1.48	6.04	.01	3.57	2.48	5.58	.02	.02	.23	714	.97	11,460	51	3.5	1,190	8.1
Dec. 21-31.....	11,710	14	4.44	1.64	7.00	.03	3.72	2.77	6.43	.02	.02	.19	769	1.07	12,530	53	4.1	1,320	7.9
Jan. 1-10, 1952.....	10,600	15	3.89	1.64	7.52	.04	3.03	3.06	7.14	.02	.02	.29	785	1.07	11,340	57	4.5	1,360	8.0
Jan. 11-20.....	10,320	12	4.59	1.73	7.37	.12	3.72	3.12	7.05	.02	.02	.35	818	1.11	11,450	54	4.3	1,410	8.0
Jan. 21-31.....	12,450	15	4.34	1.56	7.13	.01	3.61	2.87	6.49	.02	.02	.27	772	1.05	13,070	55	4.1	1,320	8.1

Feb. 1-5, 14-24..	29,720	12	3.94	1.48	5.78	.07	3.26	2.42	5.42	.02	.02	.31	703	.96	28,530	51	3.5	1,180	8.0
Feb. 6-13, 25-29	25,110	12	2.64	.80	3.13	.09	2.43	1.25	2.99	.02	.05	.20	415	.56	14,060	47	2.4	709	7.5
Mar. 1-10.....	27,070	13	2.69	.82	3.65	.07	2.36	1.52	3.36	.02	.05	.20	464	.63	17,050	50	2.7	766	7.6
Mar. 11-20.....	32,110	16	2.45	.81	3.13	.05	2.25	1.31	2.85	.01	.04	.14	415	.56	17,980	49	2.4	682	7.8
Mar. 21-31.....	19,980	17	2.64	.90	3.65	.07	2.67	1.00	3.38	.02	.03	.19	460	.63	12,590	50	2.7	764	7.5
Apr. 1-11.....	15,110	16	3.49	1.15	5.22	.12	3.54	1.37	4.82	.02	.04	.21	595	.61	12,240	52	3.4	1,010	8.1
Apr. 12-17, 23-25, 29-30.....	176,400	14	1.70	.40	.96	.11	1.80	.42	.85	.02	.05	.14	200	.27	47,630	30	.9	331	7.9
Apr. 18-22, 26-28	142,900	14	2.30	.59	1.61	.09	2.23	.90	1.35	.02	.07	.12	287	.39	55,730	35	1.3	468	7.8
May 1-10.....	51,990	15	1.95	.50	1.35	.11	2.00	.62	1.24	.02	.05	.13	258	.35	18,200	35	1.3	406	7.8
May 11-20.....	16,600	23	2.59	.75	1.86	.12	2.62	.90	1.83	.02	.05	.24	342	.47	7,800	36	1.5	551	7.9
May 21-26.....	60,750	25	2.59	.67	2.00	.10	2.54	.90	1.69	.02	.06	.21	328	.45	27,340	37	1.6	525	8.2
May 27-31.....	226,300	24	1.90	.38	0.68		2.03	.44	.37	.02	.10	--	186	.26	58,840	23	.7	286	8.0
June 1-10.....	153,400	21	1.85	.37	.57	.04	2.02	.33	.45	.01	.06	.19	187	.25	38,350	20	.6	290	8.0
June 11-20.....	50,940	22	2.15	.48	1.13	.07	2.23	.60	.93	.02	.04	.20	254	.35	17,830	30	1.0	389	8.0
June 21-30.....	6,600	19	2.69	.67	1.52	.08	2.95	.83	1.21	.02	.03	.14	300	.41	3,530	31	1.2	501	8.2
July 1-10.....	13,830	17	2.79	.82	2.13	.06	3.15	1.00	1.75	.02	.03	.21	346	.47	6,500	37	1.6	591	8.0
July 11-19.....	17,610	13	2.25	.60	1.70	.04	2.46	.69	1.44	.02	.03	.10	274	.37	6,580	37	1.4	473	8.1
July 20-24, 30-31	16,700	14	2.54	.70	2.22	.04	2.62	.87	2.00	.02	.04	.10	334	.45	7,520	40	1.7	574	7.8
July 25-29.....	7,820	18	1.75	.50	1.39	.15	2.02	.58	1.13	.02	.02	.15	243	.33	2,580	37	1.3	391	7.8
Aug. 1-5.....	4,110	21	3.09	.99	3.13	.13	3.06	1.27	2.99	.02	.03	.16	452	.61	2,510	43	2.2	759	7.3
Aug. 6-10.....	4,820	16	3.49	1.48	5.73	.14	2.51	2.56	5.67	.01	.04	.16	655	.89	4,290	53	3.6	1,120	7.7
Aug. 11-20.....	12,040	14	4.24	1.48	8.31	.16	2.36	3.58	8.24	.02	.02	.18	897	1.22	14,690	59	4.9	1,540	7.8
Aug. 21-31.....	15,960	17	4.69	1.48	8.91	.16	2.36	3.79	9.08	.02	.02	.21	960	1.31	20,910	58	5.1	1,610	7.7
Sept. 1-10.....	13,630	15	4.89	1.48	8.74	.17	2.39	3.83	9.03	.01	.02	.33	964	1.31	17,860	57	4.9	1,600	7.3
Sept. 11-20.....	16,040	14	5.09	1.56	9.87	.17	2.38	4.16	10.29	.01	.02	.18	1,010	1.37	21,970	59	5.4	1,740	8.0
Sept. 21-30.....	6,590	14	4.39	1.56	7.87	.16	2.74	3.25	8.12	.02	.03	.17	872	1.19	7,840	56	4.6	1,480	7.9
Total or weighted average	1,321,000	18	2.54	.72	2.61	.07	2.34	1.12	2.40	0.02	0.06	0.19	370	0.50	665,400	44	2.0	608	--

COLORADO RIVER BASIN--Continued

COLORADO RIVER AT AUSTIN, TEX.

LOCATION.--At raw-water intake of Austin City Water Plant, 4½ miles upstream from gaging station, at southeast edge of Austin, Travis County, at Montopolis Bridge on U.S. Highway 183, 2.8 miles upstream from Walnut Creek, 3.8 miles downstream from Waller Creek, 5 miles downstream from Barton Creek, and at mile 290.

DRAINAGE AREA.--38,160 square miles, approximately, of which 11,900 square miles is probably noncontributing.

RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1952:

Water temperatures: October 1947 to September 1952:

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 578 micromhos Mar. 10; minimum daily, 422 micromhos Sept. 23.

Percent sodium: Maximum, 46 Nov. 1-30; minimum, 33 Sept. 1-30.

EXTREMES, 1947-52.--Specific conductance (1950-52): Maximum daily, 578 micromhos Mar. 10, 1952; minimum daily, 346 micromhos Dec. 7, 1950.

Percent sodium: Maximum, 46 Nov. 1-30, 1951; minimum, 24 Oct. 1-31, 1950.

REMARKS.--Values reported for dissolved solids concentrations are residue on evaporation. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Oct. 1-31, 1951...	24,200	11	2.15	1.32	1.89	2.72	0.71	1.89	0.02	0.02		310	0.42	10,160	35	1.4	544	8.1
Nov. 1-30	14,320	11	1.70	1.32	2.56	2.79	.79	1.97	.01	.02		340	.46	6,680	46	2.1	547	8.3
Dec. 1-31	12,180	9.8	2.25	1.32	2.05	2.85	.81	1.92	.02	.02		328	.45	5,480	36	1.5	565	7.7
Jan. 1-31, 1952..	11,380	9.6	2.30	1.32	2.02	2.90	.81	1.89	.02	.02		328	.45	5,120	36	1.5	553	8.1
Feb. 1-29	11,640	8.4	2.25	1.40	2.08	2.90	.87	1.92	.02	.02		330	.45	5,240	36	1.6	569	7.7
Mar. 1-31	11,580	7.8	2.25	1.32	2.01	2.80	.85	1.89	.02	.02		322	.44	5,100	36	1.5	564	8.1
Apr. 1-30	26,680	7.8	2.10	1.23	2.09	2.61	.85	1.89	.02	.05		306	.42	11,210	39	1.6	553	7.9
May 1-31	62,910	9.8	2.10	1.15	1.99	2.59	.79	1.81	.02	.03		304	.41	25,790	38	1.6	541	7.9
June 1-30	103,100	12	1.95	1.15	2.04	2.52	.77	1.80	.01	.04		300	.41	42,270	40	1.6	531	8.0
July 1-31	110,700	11	2.00	1.15	1.83	2.56	.75	1.75	.02	.02		290	.39	43,170	37	1.4	521	7.9

Aug. 1-31.....	105,000	10	1.95	1.15	1.74	2.61	.65	1.55	.02	.01		271	.37	38,850	36	1.4	494	8.0
Sept. 1-30.....	53,620	13	2.05	1.07	1.57	2.75	.56	1.33	.02	.03		262	.36	19,300	33	1.3	470	8.0
Total or weighted average	547,500	11	2.00	1.15	1.91	2.62	0.73	1.72	0.02	0.02		293	0.40	218,400	38	1.5	522	--

COLORADO RIVER BASIN--Continued

COLORADO RIVER AT WHARTON, TEX.

LOCATION.--At gaging station at bridge on U. S. Highway 59 in Wharton, Wharton County, 1,000 feet downstream from Texas & New Orleans Railroad bridge, 12 miles upstream from Jones Creek, and at mile 67.

DRAINAGE AREA.--41,150 square miles, approximately, of which 11,900 square miles is probably noncontributing.

RECORDS AVAILABLE.--Chemical analyses: April 1944 to September 1952.

Water temperatures: October 1945 to September 1948, March 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 680 micromhos Dec. 19; minimum daily, 216 micromhos May 25.

Percent sodium: Maximum, 43 Nov. 1-30; minimum, 24 May 25-30.

EXTREMES, 1944-52.--Specific conductance (1950-52): Maximum daily, 680 micromhos Dec. 19, 1951; minimum daily, 216 micromhos May 25, 1952.

PERCENT SODIUM: Maximum, 43 Nov. 1-30, 1951; minimum, 7 Jan. 19-24, 1945.

REMARKS.--Values reported for dissolved solids concentration are residue on evaporation unless noted otherwise. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Percent sodium	Specific conductance (micro-mhos at 25° C)	pH		
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million				Tons per acre-foot	Total tons
Oct. 1-31, 1951.	37,790	12	2.59	1.32	1.83	3.21	0.69	1.81	0.02	0.01		322	0.44	16,630	32	1.3	575	8.0
Nov. 1-30.....	25,140	11	2.10	1.40	2.61	3.54	.75	1.81	.01	.00		354	.48	12,070	43	2.0	598	8.1
Dec. 1-31.....	21,620	11	2.99	1.40	1.93	3.80	.73	1.75	.02	.02		351	.48	10,380	31	1.3	609	8.1
Jan. 1-31, 1952..	18,670	9.0	2.79	1.40	2.08	3.61	.83	1.81	.02	.00		352	.48	8,960	33	1.4	616	7.7
Feb. 1-29.....	21,990	9.8	2.59	.99	1.85	3.15	.75	1.49	.02	.02		307	.42	9,240	34	1.4	535	8.0
Mar. 1-26.....	17,450	7.8	2.74	1.32	1.72	3.38	.75	1.61	.02	.02		346	.47	8,200	30	1.2	580	8.0
Mar. 27-31.....	2,700	7.8	1.55	.80	.77	2.02	.35	.68	.02	.05		186	.25	675	25	.7	309	7.5
Apr. 1-4, 12-18..	37,440	14	1.60	.41	.86	1.80	.27	.73	.01	.06		a168	.23	8,610	30	.9	297	7.5
Apr. 5-11, 19-30.	20,490	13	2.10	.82	1.48	2.33	.77	1.27	.01	.02		a253	.24	6,970	34	1.2	450	7.5
May 1-24, 31....	45,690	8.8	2.24	1.07	1.92	2.72	.81	1.66	.02	.02		294	.40	18,280	37	1.5	533	7.4
May 25-30.....	85,130	11	1.45	.41	.57	1.70	.31	.39	--	.03		154	.21	17,880	24	.6	250	7.5
June 1-30.....	56,870	14	2.05	.90	1.91	2.44	.75	1.61	.02	.04		289	.39	22,180	39	1.6	502	8.1
July 1-31.....	64,490	9.2	2.10	1.23	1.83	2.74	.71	1.69	--	.02		285	.39	25,150	35	1.4	530	7.9

a Sum of determined constituents.

Aug. 1-30.....	46,910	12	2.30	1.23	1.72	3.02	.65	1.55	.02	.01	292	.40	18,760	33	1.3	538	7.8
Sept. 1-30.....	52,020	9.6	1.90	1.07	1.82	2.64	.65	1.47	.02	.01	282	.38	19,770	38	1.5	479	7.6
Total or weighted average.	554,400	11	2.10	0.99	1.61	2.65	0.62	1.38	0.02	0.02	270	0.37	205,100	34	1.3	474	--

GUADALUPE RIVER BASIN

GUADALUPE RIVER AT VICTORIA, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 59 in Victoria, Victoria County, 1,300 feet upstream from Texas & New Orleans Railroad bridge, 10 miles upstream from Coletto Creek, and at mile 51.
DRAINAGE AREA.--5,311 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1948 to September 1952.

Water temperatures: November 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,560 micromhos Apr. 26; minimum daily, 217 micromhos Sept. 16.

Percent sodium: Maximum, 53 Apr. 25-26; minimum, 22 Sept. 10, 12, 15-19, 24-30.

EXTREMES, 1948-52.--Specific conductance (1950-52): Maximum daily, 1,820 micromhos June 24, 1951; minimum daily, 217 micromhos Sept. 16, 1952.

Percent sodium: Maximum, 67 July 23-24, 1950; minimum, 18 May 22-29, 1950.

REMARKS.--Values reported for dissolved solids concentrations are residue on evaporation. Records of specific conductance of daily samples for October 1945 to September 1952 available in district office at Austin, Tex. Some daily chloride determinations also available. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- dium	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
Oct. 1-2, 7-12, 16-20, 1951.....	5,840	17	2.59	1.48	2.61	0.07	3.20	0.71	2.79	0.02	0.02	0.24	386	0.52	3,040	39	1.8	677	8.0
Oct. 3-6, 13-15.....	3,500	16	3.19	2.14	5.09	.04	3.10	.94	6.32	.02	.01	.75	619	.83	2,900	49	3.1	1,080	8.0
Oct. 21-31.....	5,300	17	2.64	1.56	1.96	.07	3.44	.62	2.03	.02	.03	.22	358	.49	2,600	31	1.4	611	8.2
Nov. 1-10.....	6,770	18	2.89	1.73	2.26	.07	3.75	.69	2.34	.03	.03	.26	407	.55	3,720	33	1.5	682	8.0
Nov. 11-20.....	5,500	18	2.74	1.48	2.39	.08	3.43	.60	2.54	.02	.03	.23	396	.54	2,970	36	1.7	675	8.2
Nov. 21-30.....	6,450	18	2.84	1.89	3.30	.09	3.44	.69	3.81	.02	.04	.28	495	.67	4,320	41	2.1	822	8.0
Dec. 1-10.....	6,650	16	2.99	1.73	2.35	.04	3.93	.65	2.43	.02	.04	.20	430	.58	3,860	33	1.6	697	8.1
Dec. 11-20.....	6,400	14	3.39	1.97	2.96	.05	4.16	.73	3.30	.02	.04	.20	468	.64	4,100	35	1.8	822	8.0
Dec. 21-31.....	6,890	16	2.40	1.97	3.57	.03	3.03	.83	3.92	.02	.04	.14	472	.64	4,470	45	2.4	820	8.0
Jan. 1-10, 1952..	6,860	14	2.79	1.64	2.39	.01	3.69	.71	2.40	.02	.04	.28	398	.54	3,700	35	1.6	694	8.0
Jan. 11-20.....	6,480	14	2.84	1.73	2.57	.00	3.64	.73	2.68	.02	.04	.39	410	.56	3,620	36	1.7	712	8.0
Jan. 21-31.....	7,350	16	2.10	1.56	2.52	.02	2.93	.73	2.62	.02	.03	.31	368	.50	3,680	41	1.9	638	8.0
Feb. 1-10.....	6,540	15	2.35	1.56	2.44	.06	3.23	.73	2.48	.02	.04	.19	374	.51	3,340	38	1.7	655	8.1
Feb. 11-20.....	6,130	16	2.69	1.64	2.96	.05	3.39	.81	3.16	.02	.03	.31	422	.57	3,490	40	2.0	763	8.1
Feb. 21-29.....	10,400	15	2.79	1.40	2.26	.02	3.64	.71	2.14	.02	.04	.29	372	.51	5,300	35	1.6	655	8.2

7,630	17	2.69	1.32	2.35	.09	3.11	.71	2.57	.01	.06	.21	386	.54	4,120	36	1.7	663	7.6
4,620	20	3.24	2.22	4.74	.12	3.36	.94	5.98	.01	.02	.35	598	.81	3,740	45	2.8	1,110	7.9
8,320	17	2.74	1.64	2.35	.05	3.57	.73	2.54	.02	.03	.22	404	.55	4,580	35	1.6	703	8.0
7,890	18	2.20	1.56	2.09	.06	3.06	.65	2.23	.01	.03	.19	362	.49	3,770	35	1.5	608	8.3
11,980	18	2.30	1.58	2.09	.04	3.11	.85	2.28	.02	.02	.28	368	.50	5,990	35	1.5	614	8.2
11,260	18	2.50	1.23	2.91	.10	3.15	.58	1.92	.02	.03	.13	348	.47	5,290	33	1.4	578	8.3
4,180	18	4.24	2.36	7.99	--	3.13	1.04	9.90	.01	.03	--	830	1.13	4,720	53	4.1	1,500	8.4
8,760	24	1.45	1.45	1.84	.09	2.26	.71	2.09	.01	.05	.14	303	.41	3,600	41	1.7	534	7.8
6,460	26	1.41	1.45	1.65	.03	2.59	.67	1.47	.02	.02	.68	281	.40	2,560	35	1.3	472	8.1
6,180	26	1.80	1.56	1.83	.06	2.92	.60	1.66	.01	.02	.05	309	.42	2,600	35	1.4	530	8.1
61,590	21	1.65	.49	0.93		1.95	.27	.76	.01	.08	.12	195	.27	16,830	30	.9	306	7.8
37,230	18	2.89	.90	2.65	.07	2.90	.48	3.13	.01	.06	.15	400	.54	20,100	41	1.9	686	7.7
35,090	20	2.35	.76	1.26	.06	2.56	.48	1.35	.02	.05	.17	272	.37	12,970	28	1.0	527	8.1
8,350	20	2.50	1.23	1.52	.10	3.03	.54	1.64	.02	.05	.22	311	.42	8,510	28	1.1	534	8.1
8,490	19	2.40	1.32	1.93	.07	3.03	.65	1.92	.01	.02	.05	329	.45	3,850	33	1.3	564	8.1
11,700	15	2.79	1.32	1.78	.04	3.44	.65	1.78	.05	.03	.10	343	.47	5,500	30	1.3	594	8.0
1,560	14	3.59	1.89	5.13	--	3.24	.98	6.49	.02	.04	.14	838	.87	1,360	48	3.1	1,130	7.9
7,260	13	1.60	.47	.70	.08	1.87	.98	.51	.02	.05	.08	179	.24	1,740	25	.7	291	7.4
4,320	21	2.20	.90	1.26	.04	2.69	.44	1.13	.02	.06	.17	268	.36	1,560	29	1.0	444	8.3
3,880	20	2.59	1.32	2.22	.03	3.39	.58	2.19	.02	.03	.20	357	.49	1,900	36	1.6	622	8.2
2,860	20	2.58	1.32	2.17	.04	3.41	.67	2.07	.02	.02	.20	360	.49	1,410	35	1.6	621	8.3
2,340	19	2.50	1.40	2.17	.01	3.44	.58	2.03	.02	.02	.22	352	.48	1,120	36	1.6	621	8.3
162,300	15	1.75	.49	.65	.10	2.23	.31	.51	.02	.04	.11	180	.24	38,990	22	.6	303	7.6
53,690	17	2.35	.79	1.09	.10	2.70	.52	1.13	.02	.05	.19	260	.35	18,790	25	.9	432	8.2
19,260	16	3.19	1.07	1.22	.09	3.54	.60	1.41	.02	.06	.14	326	.44	8,480	22	.8	538	7.5
594,200	17	2.25	0.99	1.57	0.07	2.72	0.50	1.58	0.02	0.05	0.17	291	0.40	235,400	32	1.3	497	--
Total or weighted average.																		
a Includes equivalent of 1 part per million of carbonate (CO ₂).																		
b Includes equivalent of 3 parts per million of carbonate (CO ₂).																		

NUECES RIVER BASIN

NUECES RIVER NEAR MATHIS, TEX.

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

DRAINAGE AREA.--16,660 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1952.

Water temperatures: October 1947 to September 1952.

EXTREMES 1951-52.--Specific conductance: Maximum daily, 805 micromhos May 29; minimum daily, 371 micromhos June 13.

Percent sodium: Maximum, 60 May 1-31; minimum, 38 Oct. 1-31.

EXTREMES, 1947-52.--Specific conductance (1950-52): Maximum daily, 893 micromhos May 13, 16, 1951; minimum daily, 252 micromhos Sept. 16, 1951.

PERCENT SODIUM: Maximum, 60 May 1-31, 1952; minimum, 28 Apr. 1-26, 1949.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25° C)		
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			per-cent sodium	
Oct. 1-31, 1951 .	19,250	22	2.00	0.30	1.52	0.19	2.33	0.71	0.85	0.02	0.05	0.11	251	0.34	6,540	38	1.4	383	7.6
Nov. 1-30.....	4,120	22	2.25	.31	2.30		2.69	.83	1.30	.02	.02		314	.43	1,770	47	2.0	482	7.8
Dec. 1-31.....	2,490	22	2.45	.43	2.20		2.85	.87	1.33	.02	.01		307	.42	1,050	43	1.8	505	7.9
Jan. 1-31, 1952 .	2,720	22	2.59	.40	2.11		2.98	.85	1.24	.02	.01		307	.42	1,140	41	1.7	519	8.1
Feb. 1-29.....	3,410	24	2.74	.42	2.51		3.24	.92	1.49	.02	.00		358	.49	1,670	44	2.0	551	8.0
Mar. 1-31.....	4,630	22	2.74	.49	3.95		3.57	1.10	2.48	.02	.01		442	.60	2,780	55	3.2	718	8.1
Apr. 1-30.....	9,360	18	2.84	.73	4.06		3.67	1.19	2.74	.02	.01		478	.65	6,080	53	3.0	772	8.3
May 1-31.....	24,510	21	2.59	.40	4.46		3.44	1.21	2.76	.02	.02		454	.62	15,200	60	3.7	766	8.0
June 1-30.....	82,160	28	1.95	.35	1.70		2.56	.62	.79	.02	.01		259	.35	28,760	43	1.6	399	7.9
July 1-31.....	9,520	24	2.10	.33	1.80		2.88	.58	.73	.02	.02		259	.35	3,330	43	1.6	427	8.0
Aug. 1-31.....	4,700	25	2.30	.39	2.09		3.00	.62	1.07	.02	.07		280	.39	1,830	44	1.8	495	7.6
Sept. 1-30.....	10,440	26	2.15	.35	2.10		2.95	.60	1.02	.02	.01		279	.38	3,970	46	1.9	457	7.7
Total or weighted average	177,300	25	2.20	0.38	2.35		2.82	0.77	1.27	0.02	0.02		308	0.42	74,340	48	2.1	492	--

RIO GRANDE BASIN

RIO GRANDE ABOVE CULEBRA CREEK NEAR LOBATOS, COLO.

LOCATION.--Two and one-half miles south of La Sauses, 7 miles downstream from Conejos River, and 11 miles upstream from gaging station near Lobatos, which is 7 miles downstream from Culebra Creek and 10 miles east of Lobatos, Conejos County.

DRAINAGE AREA.--7 700 square miles above gaging station (includes 2 940 square miles in closed basin).

RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 814 micromhos July 25; minimum daily, 127 micromhos May 2.

Percent sodium: Maximum, 45 Oct. 11-20; minimum, 24 May 1-9, 1952.

EXTREMES, 1946-52.--Specific conductance: Maximum daily, 1 070 micromhos July 26, 1948; minimum daily, 122 micromhos June 1, 1949.

Percent sodium: Maximum, 46 Oct. 11-20, 1946, Aug. 1-10, 1951; minimum, 16 Dec. 1, 3-10, 1946.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-adsorp- tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Oct. 1-10, 1951..	617	40	1.70	0.59	1.65	0.21	2.88	1.00	0.28	0.05	0.01	a 0.1	274	0.37	228	40	402	7.8
Oct. 11-20.....	878	--	1.70	.57	1.83	--	--	--	--	--	--	--	246	.33	290	45	401	--
Oct. 21-31.....	1,020	--	1.95	.64	2.00	--	--	--	--	--	--	--	297	.40	408	44	451	--
Nov. 1-10.....	1,220	--	2.00	.72	2.04	--	--	--	--	--	--	--	303	.41	500	43	456	--
Nov. 11-20.....	1,330	--	2.00	.72	2.00	--	--	--	--	--	--	--	296	.40	532	42	433	--
Nov. 21-30.....	2,060	--	1.95	.66	1.97	--	--	--	--	--	--	--	276	.38	783	38	409	--
Dec. 1-10.....	2,150	--	1.40	.40	.78	--	--	--	--	--	--	--	186	.25	538	30	265	--
Dec. 11-20.....	3,670	--	1.40	.48	.78	--	--	--	--	--	--	--	190	.26	954	29	267	--
Dec. 21-31.....	4,900	--	1.40	.48	.83	--	--	--	--	--	--	--	188	.26	1,270	31	267	--
Jan. 1-10, 1952..	4,640	29	1.30	.48	.74	.12	1.74	.69	.14	.02	a .1	--	177	.24	1,110	28	250	7.6
Jan. 11-20.....	4,930	--	1.15	.37	.61	--	--	--	--	--	--	--	155	.21	1,040	29	219	--
Jan. 21-31.....	4,990	--	1.25	.39	.70	--	--	--	--	--	--	--	164	.22	1,100	30	229	--
Feb. 1-10.....	4,400	--	1.25	.43	.65	--	--	--	--	--	--	--	163	.22	968	28	234	--
Feb. 11-20.....	4,570	--	1.45	.50	.83	--	--	--	--	--	--	--	193	.26	1,190	30	275	--
Feb. 21-29.....	3,710	--	1.45	.50	.83	--	--	--	--	--	--	--	194	.26	1,065	30	274	--
Mar. 1-10.....	5,630	--	1.40	.49	.78	--	--	--	--	--	--	--	193	.26	1,460	29	267	--
Mar. 11-20.....	6,450	--	1.40	.50	.78	--	--	--	--	--	--	--	186	.25	1,610	29	267	--
Mar. 21-31.....	6,550	--	1.40	.49	.78	--	--	--	--	--	--	--	187	.25	1,640	29	266	--

a Reported boron concentration is less than figure indicated.

RIO GRANDE BASIN--Continued

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

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)		Parts per million	Tons per acre-foot	Total tons			
Apr. 1-10, 1952 ..	6,760	30	1.35	0.44	0.83	0.10	1.64	0.85	0.17	0.02	0.01	189	0.26	1,760	31	0.9	267
Apr. 11-20	7,770	--	1.10	.39	.57	--	--	--	--	--	--	156	.21	1,630	32	0.7	193
Apr. 21-30	16,510	--	.75	.53	.48	--	--	--	--	--	--	134	.18	2,970	27	0.6	156
May 1-10	49,970	--	.70	.35	.33	--	--	--	--	--	--	128	.17	8,490	24	0.4	138
May 11-20	51,800	--	1.15	.35	.74	--	--	--	--	--	--	184	.22	11,400	33	0.9	224
May 21-31	47,220	--	1.00	.36	.61	--	--	--	--	--	--	143	.19	8,970	31	0.7	191
June 1-10	52,410	--	.85	.35	.41	--	--	--	--	--	--	121	.16	8,390	25	0.5	164
June 11-20	55,940	--	.90	.35	.43	--	--	--	--	--	--	130	.18	10,070	26	0.5	178
June 21-30	21,630	--	1.35	.50	.74	--	--	--	--	--	--	181	.25	5,410	29	0.8	262
July 1-10	15,020	--	1.50	.53	1.04	15	1.54	1.39	21	--	--	222	.30	4,510	32	1.0	321
July 11-20	9,790	--	2.30	.82	1.74	--	--	--	--	--	--	319	.43	4,210	36	1.4	474
July 21-31	2,950	--	3.94	1.48	3.00	--	--	--	--	--	--	551	.75	2,210	36	1.8	806
Aug. 1-10	14,120	--	1.20	.44	.74	--	--	--	--	--	--	174	.24	3,390	31	0.8	242
Aug. 11-20	12,890	--	1.20	.39	.65	--	--	--	--	--	--	167	.23	2,960	29	0.7	232
Aug. 21-31	9,150	--	1.70	.58	1.09	--	--	--	--	--	--	242	.33	3,020	32	1.0	343
Sept. 1-10	4,290	--	2.59	.90	1.83	--	2.52	--	--	--	--	368	.50	2,150	34	1.4	532
Sept. 11-20	2,370	--	2.54	.90	1.65	--	2.49	--	--	--	--	350	.48	1,140	32	1.3	513
Sept. 21-30	3,500	--	2.54	.90	1.61	--	2.39	--	--	--	--	348	.47	1,650	32	1.2	507
Total or weighted average	447,900	--	1.15	0.43	0.70	--	--	--	--	--	--	167	0.23	103,000	31	0.8	227

RIO GRANDE BASIN--Continued

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

LOCATION.--At gaging station 400 feet (revised) downstream from bridge on State highway 4, 1½ miles southwest of San Ildefonso Pueblo, Santa Fe County, 2½ miles downstream from Rio Pojoaque, and 7 miles west of Pojoaque.

DRAINAGE AREA.--14,300 square miles (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).

RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1952.

Water temperatures: October 1948 to September 1952.

Sediment Records: October 1947 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 861 micromhos, Sept. 13; minimum daily, 165 micromhos, June 13.

Percent sodium: Maximum, 30 Nov. 21-30, Dec. 1-10; minimum, 14 May 11-20.

EXTREMES, 1946-52.--Specific conductance: Maximum daily, 1,230 micromhos, Aug. 26, 1951; minimum daily, 165 micromhos, June 13, 1952.

Percent sodium: Maximum, 32 Sept. 11-18, 22-30, 1947, Oct. 1-10, 11-20, 1951; minimum, 14 June 11-20, 1949, May 11-20, 1952.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	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, 1951.	4,050	28	1.90	0.62	1.04	--	2.57	0.83	0.23	0.01		221	0.30	1,220	29	0.9	358	7.4		
Oct. 11-20	4,370	30	1.95	.67	1.09	--	2.65	.83	.24	.00		231	.31	1,350	29	1.0	363	7.4		
Oct. 21-31	6,040	28	2.35	.66	1.22	--	2.93	1.10	.26	.01		262	.36	2,170	29	1.0	416	7.6		
Nov. 1-10	5,890	28	2.40	.61	1.30	--	2.90	1.44	.28	.01		282	.38	2,240	29	1.0	444	7.6		
Nov. 11-20	6,640	30	2.35	.79	1.26	--	2.87	1.33	.31	.01		277	.38	2,520	29	1.0	437	7.5		
Nov. 21-30	7,940	30	2.40	.79	1.35	--	2.87	1.48	.31	.01		287	.39	3,100	30	1.1	449	7.6		
Dec. 1-10	8,210	31	2.40	.82	1.35	--	2.90	1.52	.31	.01		292	.40	3,280	30	1.1	453	7.7		
Dec. 11-20	9,350	32	2.35	.82	1.30	--	2.75	1.42	.26	.02		280	.38	3,550	29	1.0	427	7.6		
Dec. 21-30	10,290	29	2.20	.76	1.04	--	2.67	1.12	.23	.02		250	.34	3,500	26	0.9	368	7.6		
Dec. 31	2,400	21	3.79	1.15	1.39	--	3.28	2.75	.21	.05		367	.53	1,270	22	0.9	582	7.7		
Jan. 1-10, 1952.	13,710	25	2.35	.82	1.00	--	2.39	1.60	.22	.03		282	.36	4,940	25	0.8	403	7.9		
Jan. 11-20	17,950	23	2.35	.76	1.00	--	2.64	1.37	.20	.03		256	.35	6,280	24	0.8	396	7.7		
Jan. 21-31	14,990	24	2.20	.77	.91	--	2.33	1.46	.20	.03		247	.34	5,100	23	0.7	380	7.8		

RIO GRANDE BASIN--Continued
RIO GRANDE AT OTOWI BRIDGE NEAR SAN ILDEFONSO, N. MEX.--Continued
Chemical analyses, water year October 1951 to September 1952.--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				Per-cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot				
Feb. 1-10, 1952..	11,930	27	2.20	0.81	1.13	--	2.52	1.42	0.23	0.02		260	0.35	4,180	27	0.9	399	7.7
Feb. 11-20.....	11,910	25	2.10	.77	1.09	--	2.49	1.31	.23	.01		248	.34	4,050	28	0.9	382	7.7
Feb. 21-29.....	10,760	26	2.05	.76	1.04	--	2.38	1.25	.23	.02		240	.33	3,550	27	0.9	375	7.8
Mar. 1-10.....	16,900	23	2.54	.82	1.13	--	2.62	1.75	.23	.03		283	.38	6,420	25	0.9	441	7.9
Mar. 11-20.....	23,930	20	2.89	.99	1.17	--	2.65	2.27	.19	.05		316	.43	10,290	23	0.8	489	8.1
Mar. 21-31.....	23,450	24	2.84	.99	1.22	--	2.64	2.17	.19	.04		313	.43	10,080	24	0.9	483	7.8
Apr. 1-10.....	43,130	22	2.74	.58	.83	--	2.51	1.50	.14	.08		260	.35	15,100	20	0.6	409	7.7
Apr. 11-20.....	50,030	21	2.40	.37	.57	--	2.39	.85	.11	.07		208	.28	14,010	17	0.5	332	7.7
Apr. 21-30.....	73,270	20	2.20	.31	.48	--	2.23	.65	.11	.05		184	.25	18,320	16	0.4	298	7.6
May 1-10.....	132,000	24	2.00	.27	.43	--	2.11	.48	.08	.05		170	.23	30,360	16	0.4	265	7.6
May 11-20.....	131,500	18	1.70	.35	.34	--	1.82	.52	.06	.03		148	.20	26,300	14	0.3	233	7.4
May 21-31.....	115,300	22	1.55	.39	.52	--	1.67	.71	.09	.02		158	.21	24,210	21	0.5	242	7.4
June 1-10.....	134,400	18	1.65	.34	.43	--	1.82	.50	.08	.02		148	.20	26,880	18	0.4	228	7.4
June 11-20.....	131,300	19	1.40	.31	.43	--	1.51	.56	.08	.02		137	.19	24,950	20	0.5	208	7.5
June 21-30.....	69,660	20	1.45	.35	.57	--	1.59	.73	.09	.01		153	.21	14,630	24	0.6	232	7.5
July 1-10.....	57,130	20	1.60	.39	.61	--	1.85	.69	.09	.01		164	.22	12,570	23	0.6	251	7.5
July 11-20.....	48,720	21	1.70	.38	.61	--	1.84	.73	.11	.00		168	.23	11,210	23	0.6	260	7.6
July 21-28, 31, Aug. 1.....	36,920	22	2.00	.46	.52	--	2.16	.75	.11	.01		186	.25	9,230	17	0.5	298	7.6
July 29-30, Aug. 2-3.....	17,610	24	3.29	.82	.96	--	2.82	2.14	.17	.04		318	.43	7,570	19	0.7	496	7.6
Aug. 4-10.....	29,550	19	2.00	.51	.52	--	2.06	.90	.12	.02		187	.25	7,390	17	0.5	303	7.7
Aug. 11-20.....	38,030	21	2.10	.62	.61	--	2.18	1.06	.11	.01		206	.28	10,650	18	0.5	329	7.6
Aug. 21-31.....	29,210	25	2.64	.65	.83	--	2.56	1.39	.20	.02		257	.35	10,220	20	0.6	402	7.8
Sept. 1-10.....	10,710	30	2.20	.69	1.13	--	2.57	1.25	.28	.01		256	.35	3,750	28	0.9	399	7.7
Sept. 11-12, 14-20	7,940	22	2.40	.81	1.22	--	2.61	1.64	.28	.01		276	.38	2,980	28	1.0	437	7.7
Sept. 13.....	1,510	28	5.49	1.48	2.40	--	4.00	4.85	.51	.01		583	.79	1,190	26	1.3	861	7.7
Sept. 21-30.....	9,220	28	2.35	.81	1.30	--	2.62	1.56	.31	.01		281	.38	3,500	29	1.0	436	7.8
Total or weighted average	1,378,000	21	1.95	0.46	0.61	--	2.05	0.87	0.12	0.03		188	0.26	358,300	20	0.6	295	--

RIO GRANDE BASIN--Continued

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

LOCATION.--At water-stage recorder at Atcheson, Topeka and Santa Fe Railway bridge over Tiffany Channel, 3 miles northeast of San Marcial, Socorro County. Tiffany Channel is bypass channel carrying water around the main channel gaging station at San Marcial.

RECORDS AVAILABLE.--Chemical analyses: April 1950 to September 1952.

Water temperatures: October 1950 to September 1952.

Sediment records: April 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,390 micromhos Dec. 11; minimum daily, 294 micromhos June 12.

Percent sodium: Maximum 62 Dec. 1-12; minimum, 29 June 11-20.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 2,390 micromhos Dec. 11, 1951; minimum daily, 294 micromhos June 12, 1952.

Percent sodium: Maximum 63 May 1-10, 1951; minimum, 29 June 11-20.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are residue on evaporation. Records of discharge for water year October 1951 to September 1952 furnished by Santa Fe district office of Surface Water Branch; records for composite of Tiffany Channel and main channel given under Rio Grande at San Marcial in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons		
Oct. 1-10, 1951..	2.8		4.19	1.89	7.91							894	1.22	3	57	4.5	1,420
Oct. 11-20.....	a. 8		3.79	1.97	8.04							881	1.20	1	58	4.7	1,410
Oct. 21-31.....	a. 6		4.29	2.06	8.83							961	1.31	1	58	4.9	1,530
Nov. 1-10.....	a. 1.0		5.29	2.30	8.78							1,050	1.43	1	54	4.5	1,650
Nov. 11-20.....	4.0		6.04	2.63	10.65							1,200	1.63	7	55	5.1	1,870
Nov. 21-30.....	12		6.54	2.71	11.83							1,310	1.78	21	56	5.5	2,030
Dec. 1-12.....	12		5.64	2.47	13.22							1,330	1.81	22	62	6.6	2,100
Dec. 13-20.....	115		4.59	1.81	7.78							893	1.21	139	55	4.3	1,390
Dec. 21-31.....	395		4.29	1.64	5.44							719	.98	377	48	3.2	1,180
Jan. 1-10, 1952..	381		3.94	1.40	4.70							656	.89	339	47	2.9	1,010
Jan. 11-17.....	73		4.29	1.81	7.91							890	1.21	88	56	4.5	1,410
Jan. 18-20.....	83		3.69	1.40	4.83							637	.87	72	49	3.0	983
Jan. 21-31.....	751		4.69	1.89	9.13							1,010	1.37	1,030	58	5.0	1,570
Feb. 1-10.....	410		5.34	2.30	10.96							1,170	1.59	652	59	5.6	1,810
Feb. 11-20.....	827		5.49	2.22	9.83							1,120	1.52	1,260	56	5.0	1,710
Feb. 21-29.....	670		5.29	2.22	10.09							1,120	1.52	1,020	57	5.2	1,710

a No flow during part of period.

RIO GRANDE BASIN--Continued

RIO GRANDE AT SAN MARCIAL, N. MEX.

LOCATION --At gaging station at Atcheson, Topeka & Santa Fe Railway bridge, 1.1 miles downstream from San Marcial, Socorro County. DRAINAGE AREA --27,700 square miles (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.). RECORDS AVAILABLE --Chemical analyses: July 1946 to September 1952.

Water temperatures: January 1949 to September 1952.

Sediment records: July 1946 to September 1952.

EXTREMES, December 1951 to September 1952.--Specific conductance: Maximum daily, 2,060 micromhos Sept. 25; minimum daily, 311 micromhos June 14.

Percent sodium: Maximum, 39 July 27-28; minimum, 23 June 11-20.

EXTREMES, 1946-52.--Specific conductance: Maximum, 2,470 micromhos Sept. 28, 1948; minimum daily, 311 micromhos June 14, 1952.

Percent sodium: Maximum, 65 May 1-10, 1951; minimum, 22 Nov. 21-22, 28-30, 1947, June 21-30, 1949. 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 Bulletin of International Boundary Commission. Records of discharge for water year October 1951 to September 1952 furnished by Santa Fe district office of Surface Water Branch. Record given in Water-Supply Paper 1242 is composite of main channel and Rio Grande Tiffany Channel.

Chemical analyses, December 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent adsorption ratio	Specific conductance (micro-mhos at 25° C)	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Dec. 14-20, 1951	a 2,580	--	4.29	1.32	2.91	--	--	--	--	--	--	541	0.74	1,910	34	808	--	
Dec. 21-31, 1951	a 4,860	--	4.04	1.32	2.74	--	--	--	--	--	--	512	.70	3,400	34	768	--	
Jan. 1-10, 1952	9,890	23	3.79	1.15	2.70	0.19	3.51	3.27	0.85	0.04	0.05	0.1	478	.65	6,430	34	726	7.8
Jan. 11-20	8,870	--	3.79	1.15	2.39	--	--	--	--	--	--	--	484	.66	5,850	33	725	--
Jan. 21-31	12,860	--	3.59	1.15	2.17	--	--	--	--	--	--	--	455	.62	7,970	31	698	--
Feb. 1-10	7,890	--	3.49	1.15	2.39	--	--	--	--	--	--	--	458	.62	4,890	34	691	--
Feb. 11-20	9,250	--	3.34	1.07	2.65	--	--	--	--	--	--	--	454	.62	5,470	38	681	--
Feb. 21-29	7,190	--	3.29	1.07	2.48	--	--	--	--	--	--	--	452	.61	4,390	36	679	--
Mar. 1-10	8,860	--	3.39	1.07	2.52	--	--	--	--	--	--	--	480	.63	5,580	36	695	--
Mar. 11-20	7,990	--	3.89	1.15	2.74	--	--	--	--	--	--	--	486	.66	5,270	35	739	--
Mar. 21-31	10,190	--	3.74	1.23	2.74	--	--	--	--	--	--	--	493	.67	6,630	36	746	--
Apr. 1-10	17,460	28	3.59	1.07	2.61	.14	3.21	3.16	.82	.03	.05	.18	477	.65	11,350	35	697	7.6
Apr. 11-20	30,620	--	3.19	.99	1.87	--	--	--	--	--	--	--	374	.51	15,620	31	562	--
Apr. 21-30	45,610	--	2.99	.82	1.70	--	--	--	--	--	--	--	342	.47	21,440	31	520	--

a No flow Oct. 1 to Dec. 12.

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

Chemical analyses, December 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				Per-cent sodium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH	
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot				Total tons
May 1-10, 1952..	66,950	--	2.79	0.77	1.48	--	--	--	--	--	--	313	0.43	28,790	29	1.1	478	--
May 11-20.....	78,050	--	2.59	.64	1.22	--	--	--	--	--	--	276	.36	29,660	27	1.0	421	--
May 21-31.....	66,570	--	2.50	.64	1.13	--	--	--	--	--	--	262	.36	23,970	26	0.9	399	--
June 1-10.....	65,900	--	2.50	.71	1.35	--	--	--	--	--	--	294	.40	26,360	30	1.1	446	--
June 11-20.....	61,390	--	2.20	.56	.83	--	--	--	--	--	--	233	.32	19,640	23	0.7	350	--
June 21-30.....	37,160	--	2.25	.61	1.04	--	--	--	--	--	--	262	.36	13,380	27	0.9	392	--
July 1-4.....	8,430	23	2.25	.58	1.22	0.10	2.23	1.44	0.39	0.02	0.02	268	.36	3,030	29	1.0	401	8.2
July 5-10.....	23,000	22	4.29	1.07	2.74	.15	2.92	4.71	.59	.02	.03	b 527	.72	16,560	33	1.7	791	8.0
July 11-20.....	29,500	--	3.09	.90	1.87	--	--	--	--	--	--	368	.50	14,750	32	1.3	567	--
July 21-26, 29-31	8,740	--	2.59	.77	1.78	--	--	--	--	--	--	340	.46	4,020	35	1.4	506	--
July 27-28.....	1,400	--	3.49	.90	2.83	--	--	--	--	--	--	474	.64	896	39	1.9	709	--
Aug. 1-8.....	11,050	--	4.69	1.23	2.44	--	--	--	--	--	--	509	.69	7,620	29	1.4	751	--
Aug. 9-20.....	20,930	--	3.89	.99	1.91	--	--	--	--	--	--	405	.55	11,510	28	1.2	604	--
Aug. 21-23, 26-28	8,740	--	3.59	.99	2.26	--	--	--	--	--	--	424	.58	5,070	33	1.5	637	--
Aug. 24-25, 29-31	10,610	--	7.09	1.97	4.13	--	--	--	--	--	--	817	1.11	11,780	31	1.9	1,120	--
Sept. 1-9.....	c1, 820	--	4.39	1.32	2.96	--	--	--	--	--	--	512	.70	1,270	34	1.8	755	--
Sept. 23, 27-30..	191	--	5.54	1.89	4.48	--	--	--	--	--	--	719	.98	1,187	38	2.3	1,040	--
Sept. 24-26.....	633	--	11.58	3.95	7.48	--	--	--	--	--	--	1,450	1.97	1,250	33	2.7	1,840	--
Total or weighted average	685,200	--	2.99	0.82	1.70	--	--	--	--	--	--	349	0.47	322,100	31	1.2	525	--

b Sum of determined constituents.

c No flow Sept. 6, 10-22.

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 1952.

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 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Month	Num- ber of sam- ples	Runoff (acre- feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- dium	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25° C)	pH
				Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
October 1951	20	241	--	5.22	2.35	8.78	--	2.55	8.01	5.85	--	0.30	1,079	1.47	354	54	4.5	1,610	8.0	
November ..	20	379	--	5.59	2.37	9.14	--	2.70	8.41	6.00	--	0.01	.25	1,144	591	53	4.6	1,700	8.0	
December ..	19	275	--	5.70	2.46	9.71	--	2.70	8.55	6.68	--	.01	.33	1,200	448	54	4.8	1,760	7.8	
January 1952	20	32,570	26	5.11	2.08	9.16	0.30	b 2.85	7.11	6.70	0.07	(a)	.19	1,082	47,880	55	4.8	1,650	8.2	
February...	20	46,010	--	2.84	1.38	4.84	--	c 2.20	3.99	3.10	--	(a)	.16	610	38,190	53	3.3	944	8.2	
March	25	27,170	--	3.57	1.38	5.00	--	3.00	4.25	3.00	--	0	.16	685	25,270	50	3.2	1,020	7.9	
April	20	42,350	--	3.40	1.35	4.45	--	d 2.85	4.14	2.35	--	.01	.17	595	34,300	48	2.9	1,905	8.2	
May	20	85,230	--	1.84	1.08	2.51	--	d 1.81	2.57	1.20	--	(a)	.16	373	43,470	46	2.1	560	8.2	
June	25	103,800	--	1.85	.84	1.75	--	e 1.95	1.73	.80	--	.01	.07	304	42,560	39	1.5	447	7.8	
July	20	117,400	15	1.96	.81	1.40	.16	c 2.05	1.58	.70	.02	0	.05	276	44,610	32	1.2	415	8.1	
August	25	58,560	--	1.82	.70	1.50	--	e 2.00	1.61	.70	--	.01	.11	271	21,670	37	1.3	418	8.0	
September..	20	29,000	--	2.10	.88	1.71	--	f 2.20	1.96	.70	--	.01	.08	306	12,180	35	1.4	477	8.2	

a Less than 0.01 parts per million

b Includes 0.30 equivalents per million of carbonate (CO₃).

c Includes 0.26 equivalents per million of carbonate (CO₃).

d Includes 0.24 equivalents per million of carbonate (CO₃).

e Includes 0.10 equivalents per million of carbonate (CO₃).

f Includes 0.40 equivalents per million of carbonate (CO₃).

RIO GRANDE BASIN--Continued

RIO GRANDE NEAR EL PASO, TEX.

LOCATION--At gaging station 5 miles northwest of El Paso, Tex., 6 miles northwest of Juarez, Chihuahua, and 1.9 river miles above the American Dam.

DRAINAGE AREA--29,267 square miles (from International Boundary and Water Commission Water Bulletin Number 20).

RECORDS AVAILABLE--Chemical analyses, 1933 to 1952.

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 1951 to September 1952 given in International Boundary and Water Commission Water Bulletin Numbers 21 and 22.

Chemical analyses, water year October 1951 to September 1952

Month	Num- ber of sam- ples	Runoff (acre- feet)	Silica (SiO ₂) ppm	Equivalents per million						Boron (B) ppm	Dissolved solids		Per- cent so- lids	So- lids ad- sorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)
				Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Parts per mil- lion	Tons per acre- foot	Total tons
October 1951	31	6,930	--	4.49	2.44	13.85	--	4.35	8.77	7.65	--	(a)	0.32	1,395	13,170
November ..	30	5,640	--	6.61	2.26	13.45	--	5.05	8.75	7.50	--	0.01	.35	1,363	10,430
December ..	31	5,300	--	5.67	2.59	13.20	--	5.05	9.12	7.50	--	.01	.37	1,378	9,910
January 1952	31	4,290	37	5.80	2.73	14.42	0.40	5.05	9.63	8.10	0.05	.01	.38	1,453	8,490
February...	29	3,190	--	5.62	2.45	14.9	--	b5.00	9.81	8.70	--	.01	.41	1,530	6,640
March	31	8,970	--	5.01	2.17	9.98	--	3.55	7.31	6.95	--	(a)	.24	1,162	14,170
April	30	26,100	--	4.84	1.90	8.21	--	3.47	6.04	5.60	--	(a)	.24	985	34,970
May	31	34,400	--	4.32	1.95	6.25	--	3.30	5.40	4.00	--	.02	.24	823	38,530
June	30	47,100	--	3.59	1.36	4.45	--	3.10	3.80	2.60	--	.02	.18	612	39,090
July	31	51,400	17	3.26	1.16	4.10	.25	3.10	3.25	.03	.02	.16	.16	549	38,550
August	31	58,000	--	3.22	1.28	3.46	--	3.07	3.03	2.15	--	.03	.11	531	41,760
September..	30	32,700	--	4.01	1.32	5.40	--	3.51	4.12	3.15	--	.02	.25	692	30,740
Total		284,020	--	--	--	--	--	--	--	--	--	--	--	--	286,400

a Less than 0.01 parts per million.

b Includes 0.20 equivalents per million of carbonate (CO₃).

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 1952.
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 1951 to September 1952 given in International Boundary and Water Commission Water Bulletin Numbers 21 and 22.

Chemical analyses, water year October 1951 to September 1952

Month	Num- ber of sam- ples	Runoff (acre- feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- lids	So- lids ad- sorp- tion ratio	Specific conduct- ance (micro- mhos at 25 C)	pH
				Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
October 1951	6	1,360	--	18.30	9.29	50.38	--	3.34	21.67	52.84	--	(b)	0.65	4,967	6.76	9,194	65	14	7,280	7.9
November...	5	1,630	--	17.47	8.27	45.74	--	4.40	20.39	47.00	--	0.01	.80	2,253	6.13	9,992	64	13	6,690	7.8
December...	3	2,080	--	14.95	7.48	37.64	--	4.32	17.84	38.35	--	.02	.58	3,824	5.20	10,820	63	11	5,720	7.7
January 1952	7	1,650	42	18.32	9.61	50.21	0.50	4.54	21.57	52.50	0.06	.01	.66	5,004	6.81	11,240	64	13	7,350	7.8
February...	6	1,040	--	20.65	10.76	55.5	--	4.39	23.31	59.30	--	0	.71	5,520	7.51	7,810	64	14	8,200	7.8
March...	4	332	--	25.35	13.80	67.6	--	4.21	26.87	76.00	--	(b)	.77	6,854	9.32	3,090	63	15	9,840	7.8
April.....	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May.....	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June.....	--	384	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July.....	5	2,280	29	7.30	2.59	11.10	.40	3.15	5.77	12.50	.05	.03	.25	1,368	1.86	4,240	52	5.0	2,190	7.8
August.....	2	185	--	7.01	2.65	11.75	--	3.31	6.14	12.25	--	.01	.4	1,321	1.80	333	55	5.3	2,080	7.8
September..	2	260	--	20.35	11.45	61.6	--	2.54	25.45	65.80	--	(b)	.80	2,950	8.02	2,080	66	15	8,800	8.0

a Includes 0.64 equivalents per million carbonate (CO₃).

b Less than 0.01 parts per million.

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 1952.

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 1951 to September 1952 given in International Boundary and Water Commission Water Bulletin Numbers 21 and 22.

Chemical analyses, water year October 1951 to September 1952

Month	Num- ber of sam- ples	Runoff (acre- feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Per- cent so- dium ratio	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH		
				Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion					Tons per acre- foot	Total tons
October 1951	9	38,600	--	3.59	1.51	3.92	--	3.05	4.50	1.60	--	0.04	0.22	605	0.82	31,650	43	2.5	880	7.9
November ..	7	38,600	--	3.99	1.39	3.95	--	3.20	4.63	1.50	--	.03	.18	814	.84	32,420	42	2.4	894	8.0
December ..	6	36,000	--	3.85	1.67	4.08	--	3.25	4.73	1.75	--	.04	.16	628	.85	30,600	42	2.5	931	8.0
January 1952	10	33,400	29	3.84	1.87	4.15	0.18	3.20	4.92	1.90	0.08	.04	.19	635	.86	28,720	41	2.5	940	7.9
February...	9	28,000	--	3.80	1.74	3.91	--	3.10	4.84	1.80	--	.04	.18	643	.87	24,360	41	2.4	950	8.0
March	8	25,200	--	3.71	1.94	4.00	--	3.05	4.81	2.00	--	.03	.21	653	.89	22,430	41	2.4	963	8.0
April	9	25,900	--	3.61	1.63	3.68	--	2.80	4.44	1.65	--	.05	.20	594	.81	20,980	41	2.3	874	7.9
May	8	34,400	--	3.61	1.35	2.41	--	2.81	3.58	1.00	--	.07	.18	494	.67	23,050	33	1.5	720	8.0
June	9	48,000	--	3.58	1.12	2.75	--	2.57	3.93	1.00	--	.06	.11	511	.69	33,120	37	1.8	741	7.8
July	19	325,000	22	4.10	.65	2.12	.18	2.35	4.03	.65	.04	.06	.11	477	.65	211,200	30	1.4	694	7.8
August	8	41,100	--	4.54	1.71	4.02	--	2.55	5.62	2.15	--	.06	.11	713	.97	39,870	39	2.3	1,020	7.7
September...	--	19,600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

a Includes 0.10 equivalents per million of carbonate (CO₃).

RIO GRANDE BASIN--Continued

RIO GRANDE AT EAGLE PASS, TEX.

LOCATION.--At gaging station 0.5 mile above the international highway bridge between Eagle Pass, Tex., and Piedras Negras, Coahuila, and 754.6 river miles below the American Dam at El Paso, Tex.

DRAINAGE AREA.--125,502 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20)

RECORDS AVAILABLE.--Chemical analyses, 1938 to 1952.

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 1951 to September 1952 given in International Boundary and Water Commission Water Bulletin Numbers 21 and 22.

Chemical analyses, water year October 1951 to September 1952

Month	Num- ber of sam- ples	Runoff (acre- feet)	Silica (SiO ₂) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids			Per- cent so- dium	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH
				Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)		Ni- trate (NO ₃)	Parts per mil- lion	Tons per acre- foot				
October 1951	27	65,490	--	3.15	1.62	3.67	--	2.63	3.00	2.75	--	0.05	536	0.73	47,810	43	2.4	849	7.8
November..	26	64,870	--	3.99	1.73	4.13	--	3.30	3.57	3.05	--	.06	.16	.85	55,140	42	2.4	968	8.2
December..	27	56,880	--	4.04	2.02	4.87	--	3.15	3.99	4.00	--	.05	.14	.96	54,600	45	2.8	1,090	8.0
January 1952	26	57,340	30	4.17	2.35	5.10	0.07	3.20	4.23	4.30	0.05	.04	.18	1.02	58,490	44	2.8	1,180	7.9
February..	23	49,310	--	7.06	6.15	6.15	--	3.00	--	5.35	--	--	874	1.19	58,680	47	3.3	1,340	--
March.....	20	40,230	--	6.67	6.09	6.09	--	2.95	--	5.25	--	--	851	1.16	46,670	48	3.3	1,290	--
April.....	22	48,920	--	5.69	5.40	5.40	--	2.70	--	4.65	--	--	690	.94	45,980	49	3.2	1,110	--
May.....	20	135,100	--	4.12	2.24	2.24	--	2.60	--	1.95	--	--	413	.56	75,660	35	1.6	652	--
June.....	23	69,410	--	5.89	4.18	4.18	--	2.69	--	3.30	--	--	671	.91	63,160	42	2.4	1,020	--
July.....	26	333,600	37	3.85	1.08	2.30 ^a	.23	2.43	3.57	1.25	.04	.14	.08	.66	220,200	31	1.5	718	7.8
August.....	26	50,080	--	5.49	3.89	3.89	--	2.45	--	2.75	--	--	614	.84	42,070	41	2.3	939	--
September..	26	27,050	--	5.30	4.00	4.00	--	2.45	--	3.35	--	--	610	.83	22,450	43	2.5	964	--
Total.....	998,280	--	--	--	--	--	--	--	--	--	--	--	--	790,900	--	--	--	--

a Includes 0.30 equivalents per million of carbonate (CO₃).

b Includes 0.10 equivalents per million of carbonate (CO₃).

RIO GRANDE BASIN--Continued
RIO GRANDE AT ROMA, TEX.

LOCATION.--At gaging station at international bridge between Roma, Tex., and Cd. Miguel Aleman (formerly San Pedro); Tamaulipas, 14.9 river miles above the confluence of the Rio San Juan from Mexico, and 992.0 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--157,448 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 20).

RECORDS AVAILABLE.--Chemical analyses, 1933 to 1952.

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 1951 to September 1952 given in International Boundary and Water Commission Water Bulletin Numbers 21 and 22.

Chemical analyses, water year October 1951 to September 1952

Month (a)	Num- ber of sam- ples	Runoff (acre- feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH		
				Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot				Total tons	
October 1951	30	144,000	--	2.99	0.98	2.73	--	2.33	2.47	2.00	--	0.06	0.13	442	0.60	86,400	41	1.9	889	7.8
November ..	30	76,860	--	3.54	1.59	4.05	--	2.70	3.55	3.05	--	.05	.15	594	.81	63,880	44	2.5	919	8.0
December ..	31	66,120	--	3.22	1.99	5.12	--	b2.20	4.23	3.90	--	(c)	.17	861	.90	59,510	50	3.2	1,060	8.1
January 1952	31	63,170	17	3.94	2.43	5.76	0.15	2.95	4.70	4.60	0.05	.02	.22	763	1.04	65,700	47	3.2	1,200	7.6
February...	29	46,690	--	4.01	2.49	5.95	--	2.70	4.88	5.05	--	(c)	.18	818	1.11	54,040	48	3.3	1,280	7.8
March.....	31	43,160	--	4.04	2.72	6.65	--	2.55	5.16	5.75	--	.01	.22	872	1.19	51,360	50	3.6	1,360	7.8
April	30	41,870	--	3.99	2.73	7.45	--	2.40	5.51	6.30	--	.02	.13	917	1.25	52,340	53	4.1	1,450	7.8
May.....	31	180,500	--	3.69	1.44	3.40	--	d2.60	3.06	2.85	--	.05	.15	533	.72	130,000	40	2.1	863	8.0
July.....	31	333,200	16	4.32	.94	2.40	.19	2.67	3.86	1.25	.04	.10	.14	519	.71	236,000	31	1.5	764	7.7
August.....	31	53,280	--	4.01	1.32	3.51	--	2.50	4.19	2.10	--	.07	.14	599	.81	43,160	40	2.2	869	7.7
September..	30	40,800	--	3.68	1.65	4.62	--	2.15	4.40	3.35	--	.03	.25	642	.87	35,500	46	2.8	1,000	8.0

a Record for June not included.

b Includes 0.30 equivalents per million of carbonate (CO₃).

c Less than 0.01 parts per million.

d Includes 0.20 equivalents per million of carbonate (CO₃).

RIO GRANDE BASIN--Continued

PECOS RIVER BELOW ALAMOGORDO DAM, N. MEX.

LOCATION:--At gaging station 1,200 feet downstream from Alamogordo Dam, 1½ miles downstream from Alamogordo Creek, and 4½ miles north-east of Guadalupe, Debaca County, DRAINAGE AREA:--4,390 square miles (contributing area). RECORDS AVAILABLE:--Chemical analyses, June 1937 to September 1952. EXTREMES, 1951-52:--Specific conductance: Maximum daily, 3,000 micromhos, Apr. 11; minimum daily, 913 micromhos, July 16. Percent sodium: Maximum, 13 June 25-30; minimum, 8 Nov. 21-30 and July 11-14. EXTREMES, 1937-52:--Specific conductance: Maximum daily, 3,200 micromhos, Jan. 14, 1948; minimum daily, 513 micromhos, July 22, 1937. Percent sodium: Maximum, 19 July 1, 3-10, 1947; minimum, 1 Feb. 21-28, 1950. REMARKS:--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Oct. 1-10, 1951..	1,800	14	22.06	5.02	3.17		2.57	24.57	2.85	0.02		1,950	2.65	4,770	10	0.9	2,330	7.5
Oct. 11-20.....	1,630	10	21.56	5.18	3.26		2.18	24.57	2.90	.01		1,930	2.62	4,270	11	0.9	2,290	7.5
Oct. 21-31.....	1,860	13	22.95	5.76	3.01		2.51	26.23	3.10	.02		2,060	2.80	5,210	10	0.8	2,420	7.5
Nov. 1-10.....	67	16	22.06	5.92	2.96		2.41	25.40	3.13	.02		2,000	2.72	237	10	0.8	2,390	7.5
Nov. 11-20.....	20	14	22.26	5.59	3.39		2.59	25.82	3.22	.03		2,040	2.77	55	11	0.9	2,430	7.5
Nov. 21-30.....	19	14	22.16	6.17	2.61		2.62	25.19	3.16	.02		2,000	2.72	52	8	0.7	2,410	7.5
Dec. 1-10.....	11	15	21.36	6.33	3.09		2.49	25.19	3.16	.02		1,990	2.71	30	10	0.8	2,390	7.5
Dec. 11-20.....	7.7	16	22.75	6.09	3.09		2.52	26.23	3.30	.02		2,070	2.82	22	10	0.8	2,450	7.6
Dec. 21-31.....	5.4	16	22.55	6.00	3.00		2.52	25.82	3.27	.02		2,040	2.77	15	10	0.8	2,430	7.6
Jan. 1-10, 1952..	4.8	15	23.15	5.92	3.17		2.59	26.65	3.38	.02		2,100	2.86	14	10	0.8	2,480	7.7
Jan. 11-20.....	5.4	16	23.65	6.17	3.13		2.75	26.86	3.50	.02		2,140	2.91	16	9	0.8	2,510	7.7
Jan. 21-31.....	5.4	16	23.05	6.09	3.30		2.79	26.65	3.47	.02		2,120	2.88	16	10	0.9	2,500	7.7
Feb. 1-10.....	5.8	16	23.95	6.58	3.22		2.75	27.48	3.55	.02		2,180	2.96	17	10	0.8	2,550	7.7
Feb. 11-20.....	a 894	17	26.35	6.58	4.35		2.52	30.40	3.72	.01		2,390	3.25	2,910	12	1.1	2,730	7.7
Feb. 21-29.....	a 2.2	15	24.75	6.50	4.35		2.36	29.35	3.58	.01		2,300	3.13	7	12	1.1	2,650	7.7

a No flow during part of period.

a No flow during part of period.

Mar. 1-10.....	1,750	27.25	6.83	4.39	2.29	31.64	3.84	.01	2,470	3.36	5,880	11	1.1	2,810	7.7
Mar. 11-20.....	1,630	27.94	6.74	4.65	2.00	32.89	4.03	.01	2,550	3.47	5,660	12	1.1	2,850	7.4
Mar. 21-31.....	8,020	27.64	6.66	4.74	2.06	32.69	3.98	.01	7,530	3.44	27,660	12	1.1	2,840	7.5
Apr. 1-12.....	20,610	28.94	6.58	4.63	2.25	33.73	4.15	.01	2,620	3.56	73,370	12	1.1	2,950	7.5
Apr. 13-20.....	1,430	20.06	4.36	3.17	2.51	22.28	2.65	.02	1,780	2.42	3,460	11	0.9	2,130	7.5
Apr. 21-30.....	1,520	18.66	4.28	3.04	2.15	21.03	2.48	.02	1,670	2.27	3,450	12	0.9	2,010	7.5
May 1-10.....	1,880	16.12	3.54	2.61	2.16	17.74	2.14	.02	1,430	1.94	3,650	12	0.8	1,780	7.3
May 11-20.....	2,200	11.58	2.47	1.74	2.00	12.26	1.41	.02	1,020	1.39	3,060	11	0.7	1,330	7.4
May 21-31.....	2,090	12.18	2.30	1.43	1.98	10.51	1.21	.02	886	1.20	2,510	10	0.6	1,190	7.3
June 1-10.....	1,720	10.53	2.30	1.52	2.02	10.87	1.24	.02	914	1.24	2,130	11	0.6	1,210	7.3
June 11-20.....	4,570	10.53	2.22	1.61	2.05	10.93	1.30	.02	921	1.25	5,710	11	0.6	1,230	7.2
June 21-24.....	8,920	9.78	2.30	1.39	1.90	10.31	1.18	.02	863	1.17	10,440	10	0.6	1,170	7.5
June 25-30.....	14,300	21.86	5.18	3.96	2.87	25.40	3.10	.03	2,020	2.75	39,320	13	1.1	2,370	7.5
July 1-2, 4-10.....	4,070	22.80	4.85	3.52	2.26	26.02	2.96	.03	2,040	2.77	11,270	11	0.9	2,370	7.5
July 3.....	301	11.98	3.54	1.91	2.16	13.78	1.55	.02	1,120	1.52	458	11	0.7	1,450	7.5
July 11-14.....	817	19.76	4.03	2.17	2.62	21.44	1.75	.03	1,680	2.28	1,660	8	0.6	1,980	7.3
July 15-20.....	773	7.93	1.97	1.04	3.29	7.02	.51	.11	684	.93	719	10	0.5	1,945	7.7
July 21-31.....	6,860	9.83	1.97	1.26	1.70	10.64	.68	.05	848	1.15	7,890	10	0.5	1,120	7.3
Aug. 1-10.....	4,810	13.27	2.71	1.61	1.84	14.57	1.10	.03	1,140	1.55	7,460	9	0.6	1,440	7.4
Aug. 11-20.....	17,030	9.88	2.06	1.26	1.84	10.47	.79	.02	851	1.16	19,750	10	0.5	1,120	7.3
Aug. 21-31.....	8,810	9.23	2.06	1.30	2.10	9.51	.85	.02	804	1.09	9,600	10	0.5	1,080	7.5
Sept. 1-10.....	1,930	10.43	2.30	1.52	2.23	10.87	1.13	.02	914	1.24	2,390	11	0.6	1,210	7.5
Sept. 11-20.....	1,730	12.23	2.63	2.00	2.16	13.26	1.38	.01	1,090	1.48	2,560	12	0.7	1,400	7.5
Sept. 21-30.....	1,790	15.22	3.37	2.30	2.41	16.63	1.86	.01	1,350	1.84	3,290	11	0.8	1,680	7.5
Total or weighted average	126,000	17.66	4.03	2.83	2.15	19.97	2.26	0.02	1,590	2.16	272,200	12	0.9	1,900	--

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR ARTESIA, N. MEX.

LOCATION.--At gaging station at bridge on Artesia-Lovington highway, 4.3 miles east of Artesia, Eddy County, 7.0 miles north of mouth of Rio Pecos, and 17 miles north of McMillan Dam.

DRAINAGE AREA.--15,300 square miles, approximately (contributing area).

RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 14,800 micromhos, June 15; minimum daily, 1,620 micromhos, Aug. 26.

Percent sodium: Maximum, 60 Sept. 10-20, minimum, 20 Aug. 21-29.

EXTREMES, 1937-52.--Specific conductance: Maximum daily, 17,200 micromhos Aug. 20, 1945; minimum daily, 898 micromhos Sept. 22, 1941.

Percent sodium: Maximum, 71 May 16, 1950; minimum, 12 Mar. 25-31, 1951.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				So- ad- orp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons	Per- cent sod- ium			
Oct. 1-10, 1951 ..	448	15	33.78	23.60	69.57		2.33	48.09	77.28	--		7,700	10.5	4,700	55	13	11,000	7.2	
Oct. 11-20	666	16	29.84	20.81	52.18		2.49	44.14	57.25	0.05		6,290	8.55	5,690	51	10	8,940	7.2	
Oct. 21-29	849	17	27.74	17.35	42.40		1.90	40.60	45.69	.04		5,390	7.33	6,220	48	8.9	7,570	7.2	
Oct. 30-31, Nov. 1-10	2,640	16	23.65	12.01	24.31		2.72	31.02	27.08	.09		3,730	5.07	13,380	41	5.8	5,260	7.3	
Nov. 11-20	1,800	17	26.65	15.38	36.87		3.23	35.39	40.89	.10		4,840	6.58	11,840	47	8.0	6,840	7.5	
Nov. 21-30	1,870	18	26.25	16.28	35.53		3.20	35.81	40.05	.13		4,800	6.53	12,210	46	7.8	7,070	7.8	
Dec. 1-10	1,760	17	26.15	16.28	39.74		3.36	36.23	42.30	.12		5,000	6.80	11,970	48	8.6	7,130	7.7	
Dec. 11-20	1,970	18	26.35	15.95	39.22		3.57	35.60	42.87	.12		4,990	6.79	13,380	49	8.5	7,130	7.7	
Dec. 21-31	2,260	17	26.05	15.71	40.01		3.43	35.60	42.59	.11		4,980	6.77	15,300	49	8.8	7,110	7.5	
Jan. 1-10, 1952 ..	1,850	16	25.85	16.37	39.40		3.38	35.81	42.30	.10		4,970	6.76	12,510	48	8.7	7,100	7.5	
Jan. 11-20	1,540	13	27.25	17.43	41.96		2.97	39.14	45.41	.07		5,320	7.23	11,130	49	8.9	7,530	7.7	
Jan. 21-31	1,350	14	28.14	19.08	45.66		2.79	41.01	49.36	.06		5,670	7.71	10,410	49	9.4	8,050	7.6	
Feb. 1-10	894	13	28.94	19.57	47.40		2.57	42.89	51.05	.07		5,870	7.98	7,130	50	9.6	8,250	7.6	
Feb. 11-20	922	11	28.24	19.57	49.57		2.36	42.26	51.61	.05		5,890	8.01	7,390	51	10	8,250	7.5	
Feb. 21-29	1,170	13	28.34	18.26	41.31		2.56	41.43	42.30	.07		5,320	7.24	8,470	47	8.6	7,330	7.5	

Mar. 1-10.....	1,100	12	29.14	19.74	47.83	2.44	43.10	51.05	.05	5,890	8.01	8,810	49	9.7	8,230	7.6
Mar. 11-20.....	1,110	14	29.74	18.17	49.14	2.10	44.55	50.48	.06	5,960	8.11	9,000	51	10	8,020	7.3
Mar. 21-31.....	1,350	15	30.04	17.43	52.18	2.62	44.97	50.48	.03	6,060	8.24	11,120	52	11	8,250	7.3
Apr. 1.....	684	24	30.44	13.98	30.53	2.97	43.93	27.36	.02	4,680	6.36	4,350	41	6.5	5,960	7.3
Apr. 2-10.....	9,040	20	30.34	9.21	15.13	2.75	38.31	12.83	.03	3,470	4.72	42,670	28	3.4	4,130	7.5
Apr. 11-19.....	9,830	17	30.04	7.89	11.48	2.49	36.23	9.93	.02	3,150	4.28	42,070	23	2.6	3,710	7.5
Apr. 20-22.....	1,410	18	26.05	6.74	12.18	2.11	32.06	10.27	.06	2,870	3.90	5,500	27	3.0	3,480	7.6
Apr. 23-30.....	1,540	19	28.24	12.25	28.70	2.39	37.47	28.49	.04	4,280	5.82	8,960	41	6.4	5,630	7.4
May 1-10.....	978	22	30.84	17.68	49.14	2.33	44.97	48.79	.03	5,950	8.09	7,910	50	10	7,940	7.3
May 11-20.....	656	20	32.93	21.30	62.18	2.70	48.30	63.74	.03	7,030	9.56	6,270	53	12	9,640	7.2
May 21-31.....	803	18	30.14	20.23	56.09	2.46	44.34	58.66	.03	6,440	8.76	7,030	53	11	8,910	7.3
June 1-13.....	648	19	31.44	20.81	58.70	2.36	47.47	60.92	.03	6,760	9.19	5,960	53	11	9,330	7.3
June 14-24.....	430	20	35.08	24.75	86.53	2.41	53.71	92.51	.03	8,950	12.2	5,250	59	16	12,400	7.4
June 25-30.....	8,700	16	24.85	5.76	11.35	2.25	29.35	10.01	.06	2,680	3.64	31,670	27	2.9	3,350	7.4
July 1-10.....	7,790	16	21.28	5.18	7.91	2.38	24.15	7.56	.06	2,190	2.98	23,210	23	2.2	2,770	7.5
July 11-15.....	633	17	24.45	9.21	23.48	1.77	31.44	23.24	.04	3,550	4.83	3,060	41	5.7	4,810	7.3
July 16-25.....	9,790	16	20.96	4.93	7.52	1.95	24.57	6.88	.05	2,160	2.94	28,790	23	2.1	2,690	7.5
July 26-31, Aug. 1-2	692	16	24.05	8.72	23.66	1.87	31.64	22.28	.09	3,520	4.79	3,310	42	5.8	4,670	7.3
Aug. 3-12.....	4,960	14	18.66	5.10	9.57	2.03	22.07	8.86	.08	2,110	2.87	14,240	29	2.8	2,800	7.3
Aug. 13-20.....	13,040	15	16.27	3.78	6.00	2.10	18.26	5.30	.06	1,660	2.26	29,470	23	1.9	2,180	7.6
Aug. 21-29.....	11,760	15	14.12	3.12	4.39	2.13	15.84	3.67	.05	1,390	1.89	22,230	20	1.5	1,810	7.7
Aug. 30-31, Sept. 1-4.....	545	15	18.41	6.83	16.96	1.86	23.73	16.36	.05	2,630	3.58	1,950	40	4.8	3,530	7.3
Sept. 5-9.....	109	16	23.75	11.10	36.09	1.61	33.31	35.54	.03	4,370	5.94	6,647	51	8.7	5,780	7.3
Sept. 10-20.....	213	17	33.53	20.72	83.05	2.02	49.13	86.02	.03	8,320	11.3	2,410	60	16	10,700	7.4
Sept. 21-30.....	537	16	30.94	21.46	71.31	2.43	47.05	73.89	.03	7,490	10.2	5,480	58	14	9,590	7.4
Total or weighted average	110,400	16	23.60	8.88	19.05	2.59	29.77	19.04	0.06	3,220	4.38	483,600	37	4.7	4,250	--

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR ORLA, TEX.

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

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

RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 13,600 micromhos Sept. 26-27; minimum daily, 4,470 micromhos Apr. 19.

Percent sodium: Maximum, 61 Sept. 1-30; minimum, 45 Apr. 16-19.

EXTREMES, 1940-52.--Specific conductance (1950-52): Maximum daily, 13,600 micromhos Sept. 26-27, 1952; minimum daily, 2,500 micromhos Oct. 2, 1950.

Percent sodium: Maximum, 64 Sept. 1-10, 1947, Sept. 19-30, 1948; minimum, 9 Aug. 17-19, 1944.

REMARKS.--Values reported for dissolved solids are sums of determined constituents. Records of specific conductance of daily samples from November 1941 to September 1952 available in District office at Austin, Tex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1242.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent ad-sorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons			
Oct. 1-31, 1951 .	407	22	30.64	19.00	64.11	1.67	45.80	66.28		--		6,940	9.44	3,840	56	13	10,000	7.4
Nov. 1-30	484	22	31.34	19.08	61.45	1.98	45.59	64.30		--		6,820	9.28	4,490	55	12	9,390	7.6
Dec. 1-31	1,730	26	31.14	19.08	63.21	1.97	45.18	66.28		--		6,910	9.40	16,260	56	13	9,790	7.7
Jan. 1-31, 1952 .	678	22	30.44	20.07	64.44	2.03	45.80	67.12		--		7,000	9.52	6,450	56	13	10,000	7.6
Feb. 1-29	607	16	29.14	19.08	67.57	1.95	45.59	68.25		--		7,050	9.59	5,820	58	14	10,000	7.4
Mar. 1-31	4,650	16	30.64	20.23	66.92	1.92	47.05	68.82		--		7,170	9.75	45,340	57	13	10,200	7.6
Apr. 1-15, 20-30	9,920	20	29.14	19.41	65.72	2.03	44.55	67.69		--		6,950	9.45	93,740	58	13	9,940	8.1
Apr. 16-19	3,060	16	25.45	8.31	27.71	2.00	29.77	29.61	0.09	0.09		3,810	5.18	15,850	45	6.6	5,440	7.8
May 1-31	2,670	36	30.54	19.90	72.59	1.46	47.68	73.89		--		7,510	10.21	27,260	59	15	10,700	7.6
June 1-30	4,250	28	31.39	20.64	78.94	1.74	49.13	80.10		--		7,980	10.65	46,110	60	16	11,300	7.0
July 1-31	7,780	21	30.64	18.59	69.91	1.64	46.63	71.07		--		7,280	9.90	77,020	59	14	10,500	7.3
Aug. 1-30	10,860	19	29.64	13.82	54.02	1.41	41.01	55.00	.06	.06		5,990	8.15	88,510	55	11	8,570	7.2
Sept. 1-30	2,240	17	33.18	17.43	80.13	1.67	45.59	83.48		--		7,930	10.78	24,150	61	16	11,500	7.4
Total or weighted average	49,350	21	29.99	17.43	63.49	1.74	44.14	65.15		--		6,780	9.22	455,400	57	13	9,690	--

RIO GRANDE BASIN--Continued

PECOS RIVER NEAR COMSTOCK, TEX.

LOCATION.--At gaging station at the Pecos High Bridge on the railroad 12 miles northwest of Comstock, Tex., 5.5 miles above the confluence with the Rio Grande. The river enters the Rio Grande 638.2 river miles below the American Dam at El Paso, Tex.

RECORDS AVAILABLE.--Chemical analyses, 1936 to 1952.

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 1951 to September 1952 given in International Boundary and Water Commission Water Bulletin Numbers 21 and 22.

Chemical analyses, water year October 1951 to September 1952

Month	Num-ber of sam-ples	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH	
				Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)		Ni-trate (NO ₃)	Parts per mil-lion	Tons per acre-foot					Total tons
October 1951	16	7,440	--	7.62	6.54	19.85	--	2.55	10.50	20.90	--	0.04	0.28	2,150	2.93	21,800	58	7.4	3,290	7.7
November ..	15	9,130	--	7.77	6.22	19.10	--	2.80	10.19	20.05	--	.02	.23	2,078	2.83	25,840	58	7.2	3,200	7.8
December ..	15	9,750	--	8.92	7.21	22.67	--	2.85	12.05	24.00	--	.03	.25	2,446	3.33	32,470	58	8.0	3,800	7.8
January 1952	16	9,680	11	9.40	8.39	25.54	0.38	3.10	13.36	27.00	0.06	.05	.26	2,678	3.84	35,240	58	8.6	4,180	7.7
February ..	13	9,700	--	10.50	9.13	28.7	--	2.72	15.21	30.60	--	(a)	.31	3,074	4.18	40,550	59	11	4,700	7.7
March	16	9,140	--	9.90	9.11	27.6	--	2.50	14.56	29.60	--	.02	.28	2,969	4.04	36,920	59	9.0	4,530	7.7
April	15	9,210	--	10.22	8.84	29.8	--	b 2.50	15.35	30.95	--	.04	.23	3,125	4.25	39,140	61	9.6	4,720	7.8
May	17	10,500	--	7.18	5.80	17.8	--	c 2.25	9.33	19.40	--	.09	.3	1,949	2.65	27,820	58	7.0	3,100	8.1
June	15	8,150	--	6.58	5.80	17.8	--	2.35	9.02	18.80	--	.05	.23	1,923	2.82	21,350	59	7.1	3,020	7.8
July	15	8,680	9	5.84	4.90	14.8	.40	2.40	7.79	15.55	.05	.05	.26	1,579	2.15	18,660	57	6.4	2,590	7.7
August	16	5,740	--	6.11	5.72	15.6	--	2.45	8.04	16.80	--	.04	.25	1,718	2.34	13,430	57	6.4	2,750	7.7
September ..	15	7,220	--	6.96	5.76	16.6	--	2.57	6.71	18.20	--	.04	.26	1,867	2.54	18,340	57	6.6	2,980	7.9
Total		104,340	--	--	--	--	--	--	--	--	--	--	--	--	--	331,600	--	--	--	--

a Less than 0.01 parts per million of carbonate (CO₃).

b Includes 0.20 equivalents per million of carbonate (CO₃).

c Includes 0.24 equivalents per million of carbonate (CO₃).

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 1952.

Water temperatures: May 1949 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,010 micromhos Jan. 8; minimum daily, 180 micromhos June 16.

Percent sodium: Maximum, 46 Feb. 21-29, Mar. 1-10; minimum, 13 June 1-10.

EXTREMES, 1941-52.--Specific conductance: Maximum daily, 1,370 micromhos Jan. 20, 1943; minimum daily, 153 micromhos May 24, 1948.

Percent sodium: Maximum, 51 Mar. 21-31, 1944; minimum, 13 June 11-20, 1949; June 1-10, 1952.

REMARKS.--Values reported for dissolved solids are 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 1951 to September 1952 given in Water-Supply Paper 1243. No appreciable inflow between Shoshone power plant and gaging station except during periods of local rains.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot			Total tons
Oct. 1-10, 1951	25,860	12	3.09	1.23	2.91	0.08	2.23	2.35	2.71	0.01	--	440	0.60	15,520	40	2.0	734
Oct. 11-20	22,680	11	3.09	1.32	2.87	.07	2.23	2.39	2.76	.01	0.11	448	.61	13,840	39	2.9	741
Oct. 21-31	26,160	12	3.14	1.32	2.74	.07	2.33	2.44	2.54	.01	--	446	.61	15,960	38	1.8	719
Nov. 1-10	22,570	13	2.94	1.15	2.57	.07	2.20	2.21	2.43	.01	--	413	.56	12,640	38	1.8	678
Nov. 11-20	20,120	12	2.99	1.23	2.74	.07	2.20	2.25	2.65	.01	.10	432	.59	11,870	39	1.9	707
Nov. 21-30	20,320	14	2.94	1.23	2.78	.07	2.29	2.12	2.62	.01	--	430	.58	11,790	40	1.9	704
Dec. 1-10	18,510	11	2.99	.99	2.61	.07	2.03	2.04	2.43	.01	--	402	.55	10,180	39	1.9	665
Dec. 11-20	22,280	13	2.59	.90	2.22	.06	1.97	1.73	2.06	.01	--	352	.48	10,690	38	1.7	587
Dec. 21-31	22,500	14	2.84	.99	2.52	.06	2.06	1.85	2.40	.01	--	364	.52	11,700	39	1.8	643
Jan. 1-10, 1952	14,130	13	3.39	1.23	3.70	.07	2.56	2.44	3.50	.01	--	507	.69	9,750	44	2.4	868
Jan. 11-20	16,740	14	2.89	1.07	2.96	.06	2.13	2.06	2.85	.01	.06	434	.59	11,060	42	2.1	721
Jan. 21-31	19,870	13	2.79	1.15	3.04	.06	2.15	2.02	2.88	.01	--	424	.58	11,520	43	2.2	717

Feb. 1-10.....	16,290	13	2.99	1.23	3.39	-.07	2.21	2.23	3.24	.01	0.11	461	.63	10,260	44	2.3	769
Feb. 11-20.....	16,060	13	2.99	1.23	3.46	.07	2.23	2.21	3.30	.01	0.11	466	.63	10,120	45	2.4	783
Feb. 21-29.....	14,360	13	3.09	1.07	3.65	.07	2.26	2.21	3.44	.02	0.11	476	.65	9,330	46	2.5	803
Mar. 1-10.....	14,750	12	2.99	1.15	3.65	.07	2.23	2.17	3.41	.02	0.11	469	.64	9,440	46	2.5	794
Mar. 11-20.....	18,180	12	2.99	.90	3.00	.06	2.06	1.89	2.76	.02	0.08	408	.55	9,970	44	2.2	693
Mar. 21-31.....	30,130	11	2.05	.77	2.17	.06	1.72	1.37	1.97	.02	0.08	308	.42	12,650	43	1.8	529
Apr. 1-10.....	25,250	11	2.84	1.15	2.65	.06	2.03	2.23	2.45	.02	0.05	407	.55	13,890	40	1.9	710
Apr. 11-20.....	55,810	12	2.50	.99	1.52	.07	2.11	1.69	1.18	.02	0.05	324	.44	24,600	30	1.2	522
Apr. 21-30.....	113,000	11	2.20	.72	.74	.06	2.13	1.08	.48	.02	0.05	232	.32	36,160	20	0.6	368
May 1-10.....	199,500	11	1.70	.54	.48	.05	1.69	.83	.23	.02	0.05	180	.24	47,880	17	0.6	274
May 11-20.....	209,700	11	1.50	.50	.43	.04	1.56	.56	.28	.02	0.05	157	.21	44,040	17	0.4	245
May 21-31.....	188,200	12	1.50	.54	.52	.03	1.51	.65	.37	.01	0.05	164	.22	41,400	20	0.5	258
June 1-10.....	317,600	10	1.65	.43	.33	.04	1.64	.52	.17	.02	0.05	147	.20	63,520	13	0.3	239
June 11-20.....	292,800	9.6	1.30	.40	.35	.03	1.31	.50	.23	.01	0.05	128	.17	49,780	17	0.4	208
June 21-30.....	174,800	8.4	1.45	.48	.57	.04	1.31	.85	.42	.00	0.05	150	.20	34,960	22	0.6	251
July 1-10.....	110,200	9.3	1.70	.59	.83	.04	1.47	1.02	.68	.01	0.05	194	.26	28,650	26	0.8	327
July 11-20.....	70,430	9.5	2.20	.82	1.30	.05	1.69	1.54	1.13	.01	0.05	266	.36	25,350	30	1.1	444
July 21-31.....	64,170	11	2.79	1.07	1.48	.06	2.03	2.04	1.27	.01	0.05	322	.44	28,230	27	1.1	526
Aug. 1-10.....	51,610	12	3.44	1.23	1.87	.07	2.34	2.52	1.75	.02	0.05	398	.54	27,870	28	1.2	646
Aug. 11-20.....	54,740	11	3.24	1.07	1.81	.05	2.16	2.25	1.47	.01	0.05	358	.49	26,820	27	1.1	587
Aug. 21-31.....	50,340	11	2.99	1.15	1.91	.05	2.16	2.10	1.63	.01	0.05	366	.80	25,170	31	1.3	609
Sept. 1-10.....	39,790	11	2.69	1.15	2.04	.05	2.10	2.04	2.12	.01	0.05	376	.51	20,290	33	1.4	638
Sept. 11-20.....	31,320	11	2.89	1.15	2.13	.06	2.16	2.12	2.12	.01	0.05	392	.53	16,600	34	1.5	658
Sept. 21-30.....	28,240	9.7	2.99	1.23	2.39	.06	2.16	2.17	2.45	.01	0.05	412	.56	15,810	36	1.6	695
Total or weighted average	2,441,000	11	2.00	0.70	1.09	0.05	1.74	1.15	0.93	0.01	0.05	236	0.32	779,300	28	0.9	386

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER NEAR CISCO, UTAH

LOCATION.--At gaging station, 1 mile downstream from Dolores River, 11 miles south of Cisco, Grand County.

DRAINAGE AREA.--24,100 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1952.

Water temperatures: April 1949 to September 1952.

Sediment records: May 1930 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,100 micromhos Oct. 26-27; minimum daily, 310 micromhos June 15.

Percent sodium: Maximum, 49 Feb. 1-10; minimum, 19 May 1-10.

EXTREMES, 1941-52.--Specific conductance: Maximum daily, 4,100 micromhos Sept. 30, 1946; minimum daily, 310 micromhos June 15, 1952.

Percent sodium (1950-52): Maximum, 49 Feb. 1-10, 1952; minimum, 19 May 1-10, 1952.

REMARKS.--Values reported for dissolved solids are 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 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent sodium adsorp- tion ratio	Specific conduct- (micro- mhos at 25°C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Total tons					
													Parts per mil- lion	Tons per acre- foot				
Oct. 1-10, 1951..	53,890	15	7.66	5.59	8.39	0.20	3.51	13.39	4.65	0.14	--	1,410	1.92	103,500	38	1,890	--	
Oct. 11-20	47,980	13	7.98	5.94	8.78	.21	3.54	14.28	4.79	.14	0.12	1,480	2.01	96,440	39	1,960	--	
Oct. 21-31	67,160	15	8.18	5.35	8.87	.22	3.54	14.22	5.22	.14	--	1,490	2.03	136,300	39	1,970	--	
Nov. 1-10	59,860	16	7.39	5.26	7.96	.19	3.79	12.22	4.37	.14	--	1,310	1.78	106,600	38	1,800	--	
Nov. 11-20	80,650	16	6.74	4.61	7.78	.18	3.59	11.28	4.48	.16	--	1,270	1.73	104,900	40	1,750	--	
Nov. 21-25, Dec. 4	35,540	16	6.49	4.69	8.31	.18	3.39	11.16	4.79	.16	--	1,260	1.71	60,770	42	1,780	8.1	
Jan. 1, 1952 a...	10,310	--	--	--	--	--	2.77	8.49	2.93	--	--	--	--	--	--	--	1,340	--
Jan. 10-20	62,580	16	6.39	4.28	8.96	.20	3.59	10.01	5.89	.18	.13	1,270	1.73	108,300	45	1,840	7.8	
Jan. 21-31	70,610	13	5.19	3.82	7.04	.16	3.08	8.76	4.09	.15	--	1,040	1.41	99,560	44	1,500	7.7	
Feb. 1-10	55,930	15	5.54	4.03	9.35	.21	3.29	9.24	6.49	.15	--	1,220	1.66	92,840	49	1,800	7.8	
Feb. 11-20	54,390	13	5.74	4.36	9.52	.21	3.39	9.74	6.49	.02	--	1,230	1.67	90,830	48	1,840	--	
Feb. 24-28	24,710	14	5.74	4.19	8.57	.17	3.34	9.72	5.67	.02	--	1,180	1.60	39,540	46	1,750	--	
Mar. 3-4, 6-8...	34,350	13	5.94	4.19	9.04	.19	3.34	9.72	5.98	.02	--	1,200	1.63	55,990	47	1,790	--	
Mar. 11-20	59,130	12	5.39	3.87	8.57	.19	3.31	8.87	5.92	.02	--	1,110	1.51	89,290	48	1,650	--	
Mar. 21-31	77,850	12	4.99	3.54	7.39	.17	3.05	8.20	4.63	.02	--	.993	1.35	105,100	46	1,480	--	

a Not included for computation of weighted averages.

Apr. 1-3, 5-7, ...	57,520	11	4.94	3.04	6.00	.17	3.21	7.25	3.38	.01	--	881	1.20	69,020	42	3.0	1,300	--
Apr. 11-20, ...	287,300	13	3.49	1.40	2.00	.10	2.97	2.75	1.13	.05	.07	426	.58	186,600	29	1.3	665	7.8
Apr. 21-30, ...	562,900	12	2.45	.99	1.00	.07	2.33	1.62	.42	.05	--	273	.37	208,300	22	.8	429	8.0
May 1-10, ...	822,700	14	2.25	.62	.74	.07	2.36	1.17	.31	.02	--	244	.33	271,500	19	.6	387	--
May 11-20, ...	772,000	13	2.10	.82	.83	.05	2.13	1.23	.37	.02	--	232	.32	247,000	22	.7	375	--
May 21-31, ...	557,400	13	2.50	1.07	1.17	.05	2.26	1.92	.56	.02	--	300	.41	228,500	24	.9	472	--
June 1-3, 5-6, ...	382,800	11	2.15	.90	.83	.04	2.02	1.46	.37	.03	--	254	.35	134,000	21	.7	388	--
June 11-20, ...	922,900	11	1.90	.72	.70	.06	1.82	1.12	.31	.02	--	208	.28	258,400	21	.6	344	--
June 21, 23, 27-29	251,300	11	2.20	.99	1.17	.06	1.93	1.33	.36	.02	--	275	.37	92,960	26	.9	448	--
July 1-4, 9, ...	166,200	11	2.69	1.32	1.74	.07	2.05	2.66	.96	.02	--	364	.50	83,100	30	1.2	579	--
July 6-7, ...	64,260	11	3.84	1.81			3.49	3.99	1.27	.01	--	b 517	.70	44,980	35	1.8	838	--
July 11-20, ...	122,200	12	3.94	2.22	3.04	.09	2.49	5.10	1.69	.05	.13	575	.78	95,320	33	1.7	895	7.4
July 21-24, 30-31	74,340	12	4.64	2.71	4.22	.13	2.65	6.45	2.31	.04	--	748	1.02	75,830	36	2.2	1,120	--
Aug. 1-10, ...	119,200	14	5.14	3.04	4.83	.14	2.90	7.37	2.71	.07	--	838	1.14	135,900	37	2.4	1,240	--
Aug. 11-20, ...	111,800	13	5.74	3.21	4.48	.11	2.92	8.29	2.28	.08	--	866	1.16	131,900	33	2.1	1,250	7.7
Aug. 21-24, 30-31	69,160	14	5.69	3.37	5.04	.15	3.10	8.27	2.51	.07	--	902	1.23	85,070	35	2.4	1,300	--
Sept. 3-7, 9-13, ...	70,350	14	6.39	4.36	6.78	.15	3.16	10.51	3.84	.11	--	1,150	1.56	109,700	38	2.9	1,600	--
Sept. 21-30, ...	74,360	14	6.99	4.52	6.52	.15	3.23	11.35	3.16	.11	--	1,180	1.60	119,000	36	2.7	1,610	--
Total or weighted average	c6,253,000	13	3.14	1.64	2.35	0.08	2.43	3.37	1.27	0.04	--	452	0.61	3,847,000	33	1.5	680	--

b Sum of determined constituents.

c Represents 81 percent of the runoff for water year October 1951 to September 1952.

COLORADO RIVER BASIN--Continued

COLORADO RIVER MAIN STEM

COLORADO RIVER AT LEES FERRY, ARIZ.

LOCATION.--At gaging station at head of Marble Gorge at Lees Ferry, Coconino County, just upstream from Paria River, 28 miles downstream from Utah-Arizona State line, 61.5 miles upstream from Little Colorado River, and 79 miles downstream from San Juan River.

DRAINAGE AREA.--107,900 square miles.

RECORDS AVAILABLE.--Chemical analyses: July 1926 to September 1927, October 1928 to September 1930, October 1942 to October 1945, October 1947 to September 1952.

Water temperatures: July 1949 to September 1952.

Sediment records: October 1928 to September 1933, November 1942 to September 1944, October 1947 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,010 micromhos Sept. 26; minimum daily, 339 micromhos June 14.

Percent sodium: Maximum, 42 Dec. 21-31; minimum, 23 May 11-20.

EXTREMES, 1928-30, 1942-45, 1947-52.--Specific conductance (1942-45, 1947-52): Maximum daily, 2,280 micromhos Oct. 15, 1945; minimum daily, 318 micromhos June 9, 1948.

Percent sodium: Maximum, 46 Mar. 2, 4, 7, 10, 1944; minimum, 21 June 21-30, 1949, June 1-10, 1951.

REMARKS.--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 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total						
													Parts per million	Tons per acre-foot	tons				
Oct. 1-10, 1951.	121,600	13	7.68	4.03	6.39	0.13	3.72	11.74	2.59	0.02	0.05	0.2	1,140	1.55	188,500	35	2.6	1,610	7.6
Oct. 11-20.....	138,800	15	6.89	4.03	6.09	.08	3.67	10.60	2.79	.02	.07	.2	1,070	1.46	202,600	36	2.6	1,560	7.4
Oct. 21-31.....	151,600	13	6.67	3.87	6.44	.07	3.56	10.49	2.76	.02	.06	.2	1,060	1.44	218,300	38	2.8	1,530	7.5
Nov. 1-10.....	172,300	13	7.34	3.87	6.35	.10	3.62	11.55	2.31	.02	.08	.3	1,110	1.51	260,200	36	2.7	1,580	7.6
Nov. 11-20.....	139,300	14	6.59	4.03	5.83	.09	3.85	9.81	2.65	.02	.06	.3	1,020	1.39	193,600	35	2.5	1,490	7.7
Nov. 21-30.....	133,300	15	5.64	3.70	5.78	.17	3.59	9.14	2.68	.02	.05	a.1	958	1.30	173,300	38	2.7	1,430	7.8
Dec. 1-10.....	131,600	15	4.89	4.36	6.70	.21	3.70	9.60	2.96	.02	.06	a.1	1,010	1.37	180,300	41	3.1	1,490	7.7
Dec. 11-20.....	88,700	15	5.84	4.19	6.78	.16	63.83	9.39	3.27	.02	.05	a.1	1,030	1.40	117,200	40	3.0	1,530	7.9
Dec. 21-31.....	118,000	15	6.19	4.44	7.78	.14	64.36	10.22	3.78	.03	.07	a.1	1,140	1.55	182,900	42	3.4	1,870	7.8

a Reported boron concentration is less than figure indicated.

b Includes 0.20 equivalents per million of carbonate (CO₃).

c Includes 0.30 equivalents per million of carbonate (CO₃).

Jan. 1-10.....	167,100	12	5.24	3.21	5.17	.19	3.41	7.93	2.59	.01	.12	a.1	885	1.18	197,200	37	2.5	1,300	7.7
Jan. 11-20.....	125,800	13	5.84	3.45	6.61	.17	3.79	9.06	2.85	.02	.07	a.1	985	1.34	168,600	41	3.1	1,470	7.8
Jan. 21-31.....	185,000	14	5.49	2.96	5.65	.14	3.56	7.66	2.82	.02	.08	a.1	877	1.19	217,800	40	2.8	1,340	7.8
Feb. 1-10.....	136,600	12	5.39	3.12	5.61	.16	3.33	8.20	2.82	.02	.07	a.1	892	1.21	187,700	39	2.7	1,350	7.2
Feb. 11-20.....	130,200	13	5.54	3.45	5.91	.18	3.54	8.47	3.13	.02	.08	a.1	937	1.27	185,400	39	2.8	1,420	7.8
Feb. 21-29.....	110,300	13	5.49	3.54	6.17	.26	3.59	8.54	3.19	.02	.06	a.1	953	1.30	143,400	40	2.9	1,430	7.8
Mar. 1-10.....	124,300	15	5.59	3.70	6.57	.14	3.77	8.51	3.30	.02	.08	.16	973	1.32	184,100	41	3.0	1,460	7.3
Mar. 11-20.....	145,400	14	5.89	3.54	6.57	.13	3.75	8.85	3.16	.02	.06	.11	985	1.34	194,800	41	3.0	1,460	7.7
Mar. 21-31.....	169,900	14	5.49	3.37	6.26	.13	3.59	8.51	2.76	.02	.07	.16	934	1.27	215,800	41	3.0	1,390	7.7
Apr. 1-10.....	381,900	14	4.99	2.80	5.26	.15	3.54	7.41	1.97	.02	.03	.13	809	1.10	430,100	40	2.7	1,200	7.7
Apr. 11-20.....	707,900	14	4.09	2.22	3.83	.13	3.38	5.60	1.27	.02	.03	.11	633	.86	608,800	37	2.2	960	7.7
Apr. 21-30.....	1,176,000	14	2.94	1.48	2.09	.09	2.84	3.04	.68	.02	.03	.09	400	.54	635,000	32	1.4	823	7.9
May 1-10.....	1,752,000	14	2.69	1.32	1.43	.13	2.79	2.23	.42	.02	.03	.17	330	.45	788,400	26	1.0	523	7.8
May 11-20.....	1,916,000	12	2.35	1.07	1.04	.08	2.59	1.56	.34	.02	.02	.09	266	.36	690,500	23	0.8	430	7.8
May 21-31.....	1,410,000	12	2.30	1.23	1.26	.10	2.46	1.94	.42	.02	.02	.10	290	.39	549,900	26	0.9	461	7.8
June 1-10.....	1,793,000	13	2.59	1.15	1.26	.08	2.74	1.87	.39	.02	.01	.04	299	.41	735,100	25	0.9	481	7.7
June 11-20.....	2,205,000	12	2.20	.81	.96	.08	2.31	1.35	.28	.02	.02	.07	236	.32	705,600	24	0.8	388	7.8
June 21-30.....	1,192,000	12	2.30	.90	1.09	.08	2.31	1.54	.39	.02	.02	.05	256	.35	417,200	25	0.9	416	7.7
July 1-10.....	755,900	15	2.84	1.23	1.52	.10	2.67	2.37	.54	.02	.02	.10	340	.46	356,900	27	1.1	544	7.7
July 11-20.....	488,000	15	3.29	1.56	2.13	.12	2.75	3.44	.87	.02	.01	.10	434	.59	287,900	30	1.4	668	7.7
July 21-31.....	308,800	13	3.69	1.97	2.91	.12	2.92	4.41	1.33	.02	.03	.09	532	.72	222,300	33	1.7	824	7.7

a Reported boron concentration is less than figure indicated.

COLORADO RIVER BASIN--Continued
 COLORADO RIVER MAIN STEM--Continued
 COLORADO RIVER AT LEES FERRY, ARIZ--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- dium	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
Aug. 1-10, 1952.	290,300	16	4.79	2.38	4.22	0.14	3.06	6.60	1.78	0.02	0.06	0.13	720	0.98	284,500	37	2.2	1,070	7.6
Aug. 11-20	257,200	15	5.24	2.71	4.52	.15	3.23	7.33	1.86	.02	.07	.18	782	1.06	272,600	36	2.3	1,160	7.6
Aug. 21-31	273,500	14	5.59	3.04	4.57	.16	3.29	8.02	1.86	.02	.07	.18	829	1.13	309,100	34	2.2	1,220	7.6
Sept. 1-10	222,700	12	6.39	3.29	5.17	.17	3.77	9.01	1.86	.02	.07	.22	923	1.26	280,600	34	2.3	1,330	7.7
Sept. 11-20	140,000	10	5.49	3.37	5.22	.15	3.46	8.20	2.20	.02	.06	.22	867	1.18	165,200	37	2.5	1,280	7.6
Sept. 21-30	179,100	14	7.44	3.62	6.22	.17	3.44	11.24	2.48	.02	.07	.20	1,090	1.48	265,100	36	2.6	1,540	7.7
Total or weighted average	17,960,000	13	3.39	1.73	2.48	0.11	2.85	3.75	0.96	0.02	0.03	--	465	0.63	11,310,000	32	1.6	714	--

COLORADO RIVER MAIN STEM--Continued
COLORADO RIVER NEAR GRAND CANYON, ARIZ.

LOCATION.--At gaging station at Kaibab Bridge, a quarter of a mile upstream from Bright Angel Creek, 11 miles by trail northeast of Grand Canyon Village, Coconino County, 26 miles downstream from Little Colorado River, and 267 miles upstream from Hoover Dam. DRAINAGE AREA.--137,800 square miles.

RECORDS AVAILABLE.--Chemical analyses: August 1925 to November 1942, September 1943 to September 1952.

Water temperatures: October 1936 to October 1942, September 1943 to September 1952.

Sediment records: October 1925 to November 1942, September 1943 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,230 micromhos Sept. 28; minimum daily, 416 micromhos June 19.

Percent sodium: Maximum, 46 Jan. 21-31; minimum, 16 June 11-20.

EXTREMES, 1937-52.--Specific conductance: Maximum daily, 2,900 micromhos Sept. 6, 1940; minimum daily, 341 micromhos June 15, 1942.

Percent sodium (1941-52): Maximum, 48 Sept. 11-20, 1942; minimum, 16 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. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- lution ratio	Specific conduct- ance (micro- mhos at 25°C)	pH	
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
Oct. 1-10, 1951..	137,800	12	7.98	3.87	7.78	0.14	4.06	11.66	4.03	0.02	0.05	--	1,300	1.77	243,900	39	3.2	1,760	7.5
Oct. 11-20.....	138,600	13	7.68	4.19	7.65	.17	4.20	11.12	4.09	.01	.07	0.23	1,250	1.70	235,600	39	3.1	1,720	7.4
Oct. 21-31.....	148,500	13	6.49	3.87	7.65	.15	4.10	9.99	4.00	.02	.05	--	1,150	1.56	231,700	42	3.4	1,620	7.4
Nov. 1-10.....	182,600	14	8.08	3.95	7.61	.15	4.06	12.01	3.30	.01	.07	--	1,260	1.71	312,200	38	3.1	1,690	7.5
Nov. 11-20.....	143,100	14	6.84	4.44	7.22	.11	4.20	10.14	3.81	.02	.07	.31	1,160	1.58	226,100	39	3.0	1,610	7.5
Nov. 21-26.....	85,110	14	6.44	4.03	7.04	.12	4.10	9.98	3.89	.02	.06	--	1,120	1.52	129,400	40	3.1	1,580	7.6
Dec. 1-3, 8-10..	84,630	12	6.19	2.62	7.83	.06	4.39	9.12	3.89	.02	.05	--	1,100	1.50	126,900	44	3.7	1,530	7.7
Dec. 11-20.....	94,510	13	6.09	3.87	8.31	.06	4.13	9.24	4.85	.02	.08	.20	1,160	1.58	149,300	45	3.7	1,670	7.8
Dec. 21, 24-28..	61,150	14	6.89	4.44	8.52	.05	4.46	10.24	5.42	.02	.10	--	1,300	1.77	108,200	43	3.6	1,840	7.8
Jan. 1-10, 1952..	202,900	12	5.04	2.55	6.31	.18	3.70	6.85	3.27	.02	.07	--	877	1.19	241,500	45	3.2	1,310	7.9
Jan. 11-20.....	132,500	12	6.19	4.19	7.70	.11	4.06	9.68	4.17	.02	.07	.17	1,130	1.54	204,000	42	3.4	1,500	7.9
Jan. 21-31.....	257,300	12	4.79	2.63	6.52	.18	4.00	6.64	3.38	.01	.07	--	891	1.21	311,300	46	3.4	1,290	7.5

COLORADO RIVER MAIN STEM--Continued
 COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued
 Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent adsorption ratio	Specific conductance (micro-mhos at 25° C)	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Feb. 1-10, 1952.	148,500	13	5.39	3.12	6.83	0.19	3.74	7.81	3.81	0.01	0.06	--	990	1.35	200,500	44	1,420	
Feb. 11-20.....	134,900	12	5.89	3.70	7.09	.16	4.23	8.29	4.29	.02	.09	0.15	1,070	1.46	197,000	42	1,530	
Feb. 21-29.....	112,900	14	5.69	3.67	7.39	.14	3.87	8.51	4.51	.02	.09	--	1,080	1.47	166,000	43	1,550	
Mar. 1, 9-10...	49,210	15	5.44	4.03	7.35	.13	3.80	8.64	4.40	.02	.09	--	1,080	1.47	72,340	43	1,540	
Mar. 11-20.....	142,300	13	5.79	3.87	7.35	.20	3.93	8.72	4.48	.02	.09	.08	1,100	1.50	213,400	43	1,570	
Mar. 21-22, 24-25, 28-29, 31..	107,800	13	5.74	3.62	7.00	.16	3.87	8.29	4.40	.02	.08	--	1,040	1.41	152,000	42	1,490	
Apr. 1-9.....	341,600	14	5.54	2.88	5.96	.15	4.21	7.39	2.82	.02	.09	--	907	1.23	420,200	41	1,330	
Apr. 10-20.....	738,600	13	4.64	2.38	4.22	.12	3.69	5.75	1.58	.02	.09	.14	708	.96	709,100	37	1,040	
Apr. 21-30.....	1,129,000	14	3.79	1.81	2.57	.13	3.79	3.21	.93	.02	.05	--	483	.67	756,400	31	.749	
May 1-10.....	1,720,000	14	3.29	1.40	1.57	.13	3.52	2.25	.54	.02	.04	--	388	.53	911,600	25	.587	
May 11-20.....	1,927,000	17	3.59	1.32	1.22	.14	4.13	1.66	.48	.02	.04	.06	370	.50	963,500	19	.574	
May 21-31.....	1,415,000	16	3.49	1.40	1.48	.12	3.80	1.98	.65	.01	.03	--	386	.52	735,300	23	.600	
June 1-10.....	1,764,000	15	3.34	1.32	1.35	.11	3.54	2.00	.51	.01	.03	--	367	.50	882,000	22	.568	
June 11-20.....	2,218,000	17	3.44	1.07	.91	.10	3.70	1.37	.39	.01	.02	.11	326	.44	975,900	16	.511	
June 21-30.....	1,221,000	14	3.29	1.07	1.22	.15	3.57	1.56	.96	.01	.08	--	332	.45	549,400	21	.524	
July 1-10.....	767,600	14	3.49	1.40	1.83	.15	3.67	2.27	.82	.01	.01	--	402	.55	422,200	27	.634	
July 11-20.....	510,500	16	3.69	1.64	2.83	.15	3.64	3.44	1.13	.01	.04	.11	504	.69	352,200	34	.761	
July 25-28.....	106,500	13	4.24	2.14	3.54		3.38	4.60	1.89	.01	.04	--	a597	.81	86,260	36	.925	
July 29-31, Aug. 1-10.....	372,900	14	5.54	2.63	4.44	.20	4.06	6.14	2.31	.01	.09	--	777	1.06	395,300	35	1,160	
Aug. 11-20.....	254,700	16	6.14	3.12	5.22	.18	4.42	7.39	2.65	.02	.05	.21	899	1.22	310,700	36	1,310	
Aug. 21-31.....	282,200	17	6.64	3.21	5.09	.18	4.56	7.81	2.57	.03	.07	--	892	1.28	361,200	34	1,360	
Sept. 1-10.....	234,400	18	7.49	3.62	5.96	.21	4.62	9.60	2.68	.03	.10	--	1,080	1.47	344,600	34	1,510	
Sept. 11-20.....	147,500	15	6.04	3.54	5.96	.22	4.33	7.89	3.38	.03	.06	.20	969	1.32	194,700	38	1,430	
Sept. 21-27.....	160,700	15	5.79	3.04	6.44	.19	4.29	7.93	2.88	.03	.04	--	953	1.30	208,900	42	1,400	
Sept. 28-29.....	35,680	13	11.08	4.11	8.25	--	4.00	15.78	3.55	--	.11	--	a1,480	2.03	72,430	35	2,020	
Sept. 30 b.....	17,340	--	--	--	--	--	3.61	10.66	3.44	--	.09	--	--	--	--	--	--	1,630
Total or weighted average	c7,710,000	15	4.19	1.89	2.78	0.14	3.82	3.71	1.30	0.02	0.05	--	547	0.74	13,170,000	31	816	

a Sum of determined constituents. b Not included for computation of weighted averages. c Represents 98 percent of the runoff for water year October 1951 to September 1952.

COLORADO RIVER MAIN STEM--Continued

COLORADO RIVER BELOW HOOVER DAM, ARIZ.-NEV.

LOCATION.--At Hoover Dam, Ariz.-Nev. State line between Mohave County, Ariz., and Clark County, Nev., about 1 mile upstream from gaging station below Hoover Dam.
DRAINAGE AREA.--167,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1939 to September 1952.
Water temperatures: October 1941 to September 1952.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,070 micromhos Mar. 11, 31, Apr. 22; minimum daily, 804 micromhos Sept. 30. Percent sodium: Maximum 41 during several periods Mar. to May; minimum 35 during several periods.
EXTREMES, 1939-52.--Specific conductance: Maximum daily, 1,250 micromhos Mar. 2, 1941; minimum daily, 804 micromhos Sept. 30, 1952.
Percent sodium (1941-44, 1950-52): Maximum, 41 during several periods in 1951 and 1952, Apr. 1-4, 7-10, May 12-16, 19-20, 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 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons	Per-cent so-dium			
Oct. 1-5, 8-10, 1951.....	218,600	13	4.29	2.47	3.86		2.77	5.75	2.06	--	0.04	681	0.93	203,300	36	2.1	980	7.7	
	199,300	12	4.29	2.30	4.00		2.75	5.75	2.06	--	.03	684	.93	185,300	38	2.2	978	7.8	
	206,300	14	4.39	2.38	3.69		2.72	5.68	2.03	--	.03	679	.92	189,800	35	2.0	978	7.9	
Oct. 22-26, 29-31	199,700	--	4.34	2.47	4.00					--	--	680	.92	183,700	37	2.2	963	--	
Nov. 1-2, 5-9....	197,200	--	4.34	2.47	4.00	--	--	--	--	--	--	681	.93	183,400	37	2.2	956	--	
Nov. 13-16, 19-20	228,900	--	4.34	2.47	4.00	--	--	--	--	--	--	681	.93	212,900	37	2.2	961	--	
Nov. 21, 23, 26-30																			
Dec. 3-7, 10.....	189,000	--	4.34	2.55	4.00	--	--	--	--	--	--	674	.92	173,900	37	2.2	972	--	
Dec. 11-14, 17-20	244,600	--	4.24	2.55	4.00	--	--	--	--	--	--	666	.91	222,600	37	2.2	950	--	
Dec. 21, 26-29...	150,100	--	4.04	2.22	3.91	0.11	2.61	--	--	--	--	659	.90	135,100	38	2.2	967	7.3	
Jan. 2-5, 7-10, 1952.....	254,100	--	4.19	2.06	3.91	.11	2.61	--	--	--	--	652	.89	226,100	38	2.2	958	7.6	
Jan. 11, 14-18...	234,000	13	4.14	2.30	3.91	.12	2.62	5.66	2.03	0.01	.03	668	.91	212,900	37	2.2	972	7.3	
Jan. 21-25, 28-31	377,500	--	4.19	2.14	3.91	.12	2.62	--	--	--	--	668	.91	343,500	38	2.2	977	7.7	
Feb. 1, 5-8.....	211,000	--	4.29	2.22	4.00	.12	2.72	--	--	--	--	676	.92	194,100	38	2.2	991	7.7	
Feb. 11-15, 18-20	362,800	--	4.44	2.06	4.09	--	--	--	--	--	--	687	.93	337,400	39	2.3	1,010	--	
Feb. 21, 25-29...	287,600	--	4.44	2.06	4.09	--	--	--	--	--	--	699	.95	273,200	39	2.3	1,020	--	

COLORADO RIVER MAIN STEM--Continued

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

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids		Per cent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)		Parts per million	Tons per acre-foot				
Mar. 3-7, 10, 1952.....	285,600	--	4.49	2.06	4.17	--	--	--	--	--	--	706	0.96	39	2.3	1,030	--
Mar. 11-14, 17-20	371,900	13	4.19	2.30	4.46	--	2.72	6.02	2.17	--	0.04	683	.93	41	2.5	1,050	7.7
Mar. 21, 24-28, 31	317,000	9.7	4.29	2.30	4.47	--	2.74	6.08	2.20	--	.04	688	.94	40	2.5	1,050	7.7
Apr. 1-4, 7-10..	367,100	9.3	4.34	2.30	4.55	--	2.79	6.10	2.26	--	.04	684	.93	41	2.5	1,050	7.8
Apr. 11, 14-18..	291,000	12	4.34	2.47	4.35	0.10	2.79	6.06	2.28	0.02	.03	700	.95	39	2.4	1,050	8.0
Apr. 21-25, 28-30	418,300	10	4.39	2.30	4.46	--	2.75	8.14	2.23	--	.03	681	.94	40	2.4	1,050	7.8
May 1-2, 5-8....	368,800	9.7	4.34	2.30	4.48	--	2.74	6.08	2.26	--	.04	683	.94	40	2.5	1,050	8.0
May 12-16, 19-20	403,800	9.8	4.29	2.30	4.54	--	2.74	8.10	2.26	--	.03	694	.93	41	2.5	1,040	8.0
May 21-23, 26-29	377,700	11	4.29	2.38	4.28	--	2.75	5.93	2.23	--	.04	692	.94	39	2.3	1,050	8.2
June 2-6, 9-10..	365,000	11	4.49	2.38	3.96	--	2.74	5.85	2.20	--	.04	695	.95	37	2.1	1,050	7.7
June 11-13, 18-20	440,700	14	4.24	2.38	4.00	--	2.67	5.77	2.14	--	.04	685	.90	38	2.2	1,010	7.8
June 23-27, 30..	281,300	15	3.79	2.30	3.93	--	2.70	5.48	1.81	--	.03	647	.88	39	2.3	983	7.6
July 1-3, 7-10..	316,000	11	3.98	2.14	3.74	--	2.61	5.27	1.95	--	.04	618	.84	38	2.1	941	7.7
July 11, 14-18..	272,100	12	3.79	2.08	3.48	.11	2.59	5.16	1.83	.01	.12	603	.82	37	2.0	917	7.5
July 21-25, 28-31	408,600	--	3.84	2.30	3.35	--	--	--	--	--	--	805	.82	35	1.9	923	--
Aug. 1, 4-8.....	272,100	--	3.74	2.22	3.17	--	--	--	--	--	--	565	.80	35	1.8	894	--
Aug. 11-15, 18-20	366,000	--	3.64	2.14	3.17	--	--	--	--	--	--	571	.78	35	1.9	872	--
Aug. 21-22, 25-29	329,700	--	3.69	2.14	3.22	--	--	--	--	--	--	571	.78	36	1.9	875	--
Sept. 2-5, 8-10..	346,300	--	3.59	2.08	3.13	--	--	--	--	--	--	561	.76	36	1.9	852	--
Sept. 11-12, 15-19	349,500	--	3.39	1.97	3.09	--	--	--	--	--	--	524	.71	37	1.9	810	--
Sept. 22-25, 27, 29-30.....	327,500	--	3.49	1.97	3.00	--	--	--	--	--	--	528	.72	35	1.8	812	--
Total or weighted average	310,840,000	--	4.14	2.22	3.91	--	--	--	--	--	--	852	0.89	38	2.2	974	--

a Represents 75 percent of runoff for water year October 1951 to September 1952.

DIVERSIONS AND RETURN FLOWS AT AND BELOW IMPERIAL DAM

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

LOCATION.--At gaging station on Yuma Main Canal below Colorado River siphon on Arizona side of river, 3½ miles downstream from siphon-drop power plant, and a quarter of a mile downstream from highway bridge over Colorado River at Yuma, Yuma County.
DRAINAGE AREA (Colorado River).--242,900 square miles, approximately, including all closed basins within drainage boundary.
RECORDS AVAILABLE.--Chemical analyses: September 1926 to September 1928, October 1942 to September 1952.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,110 micromhos on several days during May to July; minimum daily, 951 micromhos Sept. 29-30.

Percent sodium: Maximum, 41 July 1-3, 7-11, 14-18; minimum, 38 during several periods in January, August, and September.
EXTREMES, 1943-52.--Specific conductance: Maximum daily, 1,150 micromhos on several days in May and June 1944 and June 1947; minimum daily, 828 micromhos Nov. 21, 1949.

Percent sodium: Maximum, 42 several periods in 1946, 1947 and 1951; minimum, 32 several periods in 1945, 1946, 1948 and 1949.
REMARKS.--Samples collected prior to February 1943 were from gaging station on the Colorado River at Yuma. Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons		
Oct. 1-5, 8-10, 1951	11,440	18	4.04	2.48	4.44	0.12	2.72	5.98	2.48	0.01	--	700	0.95	10,870	40	2.5	1,050
Oct. 11-12, 15-19	9,140	18	4.09	2.55	4.44	.12	2.79	5.95	2.48	.01	0.28	412	.97	8,870	40	2.4	1,050
Oct. 23-26, 29-31	7,580	14	4.19	2.47	4.44	.12	2.79	6.00	2.45	.01	--	706	.96	7,280	40	2.4	1,050
Nov. 1-2, 5-9 ..	5,800	14	4.19	2.47	4.44	.12	2.79	6.06	2.48	.01	--	707	.96	5,570	40	2.4	1,050
Nov. 12-16, 19-20	5,720	14	4.14	2.47	4.44	.12	2.82	6.10	2.51	.01	.30	711	.97	5,550	40	2.4	1,060
Nov. 21-23, 26-30	6,320	16	4.29	2.47	4.61	.12	2.85	5.93	2.48	.01	--	719	.98	6,190	40	2.5	1,030
Dec. 3-7, 10 ...	3,390	13	4.34	2.47	4.61	.11	3.05	5.85	2.43	.01	--	719	.98	3,260	40	2.5	1,060
Dec. 11-14, 17-20	4,090	12	4.39	2.55	4.48	.11	3.02	5.83	2.43	.01	--	716	.97	3,970	39	2.4	1,060
Dec. 21, 24, 26-28, 31	1,950	13	4.34	2.47	4.45	.12	2.88	5.91	2.43	.01	--	719	.98	1,910	39	2.4	1,060
Jan. 2-4, 7-10, 1952	4,190	16	4.29	2.47	4.30	.11	2.75	5.79	2.37	.01	--	699	.95	3,980	38	2.3	1,040
Jan. 11, 14-18 ...	3,240	13	4.14	2.38	4.35	.10	2.77	5.91	2.31	.03	.11	703	.96	3,110	40	2.4	1,040
Jan. 21-25, 27-31	5,290	13	4.19	2.30	4.22	.10	2.75	5.83	2.17	.03	--	694	.94	4,970	39	2.3	1,010

DIVERSIONS AND RETURN FLOWS AT AND BELOW IMPERIAL DAM--Continued
YUMA MAIN CANAL BELOW COLORADO RIVER SIPHON AT YUMA, ARIZ.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
Feb. 1, 4-8, 1952	5,560	15	4.29	2.30	4.35	0.10	2.82	5.95	2.28	0.03	--	714	0.97	5,390	39	2.4	1,030	7.8
Feb. 11-15, 18-20	6,510	13	4.24	2.30	4.35	.10	2.84	5.93	2.34	.02	--	711	.97	6,310	40	2.4	1,030	7.8
Feb. 21, 25-26, 28-29	4,930	12	4.29	2.30	4.22	.10	2.79	5.91	2.26	.02	--	700	.95	4,680	39	2.3	1,020	7.9
Mar. 3-7, 10	5,760	13	4.39	2.30	4.30	.11	2.75	5.91	2.26	.03	--	688	.94	5,410	39	2.3	1,040	--
Mar. 11-14, 17-20	8,100	14	4.24	2.22	4.17	.11	2.72	5.66	2.23	.03	0.13	671	.91	7,370	39	2.3	1,000	--
Mar. 21, 24-28, 31	6,850	13	4.09	2.14	4.13	.11	2.72	5.62	2.23	.08	--	667	.91	6,230	39	2.3	1,000	--
Apr. 1-4, 7-10	8,970	11	4.19	2.22	4.30	.11	2.79	5.81	2.26	.03	--	687	.93	8,340	40	2.4	1,030	--
Apr. 11, 14, 16-18	6,640	13	4.29	2.38	4.39	.12	2.85	6.02	2.45	.03	.19	722	.98	6,510	39	2.4	1,080	--
Apr. 21-25, 28-30	7,270	14	4.34	2.38	4.44	.12	2.87	6.16	2.48	.03	--	735	1.00	7,270	39	2.4	1,100	--
May 1-2, 5-9	6,750	12	4.34	2.38	4.48	.12	2.84	6.04	2.48	.03	--	731	.99	6,680	40	2.4	1,100	--
May 12-16, 19-20	6,880	13	4.39	2.38	4.44	.12	2.88	5.93	2.48	.03	--	734	1.00	6,880	39	2.4	1,110	--
May 21-23, 26-29	10,050	12	4.39	2.47	4.48	.12	2.87	6.08	2.48	.03	--	736	1.00	10,050	39	2.4	1,110	--
June 2-6, 9-10	10,140	12	4.49	2.38	4.65	.12	2.85	6.20	2.54	.06	--	730	.99	10,040	40	2.5	1,110	--
June 11-13, 16-20	11,600	14	4.49	2.38	4.70	.12	2.87	6.20	2.51	.03	--	733	1.00	11,600	40	2.5	1,100	--
June 23-27, 30	8,380	13	4.49	2.38	4.70	.12	2.82	6.29	2.48	.03	--	727	.99	8,300	40	2.5	1,110	--
July 1-3, 7-10	8,650	13	4.24	2.30	4.65	.12	2.65	6.20	2.45	.04	--	719	.98	8,460	41	2.6	1,090	--
July 11, 14-18	9,970	13	4.29	2.38	4.65	.12	2.75	6.14	2.45	.03	.09	719	.98	9,770	41	2.5	1,090	--
July 21-25, 28-31	13,440	15	4.19	2.47	4.44	.12	2.69	5.93	2.37	.02	.17	702	.95	12,770	40	2.4	1,060	--
Aug. 1, 4-8	7,900	14	4.14	2.47	4.35	.11	2.67	5.89	2.31	.02	--	692	.94	7,430	39	2.4	1,040	--
Aug. 11-15, 18-20	11,960	23	4.24	2.38	4.17	.11	2.72	5.66	2.31	.02	--	683	.93	11,120	38	2.3	1,030	--
Aug. 21-22, 25-29	11,780	16	4.09	2.30	4.04	.11	2.65	5.58	2.23	.02	--	665	.90	10,600	38	2.3	1,010	--
Sept. 1-5, 8-10	10,550	16	4.04	2.38	3.96	.11	2.67	5.43	2.14	.02	--	652	.89	9,390	38	2.2	982	--
Sept. 11-12, 15-19	11,410	16	3.89	2.30	4.00	.10	2.56	5.43	2.14	.02	--	643	.87	9,930	39	2.3	974	--
Sept. 22-24, 26, 29-30	8,470	13	3.94	2.22	3.87	.10	2.62	5.31	2.09	.02	--	630	.86	7,280	38	2.2	954	--
Total or weighted average	276,600	14	4.24	2.38	4.35	0.11	2.77	5.89	2.37	0.02	--	700	0.95	263,400	39	2.4	1,050	--

a Represents 71 percent of runoff for water year October 1951 to September 1952.

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 1 1/2 miles upstream from mouth and Grand Junction, Mesa County.

DRAINAGE AREA.--8,020 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: October 1931.

Water temperatures: April 1949 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2,410 micromhos Oct. 28; minimum daily, 304 micromhos May 13.

PERCENT SODIUM: Maximum, 34 Jan. 21-31, Feb. 21-29; minimum, 10 June 2-5, 10.

EXTREMES, 1941-52.--Specific conductance: Maximum daily, 2,680 micromhos Nov. 5, 1950; minimum daily, 280 micromhos May 23, 1948.

PERCENT SODIUM (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 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So- dium adsorp- tion ratio	Specific conductance (micro-mhos at 25° C)	pH	
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				Per- cent sodium
Oct. 1-10, 1951..	17,090	20	12.08	7.24	8.74	0.19	4.39	22.48	0.62	0.18	--	1,800	2.45	41,870	31	2.8	2,170	--	
Oct. 11-20.....	13,140	17	10.68	6.83	6.83	.19	3.47	20.40	.62	.13	0.27	--	1,590	2.16	28,380	28	2.3	2,050	--
Oct. 21-31.....	19,060	19	11.88	7.73	9.00	.23	4.39	22.90	.71	.16	--	1,830	2.49	47,460	31	2.9	2,230	--	
Nov. 1-10.....	19,400	19	9.88	6.33	6.70	.21	4.36	17.88	.54	.14	--	1,470	2.00	38,800	29	2.4	1,880	--	
Nov. 11-20.....	19,660	21	8.93	6.00	6.57	.20	4.23	16.61	.59	.16	--	1,390	1.89	37,160	30	2.4	1,760	--	
Nov. 21-30.....	1,760	--	19.64	--	--	--	5.15	--	--	--	--	--	--	--	--	--	2,310	--	
Nov. 22-30.....	16,970	20	7.88	5.59	6.39	.18	4.05	14.84	.62	.13	--	1,260	1.71	32,440	32	2.5	1,620	--	
Dec. 1-10.....	16,810	20	7.83	5.67	6.04	.18	4.05	14.64	.56	.14	--	1,250	1.70	28,580	31	2.3	1,610	--	
Dec. 11-20.....	12,990	23	8.23	5.92	6.15	.15	4.20	15.03	.56	.16	--	1,280	1.74	22,600	30	2.3	1,650	--	
Dec. 26-31.....	9,740	19	7.09	4.85	6.09	.16	3.57	13.59	.51	.16	--	1,150	1.56	15,190	33	2.5	1,500	--	
Jan. 1-10, 1952..	15,590	19	7.49	5.26	6.13	.15	3.97	14.18	.51	.13	--	1,210	1.65	25,720	32	2.4	1,460	--	
Jan. 11-20.....	18,110	18	6.89	4.77	5.44	.16	3.57	13.01	.51	.15	.18	1,100	1.50	27,160	32	2.3	1,460	--	
Jan. 21-31.....	16,820	19	6.54	4.85	5.83	.15	3.65	12.89	.48	.16	--	1,100	1.50	28,230	34	2.4	1,460	7.5	
Feb. 1-10.....	16,370	18	6.54	4.93	5.83	.19	3.64	12.95	.45	.12	--	1,110	1.51	24,720	33	2.4	1,460	7.6	
Feb. 11-20.....	16,350	17	6.44	4.93	5.78	.15	3.49	13.10	.48	.12	--	1,100	1.50	24,520	33	2.4	1,450	7.6	
Feb. 21-29.....	14,870	16	5.99	4.61	5.44	.14	3.51	11.97	.48	.12	--	1,030	1.40	20,820	34	2.4	1,370	7.7	

a Not included for computation of weighted averages.

GUNNISON RIVER BASIN--Continued

GUNNISON RIVER NEAR GRAND JUNCTION, COLO.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			per-cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Mar. 1-10, 1952.	16,540	16	6.09	4.69	5.44	0.15	3.34	12.26	0.48	0.12	--	1,040	1.41	23,320	33	2.3	1,400	7.7	
Mar. 11-20.....	17,160	16	6.19	4.77	5.13	.17	3.57	11.91	.51	.02	--	1,020	1.39	23,850	32	2.2	1,380	--	
Mar. 21-31.....	19,690	14	6.04	4.93	5.39	.16	3.54	12.05	.51	.02	0.17	1,030	1.40	27,570	33	2.3	1,380	--	
Apr. 1-7.....	16,960	14	5.29	3.70	3.83	.18	3.54	8.76	.42	.01	--	803	1.09	18,490	29	1.8	1,130	--	
Apr. 8-13.....	33,400	14	3.59	1.89	2.00	.14	2.98	4.60	.28	.00	--	482	.66	22,040	26	1.2	706	--	
Apr. 14-20.....	79,040	14	2.94	1.48	1.13	.13	2.72	2.50	.21	.00	--	332	.45	35,570	20	.8	494	--	
Apr. 21-30.....	212,300	18	2.59	.99	1.00	.11	2.82	1.77	.11	.03	--	285	.39	82,800	21	.7	428	--	
May 1-10.....	336,100	17	2.30	.81	.65	.08	2.43	1.37	.08	.03	--	235	.32	107,600	17	.5	367	--	
May 11-20.....	287,300	15	2.15	.78	.57	.06	1.97	1.39	.08	.02	--	214	.29	83,320	16	.5	331	--	
May 21-31.....	195,000	16	2.50	1.23	1.00	.08	2.26	2.39	.16	.03	--	297	.40	78,000	21	.7	452	--	
June 2-5, 10.....	143,000	15	2.45	1.15	.43	.08	1.97	1.98	.11	.03	--	251	.34	48,620	10	.3	381	--	
June 11-20.....	299,500	16	2.50	.90	.65	.06	2.02	1.92	.08	.03	--	252	.34	101,800	16	.5	369	--	
June 21-30.....	156,700	13	2.59	1.15	.96	.08	1.88	2.69	.13	.03	--	296	.40	62,680	20	.7	448	--	
July 1-10.....	105,500	14	3.59	1.73	1.52	.09	2.29	4.25	.21	.03	--	428	.58	61,190	22	.9	628	--	
July 11-20.....	55,830	15	4.84	2.47	2.52	.12	2.67	6.91	.28	.03	--	629	.86	48,010	25	1.3	896	--	
July 21-31.....	39,250	15	6.74	3.54	4.04	.17	3.23	10.58	.39	.07	--	916	1.25	49,060	28	1.8	1,240	--	
Aug. 1-10.....	38,500	17	6.74	3.62	3.61	.15	3.18	10.49	.34	.07	--	901	1.23	47,360	26	1.6	1,210	--	
Aug. 11-20.....	34,310	18	8.58	4.69	5.26	.20	3.61	14.32	.45	.06	--	1,190	1.62	55,580	28	2.0	1,540	--	
Aug. 21, 25-26 a.	13,710	20	18.08		--	--	3.62	20.49	.54	.01	--	--	--	--	--	--	1,980	--	
Aug. 22-23, 27-31	28,840	20	8.38	4.77	5.04	.17	3.59	14.20	.51	.11	--	1,180	1.60	46,140	27	2.0	1,520	--	
Sept. 1-10.....	22,460	18	8.98	5.76	6.17	.18	3.59	16.36	.58	.11	--	1,340	1.82	40,880	29	2.3	1,730	--	
Sept. 11-20.....	17,970	16	10.78	6.99	7.13	.19	3.64	20.82	.62	.14	--	1,630	2.22	39,890	28	2.4	2,040	--	
Sept. 21-30.....	36,060	18	8.28	5.26	5.09	.15	3.54	14.78	.45	.12	--	1,210	1.65	59,500	27	2.0	1,560	--	
Total or weighted average	62,438,000	16	3.74	1.97	1.91	0.10	2.59	4.87	0.21	0.05	--	485	0.66	1,607,000	25	1.1	675	--	

a Not included for computation of weighted averages.

b Represents 93 percent of the runoff for water year October 1951 to September 1952.

GREEN RIVER BASIN
GREEN RIVER AT GREEN RIVER, UTAH

LOCATION.--At gaging station, 1 mile southeast of Green River, Emery County, 22 miles upstream from San Rafael River, and 117 miles upstream from mouth.

DRAINAGE AREA.--40,600 square miles.

RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1952.

Water temperatures: April 1949 to September 1952.

Sediment records: May 1930 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,500 micromhos Mar. 31; minimum daily, 347 micromhos June 17.

Percent sodium: Maximum, 42 Oct. 11-20; minimum, 21 June 11-20.

EXTREMES, 1941-52.--Specific conductance: Maximum daily, 2,420 micromhos Sept. 29, 1943; minimum daily, 321 micromhos May 30, 1948.

Percent sodium (1950-52): Maximum, 42 Oct. 11-20, 1951; minimum, 21 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 Salt Lake City, Utah. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids		Percent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot				
Oct. 1-10, 1951 ..	61,390	9.5	4.29	2.96	4.35	0.13	3.64	6.77	1.18	0.03	0.03	--	747	1.02	62,620	2.3	1,060	--
Oct. 11-20	66,170	12	3.99	2.55	4.74	.13	3.61	6.50	1.24	.03	0.23	0.23	727	.99	65,510	42	2.6	--
Oct. 21-31	82,910	12	4.14	2.80	4.52	.11	3.74	6.82	1.13	.02	--	--	730	.99	82,080	39	2.4	--
Nov. 1-10	63,890	11	4.29	3.12	4.44	.11	3.77	7.02	1.13	.03	--	--	767	1.04	65,930	37	2.3	--
Nov. 11-20	55,490	12	4.09	3.12	4.39	.10	3.83	6.45	1.13	.02	--	--	752	1.00	53,490	38	2.3	--
Nov. 21-30	47,050	13	4.29	3.54	4.91	.09	3.98	7.41	1.27	.04	--	--	820	1.12	52,700	38	2.5	--
Dec. 1-10	49,230	14	4.39	3.70	4.87	.08	4.26	7.66	1.33	.02	--	--	824	1.12	55,140	37	2.4	--
Dec. 11-20	31,380	15	4.99	4.28	5.52	.10	4.82	8.43	1.38	.03	--	--	936	1.27	39,850	37	2.6	--
Dec. 21-31	51,190	14	4.39	3.45	4.48	.09	4.42	6.56	1.27	.02	--	--	773	1.05	53,750	36	2.3	--
Jan. 1-10, 1952 ..	36,990	13	4.29	3.37	4.35	.08	4.26	6.52	1.16	.03	--	--	758	1.03	38,100	36	2.2	7.8
Jan. 11-20	43,930	14	4.59	3.62	4.57	.13	4.59	6.91	1.30	.04	.22	.22	814	1.11	48,760	35	2.3	7.6
Jan. 21-31	56,530	13	3.89	3.12	3.91	.09	4.03	5.87	1.07	.03	--	--	682	.93	52,570	36	2.1	994
Feb. 1-10	51,470	13	3.84	3.21	4.09	.08	3.98	6.18	1.07	.03	--	--	698	.95	48,900	36	2.2	7.7
Feb. 11-20	48,990	14	3.94	3.29	4.22	.10	4.00	6.18	1.13	.03	.23	.23	700	.95	46,540	37	2.2	--
Feb. 21-29	42,980	14	4.09	3.37	4.35	.10	4.13	6.33	1.21	.03	--	--	716	.97	41,690	36	2.2	--

SAN JUAN RIVER BASIN

SAN JUAN RIVER NEAR BLANCO, N. MEX.

LOCATION.--At highway bridge, half a mile downstream from gaging station, which is 1 mile upstream from Canyon Largo and 1½ miles east of Blanco, San Juan County.

DRAINAGE AREA.--3,320 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 651 micromhos Mar. 15; minimum daily, 107 micromhos June 20.

Percent sodium: Maximum, 39 Mar. 11-20; minimum, 13 Apr. 11-20, June 4.

EXTREMES, 1945-52.--Specific conductance: Maximum daily, 1,420 micromhos Aug. 16, 1947; minimum daily, 107 micromhos June 20, 1952.

Percent sodium: Maximum, 52 July 11-16, 18, 20, 1947; minimum, 13 Apr. 11-20, June 4, 1952.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-10, 1951..	2,830	9.8	2.30	0.77	1.70	0.10	2.61	2.06	0.23	0.02	0.02	a 0.1	294	0.40	1,130	35	1.4	475	7.9
Oct. 11-20.....	2,410	--	2.45	.81	1.91	--	--	--	--	--	--	--	310	.42	1,010	37	1.5	499	--
Oct. 21-31.....	3,640	--	2.74	.82	2.17	--	--	--	--	--	--	--	364	.50	1,820	38	1.6	570	--
Nov. 1-10.....	2,710	--	2.74	.90	2.04	--	--	--	--	--	--	--	340	.46	1,250	36	1.5	537	--
Nov. 11-20.....	2,420	--	2.64	.99	2.30	--	--	--	--	--	--	--	370	.50	1,210	38	1.7	585	--
Nov. 21-30.....	3,120	--	2.74	.90	2.22	--	--	--	--	--	--	--	356	.48	1,500	38	1.6	563	--
Dec. 1-10.....	3,720	--	2.64	.82	2.04	--	--	--	--	--	--	--	346	.47	1,750	37	1.6	534	--
Dec. 11-20.....	4,780	--	2.89	.90	2.17	--	--	--	--	--	--	--	376	.51	2,440	36	1.6	574	--
Dec. 21-31.....	10,050	--	2.54	.82	1.74	--	--	--	--	--	--	--	320	.44	4,420	34	1.3	496	--
Jan. 1-10, 1952..	11,110	15	2.94	1.23	1.65	.18	2.56	3.16	.31	.03	.04	.1	392	.53	5,890	28	1.1	590	7.7
Jan. 11-20.....	8,160	--	2.84	1.07	1.96	--	--	--	--	--	--	--	365	.50	4,080	33	1.4	557	--
Jan. 21-31.....	8,190	--	2.99	1.23	2.13	--	--	--	--	--	--	--	395	.54	4,420	34	1.5	600	--
Feb. 1-10.....	6,100	--	2.94	1.15	1.96	--	--	--	--	--	--	--	382	.52	3,170	32	1.4	575	--
Feb. 11-20.....	6,500	--	2.89	1.07	1.91	--	--	--	--	--	--	--	366	.50	3,250	33	1.4	556	--
Feb. 21-29.....	4,370	--	2.89	1.07	2.00	--	--	--	--	--	--	--	374	.51	2,230	34	1.4	572	--

a Reported boron concentration is less than figure indicated.

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

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per-cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH
			Cal-cium (Ca)	Mag-ne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons					
Mar. 1-10, 1952..	8,330	--	2.89	1.07	2.17	--	--	--	--	--	--	--	388	0.53	4,410	35	1.5	587	--	
Mar. 11-20.....	18,300	--	2.59	.99	2.30	--	--	--	--	--	--	--	374	.51	9,330	39	1.7	572	--	
Mar. 21-31.....	31,150	--	2.50	1.15	1.48	--	--	--	--	--	--	--	326	.44	13,710	29	1.1	496	--	
Apr. 1-10.....	94,810	14	2.64	.90	.61	0.08	2.59	1.46	0.08	0.02	0.06	0.04	258	.35	33,180	14	0.5	404	7.8	
Apr. 11-20.....	107,800	--	1.75	.50	.35	--	--	--	--	--	--	--	171	.23	24,790	13	0.3	261	--	
Apr. 21-30.....	124,700	--	1.50	.50	.36	--	--	--	--	--	--	--	150	.20	24,940	15	0.4	223	--	
May 1-10.....	156,000	--	1.25	.43	.27	--	--	--	--	--	--	--	133	.18	28,080	14	0.3	190	--	
May 11-20.....	130,900	--	1.05	.30	.26	--	--	--	--	--	--	--	109	.15	19,640	16	0.3	156	--	
May 21-31.....	102,900	--	1.00	.30	.30	--	--	--	--	--	--	--	109	.15	15,440	19	0.4	151	--	
June 1-3, 5-10...	133,100	--	1.00	.30	.23	--	--	--	--	--	--	--	102	.14	21,430	15	0.3	145	--	
June 4.....	22,610	--	1.50	.37	.29	--	--	--	--	--	--	--	139	.19	4,300	13	0.3	216	--	
June 11-20.....	164,300	--	.80	.28	.20	--	--	--	--	--	--	--	91	.12	19,720	16	0.3	121	--	
June 21-28.....	77,910	--	.75	.25	.24	--	--	--	--	--	--	--	89	.12	9,350	19	0.3	124	--	
June 29-30.....	12,830	--	.90	.25	.32	--	--	--	--	--	--	--	100	.14	1,800	22	0.4	144	6.8	
July 1-10.....	53,890	16	.90	.26	.32	.06	1.05	.40	.06	.02	.01	.17	121	.16	9,580	21	0.4	155	--	
July 11-20.....	35,540	--	1.05	.35	.43	--	--	--	--	--	--	--	121	.16	5,690	23	0.5	185	--	
July 21-31.....	27,720	--	1.40	.39	.57	--	--	--	--	--	--	--	158	.21	5,820	24	0.6	243	--	
Aug. 1-10.....	21,430	--	1.30	.34	.57	--	--	--	--	--	--	--	154	.21	4,500	26	0.6	230	--	
Aug. 11-20.....	13,920	--	1.60	.66	.78	--	--	--	--	--	--	--	189	.26	3,620	26	0.7	287	--	
Aug. 21-22.....	5,000	--	2.69	1.32	.74	--	--	--	--	--	--	--	278	.38	1,900	16	0.5	409	--	
Aug. 23-31.....	14,790	--	1.50	.48	.74	--	--	--	--	--	--	--	182	.25	3,700	27	0.7	275	--	
Sept. 1-10.....	7,920	--	1.65	.58	1.00	--	--	--	--	--	--	--	207	.28	2,220	31	0.9	328	--	
Sept. 11-20.....	6,220	--	1.70	.59	.96	--	--	--	--	--	--	--	208	.28	1,740	30	0.9	319	--	
Sept. 21-30.....	11,600	--	1.80	.82	.91	--	--	--	--	--	--	--	209	.28	3,250	26	0.8	312	--	
Total or weighted average	1,490,000	--	1.40	0.47	0.48	--	--	--	--	--	--	--	155	0.21	312,900	20	0.5	228	--	

a Reported boron concentration is less than figure indicated.

a Reported boron concentration is less than figure indicated.

LITTLE COLORADO RIVER BASIN

LITTLE COLORADO RIVER AT CAMERON, ARIZ.

LOCATION --At bridge on U.S. Highway 89 at Cameron, Coconino County, 12 miles upstream from gaging station near Cameron, which is 9.5 miles downstream from Moenkopi Wash.

DRAINAGE AREA --26,500 square miles (above gaging station).

RECORDS AVAILABLE --Chemical analyses: April 1951 to September 1952.

EXTREMES, 1951-52 --Specific conductance: Maximum daily, 1,920 micromhos Mar. 4; minimum daily, 420 Apr. 21.

Percent sodium: Maximum, 88 Sept. 21-23; minimum, 56 Mar. 21-30.

REMARKS --Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Discharge records, for gaging station near Cameron (below Moenkopi Wash), for water year October 1951 to September 1952 given Water-Supply Paper 1243. No appreciable inflow between sampling site and gaging station except during periods of storm runoff from Moenkopi Wash and several small arroyos.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Per-cent sodium	So-ad-sorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH		
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion					Tons per acre-foot	Total tons
Oct. 1-10, 1951..	a 7,210	23	2.15	0.71	9.46	0.13	5.29	3.62	3.27	0.11	0.03	0.30	724	0.98	7,070	77	7.9	1,200	7.7
Jan. 1-10, 1952..	33,980	13	1.55	.39	3.82	.13	2.51	1.10	2.09	.05	.03	.10	346	.47	15,970	65	3.9	602	7.9
Jan. 11-20	38,210	12	1.50	.49	4.17	.17	2.75	1.06	2.62	.03	.03	.08	380	.52	19,870	66	4.2	689	7.9
Jan. 21-31	52,530	15	1.60	.28	4.04	.23	b 2.51	1.12	2.43	.02	.03	.15	370	.50	26,260	66	4.2	632	8.0
Feb. 1-10	4,750	12	1.87	.47	3.96	.21	1.87	.98	3.27	.02	.01	.20	369	.50	2,360	64	3.9	667	7.9
Feb. 11-20	3,860	12	1.70	.47	4.22	.21	c 1.81	1.06	3.61	.01	.00	.07	390	.53	2,050	64	4.1	723	7.8
Feb. 21-29	1,580	15	2.30	.82	6.13	.26	d 2.01	1.46	6.01	.01	.01	.05	566	.77	1,220	64	4.9	1,020	8.0
Mar. 1-10	976	21	4.44	1.56	9.44	.11	2.85	4.18	8.12	.02	.07	.13	930	1.26	1,230	61	5.4	1,580	7.6
Mar. 11-20	3,000	12	2.54	.90	6.39	.08	2.23	1.67	5.75	.02	.04	.21	578	.79	2,370	64	4.9	1,040	7.7
Mar. 21-30	6,120	15	2.35	.90	4.30	.09	2.64	1.94	2.88	.02	.05	.25	453	.62	3,790	56	3.4	774	7.7
Mar. 31-Apr. 10	60,360	15	1.20	.32	2.91	.06	2.23	.73	1.47	.02	.02	.45	268	.36	21,730	65	3.3	464	7.9
Apr. 11-20	34,460	15	.95	.29	3.17	.05	1.93	.79	1.72	.02	.01	.19	271	.37	12,750	71	4.0	468	7.9
Apr. 21-30	39,800	19	1.45	.45	3.52	.06	2.74	.94	1.61	.03	.05	.22	325	.44	17,510	64	3.6	541	7.6
May 1-10	18,120	17	1.10	.33	3.44	.06	2.61	.77	1.47	.02	.04	.20	294	.40	7,250	70	4.1	501	7.9
May 11-23	2,930	14	1.55	.43	3.83	.07	1.90	.73	3.16	.01	.01	.09	346	.47	1,380	65	3.8	698	7.8
July 8-11	1,660	24	2.79	.99	11.48	.10	5.00	4.68	5.36	.02	.02	.64	927	1.26	2,090	75	8.4	1,510	7.6

a Flow in Moenkopi Wash near Tuba, Ariz., exceeded 10 percent of flow in

Little Colorado River near Cameron, Ariz., and was deducted from the

latter to give figures shown herein for sampling site.

b Includes 0.20 equivalents per million of carbonate (CO₃).

c Includes 0.17 equivalents per million of carbonate (CO₃).

d Includes 0.27 equivalents per million of carbonate (CO₃).

LITTLE COLORADO RIVER BASIN--Continued

LITTLE COLORADO RIVER AT CAMERON, ARIZ.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH			
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million				Tons per acre-foot	Total tons	
Aug. 1-10, 1952.	2,410	22	1.50	0.62	10.96	0.08	4.90	3.58	4.46	0.05	0.03	0.58	794	1.08	2,600	83	11	1,300	7.9
Aug. 21-31, Sept. 1-3.	a 9,320	19	2.05	.80	8.78	--	4.95	3.06	3.61	.04	.01	--	697	.95	8,850	75	7.4	1,150	7.8
Sept. 4-7.	234	17	1.10	.23	9.26	--	3.93	3.14	3.44	.06	.02	--	646	.88	206	87	11	1,050	--
Sept. 21-23.	a 6,790	20	.45	.31	5.50	--	c 3.60	1.50	1.13	.02	.01	--	379	.52	4,570	88	8.9	603	8.2
Sept. 24-30.	6,900	23	1.50	.55	8.48	--	4.51	2.87	3.10	.02	.02	--	639	.87	6,000	81	8.4	1,030	7.9
Total or weighted average	ae 337,200	16	1.45	0.41	4.17	0.12	2.65	1.19	2.17	0.03	0.03	0.22	365	0.50	168,600	68	4.3	624	--

a Flow in Moenkopi Wash near Tuba, Ariz., exceeded 10 percent of flow in Little Colorado River near Cameron, Ariz., and was deducted from the latter to give figures shown herein for sampling site.

c Includes 0.17 equivalents per million of carbonate (CO₃).

e No flow during part of several months. Analyses published here represent more than 99 percent of total flow for year.

GILA RIVER BASIN

GILA RIVER AT KELVIN, ARIZ.

LOCATION.--Just above mouth of Mineral Creek, 1 200 feet upstream from gaging station at Kelvin, Pinal County, 17 miles downstream from San Pedro River, and 19½ miles upstream from Ashurst-Hayden Dam.
DRAINAGE AREA.--18,000 square miles, of which 5,140 square miles is below Coolidge Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: December 1950 to September 1952.
EXTREMES, 1951-52.--Specific conductance: Maximum daily, 2 520 micromhos Oct. 21, 22; minimum daily, 407 micromhos Jan. 20.
Percent sodium: Maximum, 56 Sept. 1-10; minimum, 24 Oct. 21-30.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 2 520 micromhos Oct. 21-22, 1951; minimum daily, 407 micromhos Jan. 20, 1952.
Percent sodium: Maximum, 62 Aug. 8-10, 1951; minimum, 22 June 4-10, 11-20, 21-30, 1951.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So- ad- sorp- tion ratio	Specific conductance (micro-mhos at 25°C)	pH	
			Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron ppm	Parts per mil- lion	Tons per acre- foot	Total tons				Per- cent sod- ium
Oct. 1-10, 1951...	117	35	11.48	4.52	8.17	0.17	4.08	12.85	7.33	0.05	0.01	0.44	1,520	2.07	242	34	2.9	2,170	7.4
Oct. 11-20.....	67	35	14.37	6.33	6.78	.13	4.92	16.55	6.35	.04	.01	.10	1,730	2.35	157	25	2.1	2,390	7.4
Oct. 21-30.....	70	37	15.27	6.00	6.70	.12	4.95	16.86	6.20	.04	.01	.30	1,760	2.39	167	24	2.1	2,380	7.6
Oct. 31-Nov. 1-10	652	26	5.44	2.14	6.26	.16	4.05	5.00	4.65	.05	.03	.25	841	1.14	743	45	3.2	1,350	7.6
Nov. 11-20.....	2,110	23	3.59	1.48	5.91	.14	3.44	2.94	4.65	.05	.04	.23	667	.91	1,920	53	3.7	1,120	7.6
Nov. 21-30.....	2,160	25	4.04	1.73	6.22	.23	3.28	3.37	5.13	.06	.02	.22	732	1.00	2,160	51	3.7	1,230	8.0
Dec. 1-5.....	702	27	4.69	1.89	6.31	.21	3.82	4.29	5.10	.05	.02	.08	802	1.09	765	48	3.5	1,260	8.0
Dec. 6-7.....	347	32	3.4	1.23	7.91	.20	3.92	1.94	1.69	--	.06	--	460	.63	219	43	2.2	1,785	7.8
Dec. 8-20.....	1,120	28	6.19	2.55	7.91	.23	4.39	6.06	6.23	.06	.02	.21	1,020	1.39	1,560	47	3.8	1,630	7.9
Dec. 21-30.....	761	31	6.84	2.71	8.61	.23	4.57	7.33	6.74	.07	.02	.16	1,140	1.55	1,180	47	3.9	1,730	8.0
Dec. 31.....	3,630	26	3.09	1.40	3.44	--	3.95	2.42	1.44	--	.02	--	471	.64	2,320	43	2.3	641	7.7
Jan. 1-12, 1952..	2,210	34	6.99	2.80	8.17	.24	4.80	7.06	5.98	.07	.02	.21	1,100	1.50	3,320	45	3.7	1,680	8.0
Jan. 13-14, 18-20	16,030	31	2.74	.99	1.87	.12	b2.52	1.98	1.24	.03	.05	--	365	.50	8,020	33	1.4	570	7.9
Jan. 15-17, 21-22	2,290	26	4.99	1.81	4.17	.19	3.79	3.98	3.16	.04	.02	.21	670	.91	2,080	37	2.3	1,950	8.0
Jan. 23-31.....	1,550	31	6.84	2.63	6.78	.17	c4.83	6.00	5.26	.05	.03	.24	984	1.34	1,810	41	3.1	1,530	8.1

a Includes 0.23 equivalents per million of carbonate (CO₃).b Includes 0.17 equivalents per million of carbonate (CO₃).c Includes 0.50 equivalents per million of carbonate (CO₃).

GILA RIVER BASIN--Continued
GILA RIVER AT KELVIN, ARIZ.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Feb. 1-6, 1952 ..	573	28	6.64	2.88	7.78	0.17	44.20	7.16	5.89	0.05	0.02	0.21	1,060	1.44	825	45	1,660	8.2	
Feb. 7-10	343	30	6.79	2.96	7.96	.23	44.54	7.20	5.84	.07	.00	--	1,080	1.47	504	44	1,670	8.1	
Feb. 11-21	930	30	6.69	2.88	8.00	.23	44.56	7.06	5.98	.06	.00	.23	1,080	1.47	1,370	45	1,670	7.9	
Feb. 22-29	2,380	29	3.89	1.64	4.96	.14	31.3	2.85	4.43	.05	.04	.22	638	.87	2,070	47	1,060	7.9	
Mar. 2-5	3,580	27	3.29	1.15	2.70	.11	31.15	1.94	1.95	.04	.04	--	434	.59	2,110	37	700	7.9	
Mar. 1, 6-10	2,690	31	4.59	1.89	5.22	.15	34.54	3.37	4.71	.05	.03	.09	710	.97	2,610	44	1,160	7.9	
Mar. 11-20	7,690	29	4.34	1.81	5.13	.15	34.87	3.39	4.15	.05	.04	--	685	.93	7,150	45	1,110	8.0	
Mar. 21-31	7,680	27	3.69	1.56	5.17	.14	29.5	2.33	5.05	.04	.04	.24	628	.85	6,530	49	1,070	8.0	
Apr. 1-10	8,720	25	3.19	1.40	4.87	.13	27.5	2.04	4.71	.03	.05	.17	575	.78	6,800	51	994	7.6	
Apr. 11-20	11,010	26	2.89	1.15	4.26	.11	24.5	1.77	4.06	.03	.04	.17	512	.70	7,710	51	882	7.8	
Apr. 21-30	7,710	25	2.89	1.23	4.00	.12	26.9	1.94	3.55	.03	.03	.19	497	.68	5,240	49	856	7.8	
May 1-10	4,840	27	3.04	1.23	4.17	.13	27.5	2.00	3.72	.03	.03	.14	517	.70	3,390	49	891	7.9	
May 11-20	5,030	26	2.79	1.23	3.91	.12	26.9	1.77	3.53	.03	.03	.19	485	.66	3,320	49	831	7.8	
May 21-31	7,470	26	2.59	1.15	3.83	.12	23.7	1.54	3.38	.03	.02	.15	457	.62	4,630	50	786	7.8	
June 1-10	9,900	29	2.74	1.15	3.91	.12	27.5	1.48	3.64	.03	.03	.13	478	.65	6,440	49	826	7.9	
June 11-20	10,480	25	2.74	1.23	4.09	.11	27.2	1.39	3.84	.04	.02	.06	480	.65	6,810	50	839	7.8	
June 21-30	13,690	26	2.69	1.15	4.13	.11	27.0	1.46	3.95	.04	.01	.08	486	.66	9,040	51	849	7.8	
July 1-10	13,520	24	2.84	1.23	4.26	.13	27.9	1.58	4.00	.04	.01	.04	503	.68	9,190	50	882	7.8	
July 11-20	16,750	25	2.89	1.32	4.44	.15	29.2	1.52	4.15	.03	.01	.16	516	.70	11,730	50	889	7.6	
July 21-31	22,030	27	3.24	1.32	4.44	.14	33.2	1.39	4.00	.04	.03	.17	533	.72	15,860	49	920	7.6	
Aug. 1-10	18,220	25	3.39	1.32	4.52	.15	35.2	1.56	4.15	.04	.02	.22	549	.75	13,670	48	951	7.6	
Aug. 11-20	20,580	27	3.79	1.23	4.17	.16	41.3	1.58	3.53	.04	.02	.14	547	.74	15,230	45	925	7.7	
Aug. 21-31	17,600	23	3.34	1.15	4.87	.16	32.1	2.04	4.03	.04	.03	.22	583	.77	13,550	51	965	7.8	
Sept. 1-10	13,520	19	2.84	1.40	5.65	.16	29.5	1.96	4.91	.04	.05	.16	590	.80	10,820	56	3.9	1,030	7.7
Sept. 11-20	9,060	22	3.39	1.89	6.61	.18	34.2	2.46	6.04	.04	.06	.23	705	.96	8,700	55	4.1	1,210	7.7
Sept. 21-30	4,460	25	4.49	2.14	7.83	.21	38.8	3.48	6.94	.05	.05	.28	863	1.17	5,220	53	4.3	1,450	7.7
Total or weighted average	274,100	26	3.29	1.40	4.52	0.14	31.6	2.04	3.98	0.04	0.03	0.16	555	0.75	207,200	48	942	--	

d Includes 0.37 equivalents per million of carbonate (CO₃).

GILA RIVER BASIN--Continued
GILA RIVER BELOW GILLESPIE DAM, ARIZ.

LOCATION --At gaging station on Gillespie Canal 200 feet downstream from Gillespie Dam, Maricopa County.

DRAINAGE AREA --49,600 square miles.

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: December 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 10,200 micromhos Oct. 1; minimum daily, 1,030 micromhos Nov. 2.

Percent sodium: Maximum, 69 June 11-20, minimum, 36 Jan. 24.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 10,200 micromhos Oct. 1, 1951; minimum daily, 420 micromhos Sept. 1, 1951.

Percent sodium: Maximum, 69 Aug. 6-10, 1951, June 11-20, 1952; minimum, 36 Jan. 24, 1952.

REMARKS --Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are sums of determined constituents. Samples from canal are believed to be representative of total flow passing Gillespie Dam including spill and amounts diverted into Gillespie and Enterprise canals. Records of separate and combined discharge for the river and canals for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per-cent sodium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1951..	1,200	48	22.16	15.79	67.40	0.28	6.26	27.06	72.20	0.13	0.56	3.3	6,330	8.61	10,330	64	15	9,860	7.6
Oct. 11-20.....	1,120	37	22.36	16.45	68.27	.28	6.39	27.27	74.74	.12	.55	3.3	6,450	8.77	9,820	64	15	10,000	7.6
Oct. 21-31.....	1,460	31	21.76	15.54	67.83	.15	6.70	25.82	71.07	.12	.45	3.4	6,210	8.45	12,340	64	16	9,630	7.7
Nov. 1.....	756	11	4.29	2.38	7.78	.17	2.33	3.56	8.60	.02	.10	.48	865	1.18	892	53	4.3	1,510	7.4
Nov. 2-3.....	591	18	10.38	6.09	24.96	.23	3.83	9.97	27.36	.03	.21	--	2,460	3.35	1,980	60	8.7	4,080	7.6
Nov. 4-10.....	1,080	31	20.96	14.88	60.88	.28	6.69	23.94	65.71	.11	.60	3.0	5,760	7.83	8,460	63	14	8,920	7.7
Nov. 11-20.....	1,220	31	22.46	15.46	68.27	.19	7.39	25.82	72.48	.13	.56	3.1	6,320	8.60	10,490	64	16	9,800	7.6
Nov. 21-30.....	1,410	28	21.58	15.71	63.92	.18	6.69	25.40	68.25	.12	.45	2.8	6,000	8.16	11,510	63	15	9,220	7.7
Dec. 1-10.....	1,350	30	21.56	15.46	64.36	.21	6.69	25.19	68.82	.12	.50	2.7	6,020	8.19	11,060	63	15	9,250	7.7
Dec. 11-20.....	1,310	32	21.36	15.38	65.23	.24	6.97	25.40	68.82	.12	.47	2.7	6,050	8.23	10,780	64	15	9,270	7.6
Dec. 21-31, Jan. 1-2, 1952.....	1,820	32	21.26	15.13	63.05	.18	6.87	24.57	66.84	.12	.50	2.6	5,990	8.01	14,580	63	15	9,040	7.5
Jan. 3-4.....	571	18	5.19	3.21	10.18	.18	2.51	5.29	10.58	.03	.11	.65	1,110	1.51	862	54	5.0	1,910	7.8
Jan. 5.....	218	19	8.28	5.59	20.05	.16	3.61	8.95	21.58	.06	.19	--	2,040	2.77	604	59	7.6	3,420	7.7
Jan. 6-10.....	1,040	29	17.37	11.84	47.83	.18	5.97	19.09	50.77	.09	.44	2.4	4,550	6.19	6,440	62	13	7,110	7.8
Jan. 11-16, 20.....	1,500	38	20.36	14.47	60.88	.20	6.78	24.36	64.30	.11	.27	2.8	5,700	7.75	11,620	63	15	8,880	7.8
Jan. 17.....	676	21	7.49	2.55	13.53	.23	2.93	6.37	14.10	.06	.11	.50	1,410	1.92	1,300	57	6.1	2,410	7.4

GILA RIVER BASIN--Continued
GILA RIVER BELOW GILLESPIE DAM, ARIZ.--Continued

Chemical analyses, water year October 1951 to September 1952.--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per- cent so- lution ratio	Specific conduct- ance (micro- mhos at 25°C)	
			Cal- cium (Ca)	Magne- sium (Mg)	Sod- ium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
Jan. 18-19, 1952.	563	31	13.57	9.05	33.44	0.20	a 5.07	11.93	39.77	0.08	0.26	--	3,340	4.54	2,560	59	9.9	5,830	8.0
Jan. 21-22	1,780	23	4.39	2.06	6.74		2.54	3.66	6.91	.04	.04	0.22	791	1.08	1,920	51	3.8	1,370	7.7
Jan. 23-24	825	25	9.18	5.35		3.74	3.72	10.08	24.25	.06	.16	.85	2,060	2.80	2,310	36	5.1	3,800	7.5
Jan. 25-31	1,850	34	16.47	11.60	45.66	.19	b 5.79	17.20	50.20	.07	.18	1.8	4,350	5.92	10,950	62	12	6,950	7.9
Feb. 1-10	1,930	37	20.06	14.39	58.70	.28	6.78	23.53	63.18	.12	.35	2.7	5,570	7.58	14,630	63	14	8,470	7.7
Feb. 11-20	1,680	34	20.46	14.56	58.70	.28	6.60	23.94	64.59	.12	.37	2.6	5,650	7.68	12,900	62	14	8,670	7.8
Feb. 21-29	1,460	30	20.56	14.56	59.57	.31	6.44	23.73	66.28	.12	.34	2.7	5,710	7.77	11,340	63	14	8,920	7.8
Mar. 1-10	1,520	33	20.86	14.56	61.31	.28	6.98	24.36	66.56	.12	.35	2.7	5,810	7.90	12,010	63	15	8,980	7.5
Mar. 11-20	2,080	31	17.86	12.75	53.92	.26	6.13	21.03	57.25	.11	.34	2.4	5,040	6.85	14,250	64	14	7,710	7.6
Mar. 21-31	1,750	32	20.26	14.56	62.18	.28	6.72	24.36	66.28	.12	.40	2.9	5,810	7.90	13,820	64	15	8,650	7.8
Apr. 1-10	1,530	29	20.46	14.64	62.62	.31	6.69	25.19	66.84	.13	.34	2.9	5,870	7.98	12,210	64	15	8,780	7.8
Apr. 11-20	1,750	34	18.26	13.49	60.88	.28	6.41	23.32	61.77	.12	.44	2.3	5,510	7.49	13,110	66	15	8,510	7.7
Apr. 21-30	1,570	40	18.46	13.49	62.18	.28	6.60	23.94	62.33	.11	.44	2.9	5,600	7.62	11,960	66	16	8,560	7.7
May 1-10	1,330	38	19.56	13.32	60.44	.28	6.10	22.90	62.33	.09	.55	2.0	5,520	7.51	9,990	65	15	8,390	7.5
May 11-20	1,100	36	18.86	13.57	60.44	.28	6.11	23.53	62.05	.09	.52	2.0	5,530	7.52	8,270	65	15	8,340	7.6
May 21-31	1,080	31	18.06	12.91	59.14	.28	5.80	22.48	60.35	.09	.45	1.8	5,340	7.26	7,840	65	15	8,140	7.6
June 1-10	882	32	18.26	13.73	62.18	.28	5.49	24.36	64.02	.09	.50	1.8	5,640	7.67	6,760	66	16	8,540	7.5
June 11-20	736	26	16.47	13.32	66.10	.31	6.03	24.15	65.15	.14	.24	2.7	5,720	7.78	5,730	69	17	8,720	7.3
June 21-31	728	33	7.96	13.16	63.49	.31	5.79	24.57	62.89	.13	.50	3.0	5,640	7.67	5,560	67	20	8,500	7.5
July 1-10	736	33	17.66	12.83	59.14	.28	5.16	23.53	59.23	.13	.44	2.7	5,330	7.25	5,340	66	15	8,170	7.4
July 11-20	527	33	19.16	13.49	64.37	.31	5.51	24.15	65.15	.13	.47	2.8	5,740	7.81	4,120	66	16	8,850	7.5
July 21-27, 29	637	28	17.17	12.17	59.14	.31	5.11	23.32	58.94	.13	.44	2.4	5,290	7.19	4,560	67	15	8,130	7.5
July 28, 30-31 ...	631	19	4.79	2.38	12.35	.22	3.13	5.08	11.28	.05	.18	.5	1,190	1.62	1,020	63	6.5	2,020	7.7
Aug. 1	139	25	11.33	7.15	36.96	.28	4.92	14.43	35.82	.08	.34	2.0	3,330	4.53	630	66	12	5,260	7.9
Aug. 2-10	575	33	17.76	12.50	59.14	.31	5.70	23.53	59.23	.12	.45	2.4	5,340	7.26	4,170	66	15	8,040	7.8
Aug. 11-15	280	33	18.56	12.91	61.75	.31	6.57	23.53	61.77	.12	.44	3.0	5,540	7.53	2,110	66	16	8,320	7.4

a Includes 0.27 equivalents per million of carbonate (CO₃).
b Includes 0.75 equivalents per million of carbonate (CO₃).

Aug. 16-17.....	454	26	--	1.32	5.39	.21	2.25	2.12	5.58	--	.18	--	--	--	--	--	--	--	1,090	7.7
Aug. 18-21.....	1,260	28	4.79	2.30	13.22	.21	3.98	5.39	11.11	.05	.13	.9	1,250	1.70	2,140	64	7.0	2,110	7.9	
Aug. 22-31.....	1,040	32	17.17	11.02	51.31	.31	6.64	20.53	52.74	.09	.39	2.6	4,780	6.50	6,760	64	14	7,340	7.4	
Sept. 1-10.....	678	32	17.76	12.66	59.14	.28	5.41	24.36	58.66	.12	.58	2.7	5,360	7.29	4,940	66	15	8,070	7.7	
Sept. 11-20.....	601	32	18.26	13.49	61.75	.28	5.49	24.77	62.05	.13	.50	3.2	5,580	7.59	4,560	66	15	6,560	7.6	
Sept. 21-30.....	575	30	18.26	13.16	62.18	.28	5.33	24.98	62.33	.13	.56	3.1	5,600	7.62	4,380	66	16	8,580	7.6	
Total or weighted average	51,630	31	17.61	12.25	53.05	0.25	5.82	20.82	55.84	0.10	0.39	2.4	4,940	6.72	347,000	64	14	7,620	--	

GILA RIVER BASIN--Continued

SALT RIVER AT STEWART MOUNTAIN DAM, ARIZ.

LOCATION.--Just below dam, 3½ miles above gaging station below Stewart Mountain Dam, which is 6 miles upstream from Verde River, Maricopa County.

DRAINAGE AREA.--6,240 square miles (above gaging station).

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: December 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 1,770 micromhos Nov. 5; minimum daily, 917 micromhos Sept. 15.

Percent sodium: Maximum, 73 Nov. 11-20, 21-30; minimum, 58 Sept. 21-30.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 2,490 micromhos Aug. 20, 1951; minimum daily, 917 micromhos Sept. 15, 1952.

Percent sodium: Maximum, 76 July 21-31, Aug. 11-20, Aug. 21-26, 1951; minimum, 58 Sept. 21-30, 1952.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids are residue on evaporation. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium adsorption ratio	Specific conductance (micro-mhos at 25° C)	pH	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per million	Tons per acre-foot					
Oct. 1-10, 1951.	173	27	2.54	1.56	10.83	0.21	2.49	1.23	11.28	0.02	0.03	0.23	942	1.28	221	72	7.6	1,660	7.6
Oct. 11-20.....	58	27	2.64	1.64	11.65	.20	2.52	1.31	12.13	.02	.03	.22	976	1.33	77	72	7.9	1,750	7.8
Oct. 21-31.....	40	18	2.64	1.64	11.35	.21	2.49	1.21	11.99	.02	.03	.16	956	1.30	52	72	7.7	1,730	7.7
Nov. 1-10.....	26	12	2.69	1.64	11.26	.23	2.54	1.31	11.85	.02	.03	.18	944	1.28	33	71	7.7	1,720	7.8
Nov. 11-20.....	19	11	2.40	1.48	11.22	.21	2.49	1.29	11.56	.02	.01	.20	928	1.26	24	73	8.1	1,700	7.6
Nov. 21-30.....	38	21	2.35	1.56	11.18	.24	2.61	1.25	11.42	.02	.03	.20	923	1.26	48	73	8.0	1,650	7.9
Dec. 1-10.....	38	13	2.45	1.48	10.83	.20	2.51	1.25	11.14	.02	.02	.22	891	1.21	46	72	7.7	1,620	7.8
Dec. 11-20.....	2,340	8.2	2.69	1.56	10.18	.26	2.51	1.29	10.89	.03	.03	.26	859	1.17	2,740	69	7.0	1,600	7.7
Dec. 21-31.....	15,930	7.0	2.59	1.48	10.35	.26	2.46	1.31	10.83	.03	.02	.27	860	1.17	18,640	71	7.3	1,580	7.8
Jan. 1-10, 1952.	87	9.1	2.59	1.48	10.18	.26	2.49	1.27	10.77	.03	.03	.31	858	1.17	102	70	7.1	1,580	7.8
Jan. 11-20.....	53	10	2.59	1.40	10.21	.26	2.52	1.17	10.86	.03	.03	.16	851	1.16	61	70	7.3	1,570	7.6
Jan. 21-31.....	45	13	2.54	1.40	10.22	.28	2.57	1.23	10.86	.03	.03	.20	842	1.15	52	71	7.3	1,550	7.6
Feb. 1-10.....	25	15	2.54	1.56	9.74	.19	2.46	1.19	10.15	.02	.02	.22	834	1.13	28	69	6.8	1,530	7.8
Feb. 11-20.....	23	20	2.54	1.56	9.39	.18	2.64	1.23	9.76	.03	.02	.16	815	1.11	25	69	6.6	1,470	7.8
Feb. 21-29.....	53	14	2.50	1.46	8.87	.18	2.61	1.21	9.25	.03	.02	.15	769	1.05	56	68	6.3	1,400	7.9

Mar. 1-10.....	58	14	2.40	1.40	8.26	.17	2.56	1.17	6.52	.03	.02	.24	715	.97	56	68	6.0	1,300	7.8
Mar. 11-20.....	92	16	2.40	1.40	8.17	.17	2.59	1.17	6.46	.02	.03	.15	721	.98	90	67	5.9	1,300	7.8
Mar. 21-31.....	86	15	2.54	1.23	8.26	.17	2.61	1.15	8.40	.02	.03	.07	721	.98	86	68	6.0	1,310	7.8
Apr. 1-10.....	64	15	2.54	1.23	8.17	.16	2.59	1.12	8.46	.03	.03	.06	718	.98	63	68	6.0	1,300	7.7
Apr. 11-20.....	67	16	2.50	1.32	8.13	.16	2.59	1.12	6.29	.02	.05	.21	718	.98	66	67	5.9	1,290	7.8
Apr. 21-30.....	76	16	2.54	1.23	8.13	.18	2.59	1.15	8.12	.02	.04	.18	703	.96	73	67	5.9	1,290	7.8
May 1-10.....	42	16	2.50	1.23	8.35	.16	2.65	1.15	8.18	.03	.03	.16	707	.96	40	68	6.1	1,310	7.9
May 11-20.....	10,870	18	2.45	1.23	8.35	.16	2.59	1.12	8.18	.03	.03	.19	714	.97	10,540	68	6.2	1,290	7.7
May 21-31.....	3,920	17	2.50	1.23	6.22	.16	2.64	1.10	8.18	.03	.03	.20	717	.98	3,840	68	6.0	1,280	7.8
June 1-10.....	7,930	18	2.45	1.23	7.91	.17	2.62	1.08	7.95	.03	.03	.09	686	.93	7,370	67	5.8	1,280	7.7
June 11-20.....	7,660	24	2.40	1.15	6.78	.16	2.62	1.02	6.77	.03	.06	.10	650	.88	6,740	65	5.1	1,130	7.7
June 21-30.....	5,010	22	2.30	1.07	6.09	.15	2.49	1.00	6.09	.03	.05	.07	599	.81	4,060	63	4.7	1,040	7.8
July 1-10.....	14,700	21	2.25	1.07	5.91	.15	2.43	.98	5.81	.03	.05	.06	566	.77	11,320	63	4.6	1,000	7.7
July 11-20.....	23,810	20	2.40	1.07	6.00	.13	2.43	1.02	6.04	.02	.04	.17	582	.79	16,810	62	4.6	1,030	7.4
July 21-31.....	25,500	17	2.40	1.07	6.26	.14	2.49	1.04	6.26	.02	.04	.15	593	.81	20,860	63	4.8	1,050	7.6
Aug. 1-10.....	22,340	18	2.45	1.07	6.17	.14	2.51	.98	6.20	.02	.04	.17	581	.79	17,650	63	4.7	1,050	7.5
Aug. 11-20.....	30,060	15	2.40	1.07	6.00	.14	2.46	1.02	6.15	.02	.04	.16	581	.79	23,750	62	4.6	1,030	7.6
Aug. 21-31.....	30,950	17	2.40	1.07	5.91	.14	2.52	1.02	5.98	.02	.04	.10	574	.76	24,140	62	4.5	1,020	7.6
Sept. 1-10.....	28,650	20	2.40	1.07	5.63	.14	2.52	1.00	5.75	.07	.03	.17	565	.77	22,060	62	4.4	1,020	7.6
Sept. 11-20.....	26,960	21	2.25	1.07	5.65	.13	2.43	1.00	5.53	.03	.04	.15	548	.75	21,710	62	4.4	968	7.7
Sept. 21-30.....	2,930	30	2.99	1.48	6.39	.15	3.77	1.12	5.96	.06	.14	.16	666	.91	2,670	58	4.3	1,150	7.4
Total or weighted average	262,800	18	2.40	1.15	6.52	0.15	2.51	1.04	6.57	0.02	0.04	0.15	611	0.63	218,100	64	4.9	1,090	--

GILA RIVER BASIN--Continued

VERDE RIVER BELOW BARTLETT DAM, ARIZ.

LOCATION.--At gaging station 2½ miles downstream from Bartlett Dam, Maricopa County, and 3½ miles upstream from Camp Creek.

DRAINAGE AREA.--6,160 square miles.

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: December 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 673 micromhos Dec. 20; minimum daily, 234 micromhos Jan. 13, 15.

Percent sodium: Maximum, 24 Nov. 21-30; minimum, 12 Jan. 4-10, 11-20.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 725 micromhos, June 28, 1951; minimum daily, 234 micromhos Jan. 13, 15, 1952.

Percent sodium: Maximum, 31 July 21-31, 1951; minimum, 12 Jan. 4-10, 11-20, 1952.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1243.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre- feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per- cent so- dium ratio	Specific conduct- ance (micro- mhos at 25°C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per mil- lion	Tons per acre- foot	Total tons				
Oct. 1-10, 1951...	11,120	23	2.25	1.81	0.96	0.16	3.57	1.02	0.42	0.03	0.04	0.12	288	0.39	4,340	19	0.7	480	8.0
Oct. 11-20	12,230	20	2.50	2.22	1.28	.15	4.11	1.35	.62	.02	.04	.09	339	.46	5,630	21	.8	562	8.1
Oct. 21-31	10,610	29	2.54	2.47	1.48	.15	4.41	1.48	.68	.02	.03	.20	372	.51	5,410	22	.9	600	8.2
Nov. 1-10	5,610	25	2.45	2.55	1.52	.11	4.39	1.50	.65	.02	.03	.19	377	.51	2,860	23	1.0	611	7.9
Nov. 11-20	6,210	24	2.59	2.71	1.39	.11	4.61	1.56	.71	.02	.02	.26	396	.54	3,350	20	.9	627	8.1
Nov. 21-30	5,020	26	2.50	2.88	1.70	.12	4.82	1.62	.73	.02	.02	.27	408	.55	2,760	24	1.0	655	8.0
Dec. 1-10	4,530	23	2.59	2.96	1.57	.14	4.82	1.60	.73	.02	.02	.28	390	.53	2,400	22	.9	642	8.2
Dec. 11-20	5,010	20	2.69	2.98	1.61	.15	4.88	1.62	.73	.02	.02	.22	394	.54	2,710	22	1.0	653	8.2
Dec. 21-31	2,850	18	2.64	2.96	1.61	.16	4.95	1.56	.73	.02	.02	.28	393	.53	1,510	22	1.0	655	8.0
Jan. 1-3, 1952...	922	20	2.30	2.14	1.00	--	4.03	1.02	.54	--	.02	--	308	.42	387	18	.7	518	7.6
Jan. 4-10	1,560	16	1.90	.90	.41	.15	2.57	.40	.26	.03	.04	.11	196	.27	421	12	.3	297	7.5
Jan. 11-20	2,500	15	1.35	.82	.31	.18	2.03	.35	.17	.03	.03	--	158	.21	525	12	.3	240	7.5
Jan. 21-31	3,080	15	1.55	.90	.40	.19	2.21	.48	.28	.03	.02	.20	177	.24	739	14	.4	274	7.5

a Includes 0.20 equivalents per million of carbonate (CO₃).

b Includes 0.33 equivalents per million of carbonate (CO₃).

c Includes 0.37 equivalents per million of carbonate (CO₃).

d Includes 0.23 equivalents per million of carbonate (CO₃).

Feb. 1-10.....	7,190	17	1.45	1.07	.43	.06	2.31	.44	.18	.02	.02	.17	180	.24	1,730	14	.4	286	7.8
Feb. 11-20.....	8,950	15	1.40	.99	.43	.06	2.16	.44	.19	.02	.02	.05	171	.23	2,060	15	.4	274	7.9
Feb. 21-29.....	18,460	15	1.40	.99	.43	.06	2.23	.42	.19	.02	.02	.08	173	.24	4,430	15	.4	274	7.9
Mar. 1-10.....	12,600	19	1.40	.99	.43	.06	2.25	.42	.18	.02	.02	.07	177	.24	3,020	15	.4	288	7.7
Mar. 11-20.....	6,120	17	1.50	.99	.48	.06	2.34	.44	.21	.02	.02	.07	182	.25	1,530	16	.4	288	7.7
Mar. 21-31.....	36,610	15	1.50	.99	.52	.05	2.36	.44	.20	.01	.00	.15	188	.26	9,520	17	.5	283	6.8
Apr. 1-10.....	54,570	16	1.55	1.07	.52	.05	2.44	.50	.23	.01	.01	.20	194	.26	14,190	16	.5	303	7.6
Apr. 11-20.....	39,380	18	1.55	1.15	.61	.05	2.62	.52	.23	.01	.01	.13	200	.27	10,630	18	.5	312	7.8
Apr. 21-30.....	20,800	20	1.65	1.15	.61	.05	2.62	.52	.25	.01	.01	.28	204	.28	5,820	18	.5	323	7.7
May 1-10.....	23,740	17	1.50	1.15	.57	.05	2.49	.50	.25	.01	.01	.14	194	.26	6,170	17	.5	308	7.7
May 11-20.....	9,960	20	1.45	1.07	.52	.05	2.39	.44	.20	.02	.01	.09	181	.25	2,490	17	.5	284	7.8
May 21-31.....	30,170	20	1.40	.99	.52	.05	2.29	.40	.20	.02	.00	.09	176	.24	7,240	18	.5	273	7.7
June 1-10.....	25,030	21	1.40	.90	.52	.05	2.25	.37	.18	.02	.01	.07	175	.24	6,010	18	.5	267	7.7
June 11-20.....	36,470	19	1.35	.90	.52	.05	2.26	.37	.20	.02	.01	.10	172	.23	8,390	18	.5	265	7.7
June 21-30.....	41,520	19	1.55	1.07	.61	.06	2.57	.44	.24	.02	.01	.07	193	.26	10,800	19	.5	304	7.8
July 1-10.....	24,610	18	1.65	1.23	.52	.06	2.70	.46	.23	.01	.01	.17	202	.27	6,640	15	.4	325	7.6
July 11-20.....	21,270	20	1.65	1.23	.57	.06	2.72	.48	.24	.01	.02	.17	205	.28	5,960	16	.5	334	7.7
July 21-31.....	22,850	24	1.70	1.23	.57	.06	2.82	.52	.25	.01	.01	.18	213	.29	6,630	16	.5	340	7.5
Aug. 1-10.....	26,900	23	1.85	1.32	.70	.06	2.97	.56	.34	.01	.01	.08	231	.31	8,340	18	.6	363	7.8
Aug. 11-20.....	13,090	19	2.05	1.56	.83	.07	3.34	.71	.39	.01	.01	.17	264	.36	4,710	18	.6	415	7.7
Aug. 21-31.....	8,180	19	2.25	1.81	.96	.08	3.65	.87	.48	.01	.02	.19	282	.38	3,110	19	.7	465	7.8
Sept. 1-10.....	20,570	16	2.30	1.97	1.13	.09	3.83	1.06	.48	.01	.02	.19	299	.41	8,430	21	.8	504	7.8
Sept. 11-20.....	7,500	20	2.15	2.22	1.30	.09	3.70	1.35	.62	.02	.02	.20	286	.44	3,800	23	.9	530	7.7
Sept. 21-30.....	16,770	16	1.90	2.06	1.17	.08	3.31	1.27	.56	.02	.02	.18	294	.40	6,710	22	.8	482	7.8
Total or weighted average	604,700	21	1.70	1.32	0.70	0.07	2.80	0.62	0.31	0.02	0.01	0.15	221	0.30	181,400	18	0.6	351	--

e Sum of determined constituents.

GILA RIVER BASIN--Continued

AGUA FRIA RIVER BELOW LAKE PLEASANT DAM, ARIZ.

LOCATION.--At water-stage recorder on Canal 14 miles downstream from Lake Pleasant Dam on Agua Fria River, 23 miles upstream from New River, and 19 miles north of Marquette, Maricopa County.

DRAINAGE AREA.--1,460 miles (above Lake Pleasant).

RECORDS AVAILABLE.--December 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 487 micromhos, Jan. 23; minimum daily 241 micromhos, Jan. 29.

Percent sodium: Maximum, 26 Feb. 21-29; minimum, 14 Feb. 1-10.

REMARKS.--Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Values reported for dissolved solids concentrations are residue on evaporation. Records of discharge for Agua Fria River at Lake Pleasant Dam for water year October 1951 to September 1952 given in Water-Supply Paper 1243. (Samples for which no discharge is shown were collected at surface of lake at the dam during periods of no release).

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per- cent so- dium	So- dium adsorp- tion ratio	Specific conduct- ance (micro- mhos at 25°C)	pH
			Cal- cium (Ca)	Magne- sium (Mg)	So- dium (Na)	Potas- sium (K)	Bicar- bonate (HCO ₃)	Sul- fate (SO ₄)	Chlo- ride (Cl)	Fluo- ride (F)	Ni- trate (NO ₃)	Boron (B) ppm	Parts per mil- lion	Tons per acre- foot	Total tons				
Oct. 5, 12, 19, 26, 1951.....	--	--	1.50	0.55	0.61	--	--	--	--	--	--	--	177	0.24	--	23	0.6	247	--
Nov. 2, 9, 16, 23, 30.....	--	--	1.45	.52	.48	--	--	--	--	--	--	--	156	.21	--	20	.5	224	--
Dec. 7, 14, 21, 28.....	--	--	1.60	.60	.48	--	--	--	--	--	--	--	169	.23	--	18	.5	251	--
Jan. 4, 11, 19, 1952.....	--	--	1.60	.55	.48	--	--	--	--	--	--	--	168	.23	--	18	.5	255	--
Jan. 21-28.....	455	25	2.30	1.32	1.17	0.19	3.43	0.73	0.73	0.02	0.02	0.11	288	.39	177	23	.9	461	7.4
Jan. 29-31, Feb. 1-10.....	190	19	1.60	.64	.38	.09	2.11	.37	.18	.02	.01	.04	168	.23	44	14	.4	253	7.7
Feb. 11-20.....	214	26	1.80	.76	.65	.11	2.46	.44	.34	.02	.01	.11	206	.28	60	20	.6	305	7.7
Feb. 21-29.....	691	36	1.95	.99	1.09	.11	2.93	.60	.51	.02	.03	.20	265	.36	249	26	.9	384	7.7
Mar. 1-10.....	758	24	1.65	.78	.57	.13	2.33	.48	.28	.02	.03	.08	202	.27	205	18	.5	298	7.5
Mar. 11-20.....	568	19	1.60	.77	.52	.13	2.18	.44	.31	.02	.03	.06	186	.25	142	17	.5	279	7.3
Mar. 21-31.....	347	21	1.65	.81	.57	.14	2.33	.40	.34	.02	.03	.07	198	.27	94	18	.5	298	7.3
Apr. 1-10.....	820	22	1.70	.90	.61	.12	2.52	.48	.34	.02	.02	.09	204	.28	230	18	.5	304	7.4
Apr. 11-20.....	403	16	1.50	.78	.70	.08	2.25	.46	.28	.02	.02	.00	189	.26	105	23	.7	299	7.8
Apr. 21-30.....	509	11	1.55	.81	.74	.07	2.34	.46	.28	.02	.02	.10	187	.25	127	23	.7	306	7.8

May 1-10.....	249	12	1.65	.80	.74	.08	2.44	.46	.26	.02	.03	.13	193	.26	65	23	.7	313	7.6
May 11-20.....	564	17	1.70	.81	.78	.08	2.52	.48	.31	.02	.02	.09	203	.28	158	23	.7	319	7.7
May 21-31.....	1,941	22	1.60	.79	.74	.08	2.33	.50	.31	.02	.03	.10	199	.27	524	23	.7	302	7.9
June 1-10.....	2,040	22	1.50	.70	.61	.08	2.10	.48	.24	.02	.03	.08	180	.24	490	21	.6	273	8.1
June 11-20.....	2,563	18	1.50	.68	.65	.08	2.10	.48	.23	.02	.03	.08	177	.24	615	22	.6	271	8.0
June 21-30.....	3,390	20	1.50	.67	.61	.08	2.10	.46	.23	.02	.04	.08	179	.24	814	21	.6	272	7.9
July 1-10.....	4,334	24	1.55	.67	.52	.08	2.20	.46	.17	.02	.02	.17	188	.26	1,130	16	.5	273	7.6
July 11-20.....	4,951	27	1.55	.69	.52	.08	2.16	.46	.20	.02	.02	.14	191	.26	1,290	18	.5	277	7.6
July 21-31.....	6,430	20	1.55	.67	.52	.08	2.20	.44	.18	.02	.02	.14	180	.24	1,540	18	.5	275	7.7
Aug. 1-10.....	6,142	22	1.65	.68	.52	.08	2.23	.44	.20	.01	.02	.17	186	.25	1,540	18	.5	282	7.7
Aug. 11-20.....	6,149	20	1.65	.67	.48	.08	2.23	.42	.18	.02	.01	.16	182	.25	1,540	17	.4	276	7.8
Aug. 21-31.....	5,397	23	1.70	.76	.48	.08	2.33	.44	.20	.02	.01	.10	185	.25	1,350	16	.4	284	7.6
Sept. 1-10.....	5,482	17	1.70	.77	.48	.08	2.36	.42	.21	.02	.01	.09	186	.25	1,370	16	.4	286	7.7
Sept. 11-20.....	3,464	17	1.75	.76	.46	.08	2.43	.40	.23	.02	.02	.08	190	.26	901	16	.4	290	7.6
Sept. 21-30.....	1,023	24	1.80	.77	.52	.08	2.52	.40	.20	.02	.04	.08	199	.27	276	16	.5	302	7.3
Total or weighted average	59,070	21	1.65	0.72	0.57	0.08	2.26	0.42	0.22	0.02	0.02	0.12	188	0.26	15,360	19	0.5	284	--

Part 10. THE GREAT BASIN

SEVIER LAKE BASIN

SEVIER RIVER NEAR LYNNDYL, UTAH

LOCATION--At county highway bridge, 1½ miles upstream from gaging station, which is 3½ miles southwest of Lynndyl, Millard County. DRAINAGE AREA--6,270 square miles (above gaging station). RECORDS AVAILABLE--Chemical analyses: March 1951 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 4,620 micromhos Apr. 21; minimum daily, 1,340 micromhos Mar. 30.

Percent sodium: Maximum, 55 Apr. 2-10, 21-28; minimum, 42 Mar. 29-31.

EXTREMES, March 1951 to September 1952.--Specific conductance: Maximum daily, 4,620 micromhos Apr. 21, 1952; minimum daily, 1,340 micromhos Mar. 30, 1952.

Percent sodium: Maximum, 60 Sept. 11-20, 1951; minimum, 42 Mar. 29-31, 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 1951 to September 1952 given in Water-Supply Paper 1244.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million						Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Parts per million	Tons per acre-foot		
Oct. 1-10, 1951..	1,290	18	4.49	8.22	14.35	0.24	4.98	8.29	14.24	0.01	0.01	--	1,600	2.18	2,580
Oct. 11-20.....	785	17	5.09	8.96	14.78	.26	4.98	9.22	15.37	.01	.01	0.47	1,720	2.34	2,740
Oct. 21-31.....	649	21	6.24	9.95	17.13	.43	5.31	10.70	17.82	.01	.03	--	1,980	2.71	3,170
Nov. 1-10.....	803	20	5.54	8.47	12.57	.36	5.36	7.93	13.82	.01	.05	--	1,570	2.14	2,530
Nov. 11-20.....	1,090	17	4.89	7.48	10.18	.33	4.98	6.58	11.51	.01	.04	.32	1,330	1.81	2,160
Nov. 21-30.....	990	17	5.19	8.14	11.52	.36	5.10	7.49	12.83	.01	.03	--	1,470	2.00	2,370
Dec. 1-10.....	595	22	6.99	10.61	18.26	.36	5.93	11.70	19.32	.01	.03	--	2,150	2.92	3,370
Dec. 11-20.....	595	20	6.69	9.62	17.44	.23	5.74	10.51	18.05	.02	.05	.47	2,000	2.72	3,110
Dec. 21-31.....	655	20	6.39	9.13	16.13	.18	5.62	9.93	16.78	.02	.05	--	1,880	2.56	2,930
Jan. 1-10, 1952..	595	20	6.99	9.29	16.48	.23	5.92	9.78	16.22	.01	.06	--	1,880	2.56	2,890
Jan. 11-20.....	585	18	5.79	8.06	13.48	.20	5.33	8.51	14.24	.01	.03	.41	1,630	2.22	2,580
Jan. 21-24.....	238	17	4.49	6.50	9.87	.12	4.29	6.31	10.44	.01	.06	--	1,220	1.66	1,990
Jan. 26-31.....	357	21	6.99	12.17	20.87	.19	5.54	13.70	21.58	.01	.04	--	2,390	3.25	3,760
Feb. 1-10.....	541	22	7.29	12.09	22.18	.19	5.60	13.66	22.42	.01	.05	--	2,460	3.35	3,800
Feb. 11-20.....	476	22	7.53	11.35	19.65	.19	5.74	12.76	20.31	.01	.04	.29	2,280	3.10	3,590
Feb. 21-29.....	415	21	8.18	12.34	23.48	.20	6.06	14.70	23.13	.01	.06	--	2,600	3.54	4,000

Mar. 1-10.....	456	19	7.98	12.17	22.70	22	5.74	13.95	23.13	.01	.04	--	2,520	3.43	1,560	53	7.1	3,950	7.7
Mar. 11-22.....	575	19	7.73	11.10	19.87	21	5.87	12.37	20.87	.01	.05	0.34	2,280	3.10	1,780	51	6.5	3,580	7.8
Mar. 23-26, 28..	323	16	4.59	7.57	10.31	17	3.87	6.87	11.79	.02	.07	--	1,310	1.78	1,575	46	4.2	2,160	7.7
Mar. 27 a.....	83	--	--	--	--	--	5.01	10.66	18.90	.02	.08	--	--	--	--	--	--	3,150	--
Mar. 29-31.....	803	15	3.64	4.85	6.22	19	3.18	4.68	6.83	.01	.08	--	864	1.18	948	42	3.0	1,450	7.7
Apr. 1 a.....	151	14	--	--	--	--	3.08	6.06	8.88	--	.06	--	--	--	--	--	--	1,770	7.7
Apr. 2-10.....	478	20	7.34	11.80	23.61	28	4.93	14.53	23.83	.01	.02	--	2,550	3.48	1,660	55	7.7	3,980	7.9
Apr. 11-20.....	401	17	8.59	11.35	21.18	21	4.88	13.03	21.86	.01	.02	.42	2,330	3.17	1,270	54	7.1	3,680	7.7
Apr. 21-28.....	335	17	7.78	13.24	26.09	25	5.28	16.13	26.93	.01	.01	--	2,830	3.85	1,290	55	8.1	4,440	7.8
Apr. 29-30.....	177	14	5.29	8.47	14.03	14	4.70	8.68	14.38	.01	.02	--	1,620	2.20	1,388	50	5.3	2,640	7.7
May 1-10.....	5,280	23	8.29	9.79	12.35	24	4.98	12.01	11.62	.01	.11	--	1,710	2.33	12,300	43	4.4	2,640	7.8
May 11-20.....	14,830	24	5.04	7.40	11.85	18	5.01	8.83	10.49	.02	.18	.40	1,450	1.97	29,220	48	4.8	2,300	8.1
May 21-31.....	13,610	23	4.74	7.24	11.87	17	5.41	8.20	10.77	.02	.18	--	1,440	1.96	26,680	49	4.8	2,320	8.1
June 1-10.....	4,280	20	4.99	7.98	13.05	19	5.38	8.70	11.85	.02	.13	--	1,530	2.08	8,900	50	5.1	2,480	8.0
June 11-20.....	6,700	21	4.59	6.83	11.91	16	5.28	7.16	10.49	.02	.18	.30	1,360	1.85	12,400	51	5.0	2,220	8.0
June 21-30.....	11,410	15	4.29	8.17	10.35	16	5.44	6.60	9.17	.02	.13	--	1,230	1.67	19,050	49	4.5	2,010	7.9
July 1-10.....	10,710	20	4.04	5.92	9.78	15	5.41	6.00	8.48	.02	.10	--	1,160	1.58	16,920	49	4.4	1,910	7.9
July 11-20.....	7,370	22	3.99	6.09	9.74	16	5.44	6.00	8.46	.02	.09	--	1,160	1.58	11,640	49	4.3	1,920	7.9
July 21-31.....	9,710	20	4.49	5.67	9.31	21	5.41	6.00	8.32	.02	.07	--	1,150	1.56	15,150	47	4.1	1,890	7.8
Aug. 1-10.....	4,260	20	4.09	6.00	9.31	17	5.47	5.68	8.40	.02	.07	--	1,140	1.55	6,600	48	4.1	1,870	7.9
Aug. 11-20.....	7,910	22	3.99	6.09	8.70	17	5.57	5.82	7.84	.02	.02	.32	1,100	1.50	11,860	46	3.9	1,780	7.8
Aug. 21-31.....	7,930	22	3.89	6.00	8.78	20	5.24	5.84	7.95	.02	.06	--	1,100	1.50	11,900	47	3.9	1,760	7.9
Sept. 1-10.....	4,270	18	3.79	6.58	9.87	17	5.28	8.22	8.88	.03	.08	--	1,160	1.60	6,830	48	4.3	1,910	8.1
Sept. 11-20.....	4,430	19	3.89	6.83	10.31	18	5.59	6.37	9.45	.01	.07	.37	1,240	1.69	7,490	49	4.5	1,980	7.9
Sept. 21-30.....	1,860	19	4.79	8.39	13.70	20	5.59	8.47	13.40	.02	.06	--	1,590	2.16	4,020	51	5.3	2,570	8.0
Total or weighted average	b 128,800	21	4.64	8.99	11.18	0.19	5.33	7.43	10.29	0.02	0.10	--	1,350	1.84	236,700	49	4.6	2,180	--

a Not included for computation of weighted averages.

b Represents more than 98 percent of the runoff for water year October 1951 to September 1952.

Part 11. PACIFIC SLOPE BASINS IN CALIFORNIA

SAN JOAQUIN RIVER BASIN

SAN JOAQUIN RIVER MAIN STEM

SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.

LOCATION.--At gaging station in El Pescadero Grant, at Durham Ferry highway bridge, 3 miles downstream from Stanislaus River, and 3.4 miles northeast of Vernalis, San Joaquin County.

DRAINAGE AREA.--14,010 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 700 micromhos Aug. 22; minimum daily, 73.6 micromhos June 2, 4.

Percent sodium: Maximum, 50 Nov. 11-20, Dec. 21-31, July 2-31; minimum, 34 Apr. 1-10, May 1-10, 21-31.

EXTREMES, March 1951 to September 1952.--Specific conductance: Maximum daily, 851 micromhos Aug. 3, 1951; minimum daily, 73.6 micromhos June 2, 4, 1952.

Percent sodium: Maximum, 50 during several periods; minimum, 34 Apr. 1-10, May 1-10, 21-31, 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 1951 to September 1952 given in Water-Supply Paper 1245.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per cent sodium	So-dium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	Sod-ium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-10, 1951 .	35,940	29	1.45	1.07	2.30	0.14	2.00	0.65	2.26	0.02	0.03	--	297	0.40	14,380	46	512	7.3	
Oct. 11-20	36,910	24	1.30	.90	2.09	.13	1.67	.62	2.03	.02	.03	0.15	262	.36	13,290	47	2.0	460	7.4
Oct. 21-31	36,870	26	1.45	1.15	2.57	.14	1.80	.92	2.54	.02	.03	--	318	.43	15,850	48	2.3	551	7.5
Nov. 1-10	31,640	27	1.50	1.15	2.65	.13	1.84	.96	2.59	.01	.03	--	330	.45	14,240	49	2.3	568	7.5
Nov. 11-20	32,910	27	1.40	1.07	2.57	.07	1.80	.83	2.51	.01	.03	.21	330	.45	14,810	50	2.3	534	7.8
Nov. 21-30	40,360	25	1.25	.99	2.17	.08	1.67	.77	2.17	.01	.03	--	294	.40	16,140	48	2.1	473	7.6
Dec. 1-4	17,810	23	1.25	.90	1.96	.10	1.56	.71	2.06	.01	.01	--	a263	.36	6,410	46	1.9	454	7.4
Dec. 5-10	40,760	20	.85	.68	1.26	.06	1.31	.29	1.16	.02	.03	--	197	.27	11,010	44	1.4	299	7.4
Dec. 11-20	55,990	22	.95	.75	1.43	.08	1.39	.56	1.33	.01	.03	.14	208	.28	15,680	45	1.6	326	7.4
Dec. 21-31	78,250	19	.85	.64	1.52	.06	1.25	.54	1.35	.02	.04	--	203	.28	21,910	50	1.8	332	7.4

a Sum of determined constituents.

Jan. 2-4, 8-10, 1952.....	57,980	19	.75	.50	1.09	.04	1.23	.40	.76	.02	.03	--	166	.23	13,340	46	1.4	251	7.4
Jan. 11-13.....	33,160	17	.90	.42	.96	.06	1.28	.35	.71	.02	.04	.12	148	.20	6,830	41	1.2	236	7.5
Jan. 16-20.....	107,000	16	.55	.53	.61	.06	1.10	.25	.31	.03	.03	.08	130	.18	19,260	35	.8	161	7.7
Jan. 21-31.....	278,600	18	.60	.58	.74	.07	1.10	.29	.45	.02	.03	--	141	.19	52,930	37	1.0	194	7.7
Feb. 1-10.....	260,800	18	.65	.54	.74	.06	1.21	.29	.34	.02	.03	--	134	.18	46,940	37	1.0	193	7.2
Feb. 11-20.....	208,200	17	.60	.45	.74	.05	1.08	.29	.48	.02	.04	.06	126	.17	35,390	40	1.0	190	7.3
Feb. 21-29.....	192,800	17	.55	.41	.65	.05	.97	.25	.48	.02	.03	--	115	.16	30,850	39	.9	175	7.4
Mar. 1-10.....	191,300	15	.60	.44	.78	.05	1.02	.27	.56	.02	.02	--	125	.17	32,520	42	1.1	193	7.4
Mar. 11-20.....	245,400	16	.65	.51	.70	.05	1.11	.29	.51	.02	.02	.07	129	.18	44,170	37	.9	191	7.4
Mar. 21-31.....	408,600	17	.60	.46	.61	.05	1.08	.27	.37	.02	.02	--	115	.16	65,380	35	.8	171	7.3
Apr. 1-10.....	401,300	14	.50	.39	.48	.04	.87	.21	.28	.02	.02	--	96	.13	52,170	34	.7	141	7.3
Apr. 11-20.....	399,900	14	.47	.31	.48	.04	.80	.16	.34	--	.01	.18	90	.12	47,990	37	.8	132	7.1
Apr. 21-30.....	400,700	13	.41	.28	.40	.04	.69	.12	.31	--	.01	--	80	.11	44,080	35	.7	118	7.0
May 1-10.....	483,800	12	.37	.24	.32	.03	.59	.11	.23	--	.01	--	67	.09	43,540	34	.6	96.1	7.1
May 11-20.....	543,300	11	.32	.21	.30	.03	.52	.09	.21	--	.01	.09	62	.08	43,460	35	.6	86.7	6.9
May 21-31.....	672,400	9.8	.30	.19	.27	.03	.48	.09	.19	--	.01	--	60	.08	53,790	34	.5	80.6	6.9
June 1-10.....	635,100	9.8	.28	.19	.26	.03	.46	.08	.19	--	.01	--	54	.07	44,460	35	.5	76.6	7.0
June 11-20.....	436,000	10	.32	.21	.36	.03	.54	.11	.27	--	.01	--	65	.09	39,240	39	.7	96.7	7.2
June 21-28.....	271,900	10	.37	.25	.48	.03	.61	.15	.39	--	.01	--	77	.10	27,190	42	.9	120	7.0
June 29-30, July 1 b	64,010	--	--	--	--	--	.84	.33	--	--	--	--	123	.17	10,880	--	--	199	7.0
July 2-10.....	95,010	20	1.00	.70	1.74	.06	1.34	.54	1.58	--	.03	--	214	.29	27,550	50	1.9	374	7.2
July 11-20.....	63,750	19	1.20	.90	2.17	.07	1.64	.69	2.09	--	.03	.11	268	.36	22,950	50	2.1	468	7.2
July 21-31.....	38,140	25	1.65	1.23	2.96	.09	2.21	.92	2.96	.02	.02	--	369	.50	19,070	50	2.5	650	7.3

a Sum of determined constituents.

b Not included for computation of weighted averages.

SAN JOAQUIN RIVER BASIN--Continued

SAN JOAQUIN RIVER MAIN STEM--Continued

SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids			Per cent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	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, 1952.	27,710	27	1.70	1.32	2.96	0.10	2.36	0.92	2.93	0.02	0.01	--	364	0.50	13,860	49	2.4	646	7.3
Aug. 11-20.....	27,330	27	1.75	1.32	3.09	.11	2.44	.96	2.98	.02	.01	--	375	.51	13,940	49	2.5	661	7.3
Aug. 21-31.....	28,280	29	1.85	1.40	3.09	.09	2.49	.94	3.05	.02	.03	--	392	.53	14,990	48	2.4	668	7.3
Sept. 1-10.....	28,260	29	1.80	1.40	3.04	.09	2.43	.90	2.82	.02	.03	--	378	.51	14,410	48	2.4	641	7.4
Sept. 11-20.....	35,740	28	1.50	1.15	2.48	.09	2.20	.71	2.34	.02	.04	0.16	320	.44	15,730	48	2.2	541	7.3
Sept. 21-30.....	32,390	29	1.65	1.23	2.74	.09	2.33	.79	2.48	.02	.05	--	348	.47	15,220	48	2.3	588	7.4
Total or weighted average	c7,012,000	14	0.55	0.39	0.65	0.04	0.87	0.23	0.51	--	0.02	--	110	0.15	1,045,000	40	1.0	167	--

c Represents 98 percent of runoff for water year October 1951 to September 1952.

CALAVERAS RIVER BASIN

STOCKTON DIVERTING CANAL AT STOCKTON, CALIF.

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

RECORDS AVAILABLE.--Chemical analyses: March 1951 to May 1952.

Water temperatures: March 1951 to May 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 303 micromhos May 12; minimum daily, 83.8 micromhos Jan. 17.

Percent sodium: Maximum, 18 Apr. 11-14; minimum, 10 Mar. 21-31.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Many days, including the entire month of October, reported 0 flow. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1245.

Chemical analyses, October 1951 to May 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids		Percent sodium	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons		
Nov. 23, 1951....	373	--	1.50	1.07	0.39	0.05	1.84	0.44	0.28	--	0.01	--	162	0.22	82	243	7.2
Nov. 24-26.....	196	--	1.20	.80	.32	.05	1.52	.37	.25	--	.02	--	156	.21	41	211	7.1
Dec. 3.....	1,920	--	1.15	.68	.26	.05	1.18	.27	.25	--	.01	--	106	.14	269	12	--
Dec. 4-5.....	4,920	--	.60	.45	.20	.06	.72	.21	.14	--	.02	--	108	.15	738	15	6.8
Dec. 6-10.....	5,330	--	.75	.54	.22	.05	1.02	.27	.22	--	.03	--	109	.15	800	14	7.0
Dec. 11-20.....	2,080	18	.90	.61	.27	.04	1.00	.27	.48	--	.03	0.25	131	.18	374	15	6.7
Dec. 21-28.....	2,444	17	1.10	.74	.30	.04	1.33	.33	.48	--	.04	.49	146	.20	89	14	6.9
Dec. 29-31.....	22,200	--	.65	.35	.17	.04	.72	.14	.23	--	.02	--	108	.15	3,330	14	6.9
Jan. 1-10, 1952..	13,500	18	.70	.50	.22	.04	1.07	.23	.15	0.01	.03	.25	110	.15	2,020	15	7.2
Jan. 11-12, 15, 19-20.....	21,090	--	.65	.55	.20	.04	.93	.21	.11	--	.02	--	107	.15	3,160	14	7.2
Jan. 13-14, 16-18.	39,390	--	.48	.39	.15	.04	.72	.13	.08	--	.02	--	88	.12	4,730	14	92.2
Jan. 22-26, 31...	20,470	--	.65	.58	.20	.04	1.08	.25	.11	--	.01	.35	105	.14	2,870	14	7.5
Feb. 1-10.....	15,390	21	.70	.52	.22	.04	1.10	.23	.14	--	.01	.90	102	.14	2,150	15	6.8
Feb. 11-20.....	7,320	18	.80	.60	.26	.06	1.15	.27	.31	--	.01	.37	117	.16	1,170	15	6.7
Feb. 21-29.....	12,810	19	.70	.58	.20	.04	.97	.23	.26	--	.01	.37	103	.14	1,790	13	6.7

CALAVERAS RIVER BASIN--Continued
STOCKTON DIVERTING CANAL AT STOCKTON, CALIF.--Continued

Chemical analyses, October 1951 to May 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Dissolved solids				So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH		
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot				Total tons	
Mar. 1-10, 1952	2,530	15	0.70	0.48	0.23	0.05	0.98	0.21	0.23	--	0.00	0.40	108	0.15	380	16	0.3	146	6.6
Mar. 11-20	31,290	18	.65	.48	.23	.05	1.03	.20	.14	0.01	.01	.05	99	.13	4,070	17	.3	139	7.5
Mar. 21-31	54,570	18	.65	.51	.13	.05	1.07	.17	.08	.01	.01	.02	93	.13	7,090	10	.2	136	7.2
Apr. 1-10	10,010	21	.70	.56	.18	.06	1.10	.19	.25	--	.00	.06	108	.15	1,500	12	.2	163	7.0
Apr. 11-20	16	17	.95	.69	.37	.08	1.31	.29	.34	--	.06	.08	128	.17	3	18	.4	206	6.9
Apr. 21-23, May 9, 11-14	9.9	--	1.35	.99	.52	.06	1.80	.48	.45	--	.04	--	167	.23	2	18	.5	267	7.3
Total or weighted average	265,900	19	0.65	0.49	0.19	0.04	0.97	0.19	0.14	--	0.01	--	101	0.14	36,660	14	0.2	132	--

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

MOKELUNNE RIVER BASIN
MOKELUNNE 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 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 87.5 micromhos Mar. 8; minimum daily, 29.4 micromhos July 9.

Percent sodium: Maximum, 25 May 21-31; minimum, 16 Nov. 21-30, Aug. 11-31.

EXTREMES, March 1951 to September 1952.--Specific conductance: Maximum daily, 87.5 micromhos Mar. 8, 1952; minimum daily, 29.4 micromhos July 9, 1952.

Percent sodium: Maximum, 25 May 21-31, 1952; minimum, 14 Apr. 1-20, 1951.

REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1245.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per cent sodium adsorption ratio	Specific conductance (micro-mhos at 25° C)	pH	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1951.	6,010	11	0.23	0.17	0.11	0.04	0.38	0.17	0.05	0.01	0.00	--	42	0.06	361	19	0.2	55.1	7.2
Oct. 11-20.....	6,730	11	.24	.19	.11	.06	.33	.20	.06	.01	.00	0.08	43	.06	404	18	.2	57.4	7.1
Oct. 21-31.....	6,860	11	.25	.17	.11	.07	.36	.14	.06	.01	.00	--	43	.06	412	18	.2	58.7	7.1
Nov. 1-10.....	9,060	10	.26	.16	.10	.08	.34	.16	.06	.01	.01	--	43	.06	544	17	.2	58.8	7.2
Nov. 11-20.....	8,250	9.7	.25	.15	.10	.08	.34	.17	.06	.01	.01	.11	43	.06	495	17	.2	57.5	7.1
Nov. 21-30.....	12,230	10	.28	.17	.10	.08	.36	.16	.06	.01	.01	--	45	.06	734	16	.2	59.1	7.2
Dec. 1-10.....	19,390	11	.25	.17	.10	.07	.36	.17	.07	.01	.01	--	50	.07	1,360	17	.2	59.2	7.2
Dec. 11-20.....	20,350	10	.25	.12	.11	.09	.39	.11	.06	.02	.00	.11	39	.05	1,020	20	.3	53.4	6.5
Dec. 21-31.....	16,580	10	.26	.15	.13	.11	.41	.16	.08	.02	.01	--	48	.07	1,160	20	.3	63.5	6.8
Jan. 1-10, 1952.	26,630	11	.28	.16	.13	.03	.44	.12	.07	.01	.01	--	49	.07	1,860	21	.3	58.6	7.0
Jan. 11-20.....	34,410	11	.29	.17	.14	.03	.41	.16	.07	.01	.01	.02	54	.07	2,410	22	.3	63.9	7.1
Jan. 21-31.....	37,130	12	.31	.18	.15	.03	.49	.13	.07	.01	.01	--	54	.07	2,600	23	.3	65.2	7.1
Feb. 1-10.....	30,150	13	.31	.18	.15	.03	.51	.11	.06	.01	.01	--	57	.08	2,410	22	.3	64.1	7.2
Feb. 11-20.....	24,020	14	.33	.19	.13	.03	.52	.13	.06	.01	.01	.02	57	.08	1,920	19	.3	66.7	7.3
Feb. 21-29.....	22,330	15	.33	.25	.14	.03	.52	.16	.06	.01	.00	--	57	.08	1,790	18	.3	70.2	7.1

MOKELENE RIVER BASIN--Continued
MOKELENE RIVER AT WOODBRIDGE, CALIF.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			So-adsorption ratio	Percent sodium	Specific conductance (micro-mhos at 25° C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1952..	21,520	15	0.34	0.26	0.14	0.03	0.52	0.17	0.06	0.01	0.01	--	59	0.08	1,720	18	73.9	7.1	
Mar. 11-20	32,170	15	.35	.26	.16	.03	.52	.19	.07	.01	.01	0.09	60	.08	2,570	20	76.8	7.1	
Mar. 21-31	41,320	15	.37	.25	.17	.04	.59	.19	.07	.01	.01	--	61	.08	3,310	20	78.1	7.1	
Apr. 1-10	46,830	13	.32	.21	.14	.04	.51	.10	.06	.01	.01	--	52	.07	3,280	20	67.3	7.2	
Apr. 11-20	47,840	14	.29	.19	.14	.03	.49	.09	.06	.01	.01	0.08	51	.07	3,350	22	63.9	7.2	
Apr. 21-30	75,650	13	.25	.16	.13	.03	.46	.06	.06	.01	.01	--	45	.06	4,540	22	56.7	6.9	
May 1-10	82,330	11	.21	.11	.11	.03	.34	.05	.05	.00	.00	--	37	.05	4,120	24	44.5	6.7	
May 11-20	70,750	11	.20	.11	.10	.02	.34	.05	.05	.00	.01	0.06	37	.05	3,540	23	43.1	6.9	
May 21-31	92,230	9.7	.17	.09	.10	.02	.31	.04	.04	.00	.00	--	32	.04	3,690	25	37.4	6.8	
June 1-10	88,940	8.1	.16	.08	.08	.02	.28	.03	.04	.00	.01	--	30	.04	3,580	23	34.1	6.8	
June 11-20	60,440	8.5	.16	.12	.08	.04	.29	.05	.03	.01	.00	0.04	30	.04	2,420	21	34.7	6.9	
June 21-30	26,620	8.4	.18	.12	.07	.02	.29	.05	.03	.01	.01	--	30	.04	1,060	18	33.2	6.9	
July 1-10	23,520	8.9	.21	.09	.08	.02	.29	.05	.04	.01	.00	--	30	.04	941	19	35.2	6.7	
July 11-20	17,030	8.7	.18	.12	.08	.02	.29	.05	.03	.01	.00	0.03	30	.04	681	20	33.9	6.7	
July 21-31	4,190	8.7	.18	.14	.08	.02	.26	.12	.05	.01	.01	--	34	.05	210	19	42.5	6.6	
Aug. 1-10	3,310	9.1	.18	.12	.07	.02	.29	.08	.03	.01	.01	--	34	.05	166	19	39.5	6.8	
Aug. 11-20	2,270	8.5	.22	.11	.07	.04	.26	.10	.05	.01	.01	0.02	35	.05	114	16	40.0	6.7	
Aug. 21-31	2,610	8.6	.22	.12	.07	.03	.23	.17	.04	.01	.00	--	36	.05	130	16	42.8	6.5	
Sept. 1-10	3,660	8.5	.20	.09	.07	.03	.26	.09	.04	.01	.01	--	34	.05	183	18	36.9	6.7	
Sept. 11-20	5,240	8.5	.18	.12	.07	.03	.26	.09	.05	.01	.01	0.03	34	.05	262	18	37.9	6.8	
Sept. 21-30	5,220	8.7	.20	.12	.08	.03	.26	.09	.05	.01	.01	--	35	.05	261	19	40.4	6.6	
Total or weighted average	1,034,000	11	0.24	0.15	0.11	0.03	0.39	0.09	0.05	0.01	0.01	--	43	0.06	59,590	21	52.1	--	

SACRAMENTO RIVER BASIN
SACRAMENTO RIVER MAIN STEM
SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.

LOCATION.--At gaging station at Yolo-Sutter County line, just upstream from Southern Pacific Railroad bridge at Knights Landing. RECORDS AVAILABLE.-- Chemical analyses: March 1951 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-1952.--Specific conductance: Maximum daily, 447 micromhos Sept. 9; minimum daily, 99.1 micromhos Mar. 17.

Percent sodium: Maximum, 42 Sept. 1-10; minimum, 19 Apr. 1-10.

EXTREMES, March 1951 to September 1952.-- Specific conductance: Maximum daily, 447 micromhos Sept. 9, 1952; minimum daily, 99.1 micromhos Mar. 17, 1952.

Percent sodium: Maximum, 42 Sept. 1-10, 1952; minimum, 19 Apr. 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 Sacramento, Calif. Records of discharge for water year October 1951 to September 1952 in Water-Supply Paper 1245.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million											Dissolved solids			So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total tons					
													Parts per mil-lion	Tons per acre-foot				
Oct. 1-10, 1951 ..	117,700	27	0.65	0.62	0.43	0.11	1.43	0.20	0.19	0.01	0.01	--	117	0.16	18,830	24	0.5	169 7.4
Oct. 11-20	109,200	28	.70	.63	.46	.11	1.49	.21	.20	.01	.01	0.13	122	.17	18,560	25	.6	176 7.6
Oct. 21-31	143,800	28	.65	.61	.52	.11	1.43	.25	.21	.01	.01	--	119	.16	23,010	28	.7	174 7.4
Nov. 1-10	121,200	29	.70	.65	.57	.11	1.49	.27	.25	.01	.01	--	126	.17	20,600	28	.7	187 7.7
Nov. 11-20	121,700	29	.70	.63	.52	.11	1.46	.25	.25	.01	.01	.13	123	.17	20,690	27	.6	178 7.8
Nov. 21-30	172,500	26	.65	.62	.65	.06	1.33	.37	.34	.02	.01	--	136	.19	32,780	33	.8	190 7.6
Dec. 1-10	357,800	21	.50	.45	.34	.05	.93	.29	.19	.02	.01	--	111	.15	53,670	25	.5	132 7.5
Dec. 11-20	188,100	26	.80	.77	.74	.07	1.56	.50	.39	.02	.01	.31	157	.21	39,500	31	.8	226 7.6
Dec. 21-31	283,900	26	.80	.75	.65	.06	1.52	.37	.34	.02	.01	--	149	.20	56,780	29	.7	215 7.6
Jan. 1-10, 1952 ..	423,900	23	.60	.49	.38	.05	1.13	.23	.18	.02	.01	--	111	.15	63,580	25	.5	151 7.3
Jan. 11-20	447,300	20	.55	.57	.38	.04	1.05	.23	.17	.02	.01	.07	117	.16	71,570	25	.5	139 7.7
Jan. 21-25, 28-31.	390,500	20	.70	.63	.43	.04	1.21	.29	.21	.02	.01	--	122	.17	66,380	24	.5	168 7.7
Jan. 26-27 a.....	90,450	--	0.88	--	--	--	.82	.17	--	--	--	--	--	--	--	--	--	110 7.6
Feb. 1-10	444,500	21	.60	.56	.32	.03	1.16	.23	.14	.02	.01	--	105	.14	62,230	21	.4	147 7.4
Feb. 11-20	447,300	21	.60	.51	.30	.03	1.16	.18	.11	.02	.01	.07	97	.13	56,150	21	.4	137 7.4
Feb. 21-29	390,100	22	.60	.51	.30	.03	1.16	.18	.12	.02	.01	--	98	.13	50,710	21	.4	141 7.5

SACRAMENTO RIVER BASIN--Continued
SACRAMENTO RIVER MAIN STEM--Continued
SACRAMENTO RIVER AT KNIGHTS LANDING, CALIF.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Mag-ne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total tons							
													Parts per mil-lion	Tons per acre-foot	Total tons					
Mar. 1-10, 1952.	410,800	22	0.65	0.54	0.31	0.03	1.21	0.19	0.12	0.02	0.01	--	103	0.14	57,510	20	0.4	145	7.5	
Mar. 11-20	427,000	21	.60	.57	.31	.03	1.20	.19	.12	.02	.01	0.08	102	.14	59,780	21	.4	140	7.7	
Mar. 21-31	463,700	22	.70	.61	.33	.03	1.28	.23	.11	.01	.01	--	109	.15	69,560	20	.4	159	7.5	
Apr. 1-10	388,800	22	.70	.54	.29	.03	1.25	.21	.10	.01	.00	--	102	.14	54,430	19	.4	151	7.3	
Apr. 11-20	406,000	22	.55	.46	.29	.03	1.10	.17	.08	.01	.00	.07	91	.12	48,720	22	.4	129	7.3	
Apr. 21-30	392,300	22	.55	.46	.30	.03	1.07	.18	.09	.01	.00	--	92	.13	51,000	23	.4	129	7.4	
May 1-10	378,400	21	.55	.60	.37	.03	1.28	.20	.20	.01	.00	--	96	.13	49,190	24	.5	137	7.2	
May 11-20	341,000	20	.55	.58	.37	.03	1.15	.23	.19	.01	.01	.04	100	.14	47,740	24	.5	145	7.2	
May 21-31	305,900	20	.60	.64	.39	.03	1.18	.23	.15	.01	.01	--	103	.14	42,830	23	.5	150	7.1	
June 1-10	210,600	23	.70	.82	.52	.03	1.47	.33	.21	.01	.01	--	118	.16	33,700	25	.6	180	7.3	
June 11-20	194,200	21	.80	.99	.87	.04	1.74	.54	.37	.01	.01	.08	156	.21	40,780	32	.9	250	7.2	
June 21-30	174,300	24	.75	.90	1.09	.04	1.77	.54	.45	.01	.01	--	171	.23	40,980	39	1.2	271	7.5	
July 1-10	179,900	24	.70	.79	.91	.04	1.66	.44	.37	.01	.01	--	151	.21	37,780	37	1.1	240	7.6	
July 11-20	147,400	24	.75	.82	.96	.04	1.69	.46	.37	.01	.01	--	158	.21	30,950	37	1.1	250	7.8	
July 21-31	146,600	23	.75	.90	.96	.04	1.77	.48	.39	.01	.01	--	160	.22	32,350	36	1.1	257	7.7	
Aug. 1-10	147,200	23	.75	.82	.96	.04	1.74	.46	.39	.01	.01	--	159	.22	32,380	37	1.1	257	7.6	
Aug. 11-20	155,700	22	.80	.99	1.09	.04	2.03	.52	.45	.01	.01	.20	175	.24	37,370	37	1.2	286	7.6	
Aug. 21-31	176,600	21	.85	1.07	1.26	.04	2.16	.58	.48	.02	.01	--	186	.25	44,150	39	1.3	309	7.5	
Sept. 1-10	163,400	19	1.05	1.23	1.70	.04	2.57	.75	.62	.02	.01	--	226	.31	50,650	42	1.6	377	7.3	
Sept. 11-20	189,100	22	.80	.90	.96	.04	1.93	.42	.37	.02	.01	.16	159	.22	41,600	35	1.0	254	7.4	
Sept. 21-30	167,400	24	.80	.90	.83	.04	1.82	.37	.31	.02	.01	--	152	.21	35,150	32	.9	238	7.4	
Total or weighted average	1,926,000	22	0.65	0.64	0.52	0.04	1.34	0.29	0.21	0.01	0.01	--	120	0.16	1,595,000	28	0.6	175	--	

a Not included for computation of weighted averages.

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

FEATHER RIVER BASIN

FEATHER RIVER AT NICOLAUS, CALIF.

LOCATION --At gaging station at Nicolaus, Sutter County, 0.4 mile downstream from highway bridge.

RECORDS AVAILABLE --Chemical analyses: March 1951 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 143 micromhos Oct. 6; minimum daily, 50.0 micromhos May 28.

Percent sodium: Maximum, 21 May 21-31; minimum, 12 Dec. 21-31.

EXTREMES, March 1951 to September 1952.--Specific conductance: Maximum daily, 189 micromhos Aug. 17, 1951; minimum daily, 50.0 micromhos May 28, 1952.

Percent sodium: Maximum, 21 May 21-31, 1952; minimum, 8 June 21-30, 1951.

REMARKS --Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1245.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent so-dium	So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25° C)	pH
			Cal-cium (Ca)	Mag-ne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total						
													Parts per mil-lion	Tons per acre-foot	tons				
Oct. 1-10, 1951 ..	45,080	16	0.65	0.51	0.23	0.07	1.28	0.11	0.07	0.01	0.01	--	85	0.12	5,410	16	0.3	136	7.3
Oct. 11-20 ..	47,560	15	.65	.50	.23	.06	1.28	.11	.06	.01	.01	0.11	84	.11	5,230	16	.3	132	7.1
Oct. 21-31 ..	63,970	16	.60	.49	.23	.07	1.18	.13	.08	.01	.01	--	83	.11	7,040	16	.3	129	7.3
Nov. 1-10 ..	53,970	16	.60	.46	.20	.05	1.16	.11	.06	.02	.00	--	85	.12	6,480	15	.3	126	7.0
Nov. 11-20 ..	85,470	12	.50	.37	.17	.03	.95	.13	.07	.02	.00	.17	76	.10	8,550	16	.3	106	7.3
Nov. 21-30 ..	115,300	14	.60	.55	.19	.05	1.08	.17	.10	.02	.01	--	86	.12	13,840	14	.3	118	7.2
Dec. 1-10 ..	422,400	13	.44	.35	.13	.05	.75	.15	.14	.02	.01	--	76	.10	42,240	14	.2	93.1	7.1
Dec. 11-20 ..	137,900	16	.44	.35	.16	.05	.95	.14	.07	.02	.01	.14	79	.11	15,170	16	.3	104	7.3
Dec. 21-31 ..	453,200	14	.50	.40	.13	.05	.85	.12	.07	.02	.00	--	73	.10	45,320	12	.2	90.2	7.6
Jan. 1-10, 1952 ..	287,000	15	.41	.30	.14	.05	.75	.11	.06	.02	.01	--	71	.10	28,700	16	.2	87.2	7.2
Jan. 11-20 ..	593,100	13	.39	.29	.14	.03	.70	.11	.06	.01	.01	.02	66	.09	53,380	17	.2	82.2	7.2
Jan. 21-31 ..	569,100	15	.42	.34	.15	.03	.77	.11	.06	.01	.01	--	70	.10	56,910	16	.2	89.0	7.3
Feb. 1-10 ..	823,300	13	.37	.30	.12	.03	.74	.09	.05	.01	.00	--	58	.08	65,860	15	.2	77.8	7.4
Feb. 11-20 ..	456,000	14	.42	.30	.14	.02	.74	.09	.06	.01	.00	.02	64	.09	41,040	16	.2	84.0	7.5
Feb. 21-29 ..	354,600	16	.41	.37	.15	.02	.79	.11	.05	.01	.01	--	63	.09	31,910	16	.2	88.0	7.2

FEATHER RIVER BASIN--Continued
FEATHER RIVER AT NICOLAUS, CALIF.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million								Boron (B) ppm	Dissolved solids			Per cent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	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, 1952.	396,900	15	0.45	0.39	0.16	0.02	0.82	0.12	0.06	0.01	0.01	--	66	0.09	35,720	15	91.1	7.1
Mar. 11-20.....	449,500	15	.43	.40	.16	.02	.82	.12	.05	.01	.01	0.03	68	.09	40,460	16	91.8	7.2
Mar. 21-31.....	433,400	16	.43	.39	.18	.02	.85	.13	.05	.01	.00	--	70	.10	43,340	18	98.4	7.2
Apr. 1-10.....	789,400	17	.39	.33	.18	.02	.80	.10	.04	.01	.00	--	67	.09	71,050	20	86.3	7.1
Apr. 11-20.....	811,600	17	.34	.32	.17	.02	.69	.08	.04	.01	.00	.06	62	.09	64,930	20	77.0	7.2
Apr. 21-30.....	936,000	15	.32	.27	.12	.02	.61	.06	.03	.01	.00	--	56	.08	74,680	17	67.6	7.2
May 1-10.....	825,700	13	.32	.29	.10	.02	.62	.06	.04	.01	.01	--	50	.07	57,800	14	61.5	6.9
May 11-20.....	702,000	13	.30	.26	.10	.02	.59	.06	.05	.01	.01	0.03	49	.07	49,140	14	58.5	6.8
May 21-31.....	716,000	13	.27	.20	.13	.02	.51	.08	.03	.01	.01	--	47	.06	43,080	21	56.6	6.9
June 1-3, 8, 10.	265,600	12	.27	.16	.10	.01	.49	.05	.02	.01	.01	--	45	.06	15,940	16	55.9	7.5
June 11-20.....	317,800	13	.29	.21	.11	.02	.57	.05	.03	.01	.01	0.10	48	.07	22,250	17	61.9	7.1
June 21-30.....	251,300	13	.31	.22	.11	.02	.61	.05	.04	.01	.01	--	50	.07	17,590	17	64.6	7.3
July 1-10.....	178,600	14	.35	.27	.12	.02	.66	.06	.05	.01	.01	--	54	.07	12,500	15	73.4	7.2
July 11-20.....	99,550	15	.41	.34	.15	.03	.82	.08	.06	.01	.01	0.07	63	.09	8,960	16	87.3	7.4
July 21-31.....	51,110	16	.42	.42	.18	.04	.95	.08	.08	.01	.01	--	74	.10	5,110	17	111	7.3
Aug. 1-10.....	32,870	17	.60	.45	.20	.04	1.05	.11	.09	.01	.01	--	81	.11	3,620	15	117	7.5
Aug. 11-20.....	25,550	16	.55	.51	.22	.04	1.15	.10	.09	.01	.01	0.10	83	.11	2,810	17	128	7.5
Aug. 21-31.....	28,860	18	.60	.51	.22	.04	1.06	.10	.11	.01	.01	--	88	.12	3,460	16	126	7.4
Sept. 1-10.....	27,670	16	.60	.49	.22	.04	1.15	.10	.14	.01	.01	--	85	.12	3,320	16	124	7.2
Sept. 11-20.....	37,050	17	.60	.46	.20	.04	1.18	.11	.09	.01	.01	0.04	84	.11	4,080	15	125	7.2
Sept. 21-30.....	48,610	16	.60	.45	.20	.04	1.11	.09	.08	.01	.01	--	81	.11	5,350	16	120	7.3
Total or weighted average	1,194,000	14	0.38	0.31	0.14	0.03	0.72	0.09	0.05	0.01	0.01	--	62	0.08	1,012,000	16	79.8	--

a Sum of determined constituents.

b Represents 98 percent of runoff for water year October 1951 to September 1952.

AMERICAN RIVER BASIN
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. DRAINAGE AREA. --1,921 square miles.

RECORDS AVAILABLE. --Chemical analyses: January to December 1906. March 1951 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52. --Specific conductance: Maximum daily, 102 micromhos Mar. 11; minimum daily, 29.1 micromhos June 3.

Percent sodium: Maximum, 24 June 11-20; minimum, 9 June 1-10.

EXTREMES, March 1951-September 1952. --Specific conductance: Maximum daily, 112 micromhos Aug. 28, 1951; minimum daily, 29.1 micromhos June 3, 1952.

Percent sodium: Maximum, 24 June 11-20, 1952; minimum, 9 June 1-10, 1952.

REMARKS. --During March and April 1951 samples were collected at the Sacramento gaging station on the American River. 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 1951 to September 1952 given in Water-Supply Paper 1245.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				So- dium adsorp- tion ratio	Specific conductance (micro-mhos at 25° C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1951.	8,800	11	0.44	0.26	0.16	0.04	0.64	0.10	0.11	0.02	0.00	--	56	0.08	704	18	84.2	7.2	
Oct. 11-20.....	10,020	11	.39	.23	.13	.04	.59	.12	.09	.01	.00	0.08	54	.07	701	17	79.1	7.1	
Oct. 21-31.....	23,390	11	.42	.25	.13	.03	.61	.11	.10	.01	.00	--	58	.08	1,870	16	82.3	7.1	
Nov. 1-10.....	14,690	11	.39	.25	.13	.03	.62	.10	.10	.01	.00	--	53	.07	1,030	16	77.1	7.2	
Nov. 11-20.....	42,050	11	.44	.25	.16	.04	.56	.18	.10	.01	.00	.08	57	.08	3,360	18	75.5	7.2	
Nov. 21-30.....	56,370	13	.39	.25	.10	.07	--	.10	--	.01	.01	.08	61	.08	4,510	13	80.6	7.3	
Dec. 1-10.....	142,700	13	.35	.24	.09	.07	.49	.12	.11	.02	.01	--	53	.07	9,990	12	69.1	7.3	
Dec. 11-20.....	40,840	14	.36	.25	.10	.07	.49	.11	.06	.01	.01	--	53	.07	2,860	12	71.0	7.4	
Dec. 21-31.....	150,800	13	.32	.24	.11	.03	.57	.09	.07	.02	.01	--	56	.08	12,060	16	71.1	7.1	
Jan. 1-10, 1952.	79,810	14	.36	.25	.12	.04	.62	.10	.07	.01	.00	--	59	.08	6,380	15	76.5	7.1	
Jan. 11-20.....	261,800	15	.35	.29	.17	.05	.69	.11	.08	.02	.01	.07	67	.09	23,540	20	79.0	7.2	
Jan. 21-31.....	214,500	14	.35	.29	.10	.03	.66	.11	.06	.02	.01	--	59	.08	17,160	13	78.4	7.3	
Feb. 1-10.....	247,600	14	.34	.23	.09	.03	.57	.08	.05	.02	.01	--	53	.07	17,330	13	69.3	7.4	
Feb. 11-20.....	172,900	14	.31	.23	.10	.04	--	.08	--	.02	.01	--	56	.08	13,830	15	72.4	7.1	
Feb. 21-29.....	138,900	15	.34	.26	.11	.03	.61	.10	.10	.02	.00	--	59	.08	11,110	15	77.8	7.2	

AMERICAN RIVER BASIN--Continued
AMERICAN RIVER AT FAIR OAKS, CALIF.--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids		Per cent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot				
Mar. 1-10, 1952	134,500	15	0.32	0.25	0.12	0.04	0.61	0.10	0.05	0.02	0.01	--	56	0.08	17	0.2	73.2	7.0
Mar. 11-20	182,300	16	.37	.35	.14	.02	--	.11	--	.01	.01	--	64	.09	16	.2	89.1	7.6
Mar. 21-31	185,000	15	.35	.29	.13	.02	.62	.09	.06	.01	.01	--	56	.08	17	.2	74.4	7.5
Apr. 1-10	239,400	12	.26	.17	.10	.03	.43	.05	.09	.01	.01	--	42	.06	18	.2	54.6	7.1
Apr. 11-20	242,800	12	.23	.15	.09	.02	.39	.04	.04	.01	.00	0.08	38	.05	18	.2	47.3	7.2
Apr. 21-30	335,800	11	.21	.12	.07	.01	.36	.05	.02	.01	.00	--	35	.05	18	.2	41.5	7.1
May 1-10	327,100	11	.21	.10	.07	.01	.33	.05	.03	.01	.00	--	34	.05	19	.2	39.8	7.0
May 11-20	367,900	9.9	.24	.21	.06	.01	.36	.04	.07	.01	.01	.02	33	.04	12	.1	38.2	6.9
May 21-31	424,100	8.9	.25	.17	.05	.02	.33	.04	.09	.01	.01	--	31	.04	11	.1	36.0	6.8
June 1-10	338,300	8.9	.25	.16	.04	.02	.36	.04	.02	.01	.01	--	29	.04	9	.1	30.9	6.7
June 11-20	185,600	9.4	.20	.12	.11	.02	.39	.05	.03	.01	.00	.05	34	.05	24	.3	34.0	6.9
June 21-30	146,500	10	.21	.12	.07	.02	.33	.04	.03	.01	.00	--	32	.04	17	.2	35.6	6.9
July 1-10	117,000	9.6	.19	.13	.07	.02	.33	.04	.03	.01	.01	--	34	.05	17	.2	37.3	6.7
July 11-20	75,190	10	.25	.14	.07	.03	.39	.06	.03	.01	.01	.03	40	.05	15	.2	42.0	6.7
July 21-31	46,230	11	.28	.16	.09	.04	.46	.05	.05	.01	.01	--	42	.06	15	.2	49.4	6.9
Aug. 1-10	28,300	12	.30	.17	.10	.02	.49	.06	.05	.01	.01	--	44	.06	16	.2	56.4	7.0
Aug. 11-20	15,840	13	.41	.21	.13	.02	.62	.07	.08	.01	.01	.05	54	.07	17	.2	73.8	7.1
Aug. 21-31	12,380	12	.42	.22	.14	.04	.64	.08	.10	.01	.01	--	55	.07	17	.3	78.0	7.0
Sept. 1-10	9,350	12	.42	.23	.14	.04	.66	.08	.09	.01	.01	--	55	.07	17	.3	77.8	7.1
Sept. 11-20	11,220	12	.42	.23	.15	.04	.66	.10	.10	.01	.01	.05	56	.08	18	.3	80.6	7.2
Sept. 21-30	10,740	11	.39	.21	.15	.04	.62	.08	.10	.01	.01	--	53	.07	19	.3	77.0	7.0
Total or weighted average	5,030,000	12	0.28	0.20	0.09	0.03	0.46	0.07	0.06	0.01	0.01	--	45	0.06	15	0.2	55.3	--

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

UPPER COLUMBIA RIVER BASIN

COLUMBIA RIVER MAIN STEM

COLUMBIA RIVER AT GRAND COULEE DAM, WASH.

LOCATION.--At Grand Coulee Dam, Grant-Okanogan County line, 2,500 feet upstream from gaging station, which is 14 miles upstream from Nespelem River.

DRAINAGE AREA.--74,100 square miles (above gaging station).

RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1952.

Water temperatures: November 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 183 micromhos Apr. 13, 21; minimum daily, 128 micromhos May 31.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 183 micromhos Apr. 13, 21, 1952; minimum daily, 128 micromhos May 31, 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 1951 to September 1952 given in Water-Supply Paper 1246.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million						Boron (B) ppm	Dissolved solids			Percent adsorption ratio	Specific conductance (micro-mhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	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, 1951..	1,544,000	6.4	1.00	0.40	0.07	0.08	1.26	0.25	0.03	0.01	0.01	85	0.12	185,300
Oct. 11-20.....	1,475,000	5.5	1.05	.41	.07	.09	1.28	.27	.03	.01	.01	85	.12	177,000
Oct. 21-31.....	1,546,000	5.3	1.05	.42	.07	.09	1.33	.27	.03	.01	.00	86	.12	165,500
Nov. 1-10.....	1,278,000	6.7	1.05	.43	.07	.09	1.29	.27	.03	.01	.00	88	.12	153,400
Nov. 11-20.....	1,182,000	6.3	1.05	.43	.08	.05	1.31	.25	.05	.01	.01	94	.13	153,700
Nov. 21-30.....	1,152,000	6.8	1.00	.49	.08	.05	1.29	.25	.04	.01	.01	96	.13	149,800
Dec. 1-10.....	1,270,000	--	--	--	--	--	--	--	--	--	--	95	.13	165,100
Dec. 11-20.....	1,254,000	7.0	1.00	.49	0.19	--	1.31	.27	.08	--	.01	97	.13	163,000
Dec. 21-31.....	1,224,000	--	--	--	--	--	--	--	--	--	--	94	.13	159,100
Jan. 1-10, 1952..	1,390,000	--	--	--	--	--	--	--	--	--	--	104	.14	194,600
Jan. 11-20.....	1,375,000	6.9	1.10	.44	--	.09	1.33	.27	.02	--	.01	96	.13	178,800
Jan. 21-31.....	1,537,000	--	--	--	--	--	--	--	--	--	--	95	.13	199,800
Feb. 1-10.....	1,167,000	--	--	--	--	--	--	--	--	--	--	98	.13	151,700
Feb. 11-20.....	1,273,000	7.9	1.15	.51	--	.08	1.39	.31	.03	--	.01	101	.14	178,200
Feb. 21-29.....	1,210,000	--	--	--	--	--	--	--	--	--	--	100	.14	169,400

UPPER COLUMBIA RIVER BASIN--Continued
COLUMBIA RIVER MAIN STEM--Continued

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

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million							Boron (B) ppm	Dissolved solids			Per-cent sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	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, 1952.	1,452,000	--	1.15	--	--	--	--	--	--	--	--	103	0.14	203,300	169	--
Mar. 11-20.....	1,456,000	7.9	--	0.49	--	--	1.41	0.33	0.03	--	0.01	105	--	203,800	168	7.3
Mar. 21-31.....	1,651,000	--	--	--	--	--	--	--	--	--	--	107	0.15	247,600	172	--
Apr. 1-10.....	1,497,000	--	--	--	--	--	--	--	--	--	--	110	0.15	223,000	178	--
Apr. 11-20.....	1,459,000	10	1.20	.47	--	.20	1.44	.37	.03	--	--	110	0.15	218,800	11	7.7
Apr. 21-30.....	1,446,000	--	1.00	.53	.34	.34	1.41	.40	.03	--	.02	106	0.15	216,900	18	7.2
May 1-10.....	3,672,000	--	1.15	.45	.18	.18	1.36	.35	.04	--	.02	105	0.14	514,100	10	7.5
May 11-20.....	5,306,000	9.1	.95	.36	.12	.12	1.15	.25	.03	--	.01	91	.12	636,700	9	7.6
May 21-31.....	7,085,000	--	.95	.35	.12	.12	1.13	.25	.03	--	.01	83	.11	779,400	8	7.6
June 1-10.....	5,548,000	8.7	.95	.37	.13	.13	1.23	.19	.03	--	.01	83	.11	610,300	9	7.3
June 11-20.....	5,163,000	7.6	.90	.37	.23	.23	1.26	.21	.02	--	.01	82	.11	587,900	16	7.3
June 21-30.....	4,572,000	7.6	.90	.38	.19	.19	1.21	.23	.01	--	.01	83	.11	502,900	13	7.3
July 1-10.....	4,661,000	6.8	.90	.39	.12	.12	1.20	.19	.02	--	.01	82	.11	512,700	9	7.2
July 11-20.....	3,813,000	6.6	.90	.40	.10	.10	1.16	.20	.03	--	.02	82	.11	419,400	7	7.4
July 21-31.....	3,324,000	--	--	--	--	--	--	--	--	--	--	84	.11	365,600	--	--
Aug. 1-10.....	2,375,000	--	--	--	--	--	--	--	--	--	--	84	.11	261,200	--	--
Aug. 11-20.....	1,678,000	6.7	1.00	.39	.05	.05	1.16	.23	.03	--	.01	82	.11	206,600	4	7.5
Aug. 21-31.....	1,668,000	--	--	--	--	--	--	--	--	--	--	82	.11	205,500	--	--
Sept. 1-10.....	1,247,000	5.9	1.00	.38	.04	.04	1.18	.21	.02	--	.01	80	.11	137,200	3	7.3
Sept. 11-20.....	1,146,000	5.9	.95	.37	.12	.12	1.18	.23	.02	--	.01	80	.11	126,300	8	7.4
Sept. 21-30.....	1,098,000	6.2	1.00	.37	.06	.06	1.16	.23	.02	--	.01	81	.11	120,600	4	7.5
Total or weighted average	81,590,000	--	--	--	--	--	--	--	--	--	--	90	0.12	9,844,000	--	--

a Sum of determined constituents.

Part 13. SNAKE RIVER BASIN

SNAKE RIVER MAIN STEM

SNAKE RIVER AT KING HILL, IDAHO

LOCATION --At county highway bridge about 400 yards downstream from gaging station, which is 300 feet east of railroad station at King Hill, Elmore County, and 20 miles downstream from Big Wood (Malad) River.

DRAINAGE AREA --35,800 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1952.

Water temperatures: March 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 557 micromhos Sept. 29; minimum daily, 394 micromhos May 7.

Percent sodium: Maximum, 28 Sept. 11-30; minimum, 21 Mar. 11-20.

EXTREMES, March 1951 to September 1952.--Specific conductance: Maximum daily, 564 micromhos Aug. 21, 1951; 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 Salt Lake City, Utah. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1247.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons		
Oct. 1-10, 1951..	251,500	36	2.35	1.73	1.48	0.17	3.67	1.23	0.73	0.03	0.05	--	336	0.46	115,700	26	526
Oct. 11-20	275,900	33	2.40	1.64	1.39	.16	3.70	1.19	.73	.03	.04	0.19	324	.44	121,400	25	507
Oct. 21-31	283,800	32	2.40	1.64	1.43	.16	3.64	1.19	.73	.03	.05	--	326	.44	124,800	25	519
Nov. 1-10	257,300	37	2.40	1.64	1.43	.13	3.57	1.19	.73	.03	.06	--	329	.45	115,800	26	523
Nov. 11-20	248,900	37	2.45	1.64	1.39	.13	3.57	1.19	.73	.03	.07	.17	331	.45	112,000	25	519
Nov. 21-30	258,200	37	2.45	1.64	1.39	.14	3.57	1.15	.73	.03	.06	--	326	.44	113,600	25	515
Dec. 1-10	236,200	36	2.40	1.64	1.43	.14	3.56	1.17	.73	.03	.06	--	331	.45	106,300	25	514
Dec. 11-20	248,900	36	2.50	1.64	1.43	.14	3.59	1.19	.73	.03	.06	.16	329	.45	112,000	25	515
Dec. 21-31	277,100	35	2.50	1.64	1.39	.14	3.56	1.17	.73	.03	.05	--	328	.45	124,700	25	511
Jan. 1-10, 1952..	245,000	34	2.45	1.64	1.39	.12	3.57	1.12	.73	.03	.06	--	334	.45	110,200	25	519
Jan. 11-20	256,300	35	2.45	1.56	1.30	.12	3.52	1.03	.73	.03	.06	.12	327	.44	112,800	24	512
Jan. 21-31	306,200	30	2.45	1.56	1.30	.11	3.46	1.04	.73	.03	.05	--	323	.44	135,600	24	504
Feb. 1-10	337,800	30	2.40	1.48	1.22	.12	3.44	1.02	.71	.04	.05	--	312	.42	141,900	23	483
Feb. 11-20	351,700	30	2.54	1.64	1.17	.09	3.51	1.06	.73	.03	.05	.10	317	.43	151,200	22	497
Feb. 21-28	317,000	29	2.59	1.56	1.17	.09	3.57	1.06	.73	.04	.04	--	322	.44	139,500	22	498

SNAKE RIVER MAIN STEM--Continued
SNAKE RIVER AT KING HILL, IDAHO--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				Per-cent so-dium	So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons					
Mar. 1-10, 1952...	353,300	29	2.50	1.64	1.30	0.09	3.54	1.08	0.73	0.03	0.04	--	316	0.43	151,900	24	0.9	495	8.0	
Mar. 11-20.....	372,500	28	2.50	1.64	1.13	.09	3.51	1.02	.68	.04	.04	0.10	310	.42	156,400	21	.8	481	8.0	
Mar. 21-31.....	445,100	27	2.35	1.40	1.13	.11	3.28	.98	.62	.04	.04	--	292	.40	178,000	23	.8	454	7.6	
Apr. 1-10.....	414,900	27	2.20	1.32	1.09	.10	3.15	.94	.62	.04	.03	--	278	.38	157,700	23	.8	441	7.5	
Apr. 11-20.....	431,400	27	2.20	1.40	1.00	.10	3.15	.92	.62	.04	.03	.09	278	.38	163,900	23	.8	439	7.8	
Apr. 21-22, 29-30.	171,800	26	2.20	1.23	1.00	.09	3.00	.83	.56	--	.05	--	269	.37	63,570	22	.8	424	7.9	
May 1-10.....	440,300	26	2.00	1.32	.96	.09	2.85	.81	.56	.03	.04	--	252	.34	149,700	22	.7	405	7.9	
May 11-20.....	341,800	27	2.05	1.32	1.00	.09	2.95	.83	.56	.03	.04	.11	262	.36	123,000	22	.8	418	7.9	
May 21-31.....	300,500	29	2.15	1.40	1.13	.10	3.18	.96	.65	.03	.04	--	282	.38	114,200	24	.9	448	8.1	
June 1-10.....	274,100	26	2.10	1.40	1.09	.09	3.05	.90	.56	.03	.04	--	270	.37	101,400	23	.8	436	8.0	
June 11-20.....	321,100	25	2.15	1.32	1.04	.10	3.18	.85	.56	.02	.04	.10	270	.37	118,800	23	.8	436	7.8	
June 21-30.....	254,300	32	2.20	1.48	1.22	.10	3.41	1.00	.65	.03	.05	--	304	.41	104,300	24	.9	479	7.8	
July 1-10.....	231,800	28	2.10	1.40	1.13	.10	3.34	.87	.59	.03	.05	--	286	.39	90,320	24	.9	459	7.8	
July 11-20.....	182,000	37	2.20	1.64	1.43	.13	3.57	.92	.73	.02	.07	.10	327	.44	71,280	27	1.0	512	7.9	
July 21-31.....	181,100	36	2.15	1.64	1.48	.13	3.56	1.19	.76	.03	.05	--	333	.45	81,500	27	1.1	522	7.9	
Aug. 1-10.....	171,000	39	2.25	1.73	1.52	.12	3.61	1.15	.82	.03	.06	--	336	.46	78,660	27	1.1	529	7.7	
Aug. 11-20.....	168,900	41	2.30	1.73	1.52	.12	3.64	1.19	.82	.04	.05	.05	342	.47	79,380	27	1.1	537	8.0	
Aug. 21-31.....	186,400	41	2.30	1.81	1.52	.13	3.83	1.15	.79	.03	.06	--	342	.47	87,610	26	1.1	537	8.0	
Sept. 1-10.....	177,200	37	2.30	1.73	1.57	.12	3.67	1.17	.76	.03	.05	--	359	.49	86,830	27	1.1	546	8.0	
Sept. 11-20.....	185,900	33	2.30	1.73	1.61	.12	3.67	1.73	.79	.03	.05	.08	341	.46	85,510	28	1.1	546	8.1	
Sept. 21-30.....	183,400	35	2.30	1.81	1.65	.12	3.72	1.23	.76	.03	.05	--	342	.47	86,200	28	1.2	551	8.2	
Total or weighted average	489,223,000	31	2.30	1.56	1.26	0.12	3.41	1.04	0.68	0.03	0.05	--	309	- 0.42	4,168,000	24	0.9	486	--	

a Represents 97 percent of runoff for water year October 1951 to September 1952.

BOISE RIVER BASIN

BOISE RIVER AT NOTUS, IDAHO

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

RECORDS AVAILABLE.--Chemical analyses: January 1939 to September 1952.

Water temperatures: November 1950 to September 1952.

Sediment records: January 1939 to June 1940.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 802 micromhos Aug. 20; minimum daily, 81.7 micromhos Apr. 27.

Percent sodium: Maximum, 53 July 31, Aug. 1-10, 21-31; minimum, 28 Apr. 21-30, May 1-10.

EXTREMES, 1939-40, 1950-52.--Specific conductance: Maximum daily, 1,390 micromhos Aug. 21-31, 1939; minimum daily, 81.7 micromhos Apr. 27, 1952.

Percent sodium: Maximum, 64 Sept. 1-10, 1939; minimum, 25 Apr. 11-20, 1951.

REMARKS.--Values reported for dissolved solids are 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 1951 to September 1952 given in Water-Supply Paper 1247.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25° C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Total tons						
													Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-10, 1951..	15,730	34	1.95	0.90	3.61	0.16	3.61	1.48	0.51	0.03	0.05	--	338	0.46	7,240	46	3.0	521	7.8
Oct. 11-20.....	19,340	37	2.30	1.07	2.91	.16	4.06	1.77	.54	.03	.05	0.24	388	.53	10,250	45	2.2	596	8.0
Oct. 21-31.....	19,820	36	2.30	1.07	2.96	.15	4.13	1.81	.56	.02	.05	--	395	.54	10,700	46	2.3	607	7.8
Nov. 1-10.....	15,390	37	2.40	1.07	3.09	.18	4.26	1.92	.56	.02	.05	--	410	.56	8,620	46	2.3	631	7.7
Nov. 11-20.....	12,540	41	2.64	1.15	3.35	.20	4.65	2.06	.65	.02	.02	.28	444	.60	7,520	46	2.4	682	7.7
Nov. 21-29.....	10,710	38	2.50	1.15	3.04	.14	4.34	1.92	.56	.03	.02	--	420	.57	6,100	45	2.3	631	7.4
Nov. 30, Dec. 1-11	24,720	33	2.15	.90	2.17	.14	3.52	1.37	.42	.03	.03	--	330	.45	11,120	40	1.8	496	7.5
Dec. 12-20.....	32,510	26	1.45	.59	1.39	.10	2.29	.85	.28	.03	.04	.14	217	.30	9,750	39	1.4	328	7.4
Dec. 21, 25-31...	43,760	20	1.05	.36	.96	.12	1.69	.54	.17	.02	.02	--	156	.21	9,190	38	1.1	234	7.4
Dec. 22-24.....	8,900	35	2.10	.90	2.35	.09	3.51	1.46	.45	.03	.05	--	346	.47	4,180	43	1.9	511	7.7
Jan. 1-10, 1952..	71,250	17	1.05	.42	.74	.06	1.56	.44	.14	.02	.04	--	136	.18	12,820	33	.9	214	7.2
Jan. 11-20.....	71,390	17	1.05	.39	.74	.07	1.54	.44	.14	.02	.04	.06	134	.18	12,850	33	.9	206	7.3
Jan. 21-27.....	52,340	18	1.10	.36	.74	.07	1.61	.44	.14	.02	.04	--	140	.19	9,940	33	.9	217	7.3
Jan. 28-31.....	14,750	30	1.95	.90	2.17	.12	3.15	1.37	.39	--	.09	--	308	.42	6,200	42	1.8	476	7.5

BOISE RIVER BASIN--Continued

BOISE RIVER AT NOTUS, IDAHO--Continued

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion		Total tons				
													per mil-lion	per acre-foot					
Feb. 1-7, 1952...	19,800	29	1.70	0.82	1.74	0.08	2.77	0.98	0.37	0.03	0.06	--	265	0.36	7,130	40	1.5	407	7.3
Feb. 8-10.....	23,660	20	1.20	.21	.65	.03	1.39	.37	.14	.02	.05	--	123	.17	4,060	31	.8	190	8.0
Feb. 11-20.....	85,590	18	.90	.40	.65	.03	1.34	.37	.14	.02	.04	0.05	119	.16	13,690	33	.8	184	7.5
Feb. 21-29.....	71,190	16	.85	.41	.65	.03	1.34	.35	.13	.02	.04	--	120	.16	11,390	34	.8	185	7.6
Mar. 1-10.....	76,800	18	.95	.40	.70	.03	1.38	.40	.16	.02	.04	--	125	.17	13,060	33	.8	191	7.5
Mar. 11-20.....	89,100	17	.85	.31	.65	.04	1.31	.35	.11	.02	.04	.09	122	.17	15,150	35	.9	177	7.5
Mar. 21-31.....	134,600	18	.75	.29	.52	.04	1.15	.27	.08	.02	.05	--	110	.15	20,190	33	.7	153	7.5
Apr. 1-10.....	107,000	20	.70	.32	.57	.04	1.11	.31	.09	.02	.06	--	114	.16	17,120	35	.8	150	7.4
Apr. 11-20.....	146,200	18	.55	.29	.37	.04	.85	.20	.06	.02	.05	.06	97	.13	19,010	30	.6	116	7.4
Apr. 21-30.....	134,000	16	.39	.33	.29	.04	.75	.14	.05	.02	.05	--	84	.11	14,740	28	.5	94.3	7.4
May 1-10.....	115,000	16	.41	.30	.30	.04	.79	.14	.05	.02	.02	--	77	.10	11,500	28	.5	94.1	7.4
May 11-20.....	127,600	15	.50	.22	.32	.03	.79	.15	.06	.02	.03	.08	78	.11	14,060	30	.5	103	7.4
May 21-31.....	88,800	16	.60	.22	.43	.04	.98	.23	.09	.02	.03	--	92	.13	11,520	34	.7	131	7.3
June 1-11.....	62,990	15	.60	.29	.48	.04	1.00	.25	.09	.02	.03	--	94	.13	10,790	34	.7	136	7.3
June 12-18.....	31,140	18	.75	.35	.78	.06	1.38	.42	.14	.02	.04	.07	131	.18	5,610	40	1.1	194	7.3
June 19-30.....	23,000	22	1.15	.56	1.35	.07	2.06	.73	.27	.02	.05	--	201	.27	6,210	43	1.5	304	7.6
July 1-9.....	10,570	25	1.45	.74	2.00	.08	2.77	1.04	.37	.02	.05	--	263	.36	3,610	47	1.9	413	7.7
July 10-20.....	5,460	30	1.90	.99	3.04	.11	3.62	1.73	.62	.01	.06	.16	400	.54	2,950	50	2.5	581	7.7
July 21-30.....	5,430	30	1.65	.82	2.83	.12	3.51	1.56	.56	.03	.06	--	341	.46	2,500	50	2.4	540	7.6
July 31, Aug. 1-10	3,550	37	2.10	1.15	3.83	.13	4.33	2.06	.82	.03	.04	--	454	.62	2,200	53	3.0	691	7.6
Aug. 11-20.....	2,650	37	2.40	1.23	4.13	.12	4.56	2.31	.87	.03	.05	.10	481	.65	1,720	52	3.1	739	8.0
Aug. 21-31.....	2,740	38	2.30	1.23	4.09	.13	4.52	2.21	.93	.03	.05	--	477	.65	1,780	53	3.1	732	8.0
Sept. 1-10.....	7,400	35	2.15	1.07	3.35	.12	4.10	1.85	.73	.03	.04	--	417	.57	4,220	50	2.6	646	7.7
Sept. 11-20.....	15,660	34	2.05	.99	3.13	.12	3.93	1.73	.62	.03	.05	.17	390	.53	8,300	50	2.5	602	7.9
Sept. 21-30.....	9,480	34	2.10	1.15	3.35	.12	4.20	1.92	.68	.02	.05	--	426	.58	5,500	50	2.6	650	7.9
Total or weighted average	1,833,000	20	0.90	0.41	0.83	0.06	1.47	0.46	0.16	0.02	0.04	--	142	0.19	354,700	38	1.0	206	--

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

COLUMBIA RIVER MAIN STEM

COLUMBIA RIVER AT MARYHILL FERRY NEAR RUFUS, OREG.

LOCATION.--At Maryhill Ferry, about 2½ miles downstream from Rufus, Sherman County, and about 9 miles upstream from gaging station, near The Dalles which is just upstream from Celilo Falls, 3 miles downstream from Deschutes River, and 11 miles east of The Dalles, Wasco County.

DRAINAGE AREA.--237,000 square miles (above gaging station).

RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1952.

Water temperatures: December 1950 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 242 micromhos Feb. 27; minimum daily, 125 micromhos May 1.

Percent sodium: Maximum, 23 Sept. 11-30; minimum, 13 May 1-10, June 21-30.

EXTREMES, 1950-52.--Specific conductance: Maximum daily, 242 micromhos Feb. 27, 1952; minimum daily, 124 micromhos May 26, 1951.

Percent sodium: Maximum, 23 Sept. 11-30, 1952; minimum, 12 June 21-30, 1951.

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 The Dalles for water year October 1951 to September 1952 given in Water-Supply Paper 1248. 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 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per-cent sodium	So-dium adsorp-tion ratio	Specific conduct-ance (micro-mhos at 25°C)	
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-10, 1951	2,318,000	13	1.20	0.58	0.39	0.08	1.64	0.46	0.12	0.02	0.02	--	129	0.18	417,200	17	0.4	211	8.0
Oct. 11-20.....	2,362,000	10	1.20	.56	.37	.08	1.61	.42	.12	.02	.01	0.14	122	.17	401,500	17	.4	204	7.7
Oct. 21-31.....	2,809,000	12	1.25	.59	.42	.09	1.70	.44	.14	.02	.02	--	131	.18	505,600	18	.4	217	7.8
Nov. 1-10.....	2,813,000	13	1.25	.61	.42	.07	1.70	.44	.14	.02	.02	--	134	.18	416,300	18	.4	218	7.7
Nov. 11-20.....	2,237,000	13	1.25	.61	.43	.09	1.70	.46	.17	.02	.01	.16	138	.19	425,000	18	.5	226	7.9
Nov. 21-30.....	2,094,000	13	1.30	.63	.48	.08	1.84	.48	.16	.02	.01	--	144	.20	418,800	19	.5	231	7.8
Dec. 1-10.....	2,537,000	14	1.25	.61	.42	.05	1.72	.40	.16	.01	.02	--	139	.19	482,000	18	.4	217	7.1
Dec. 11-20.....	2,200,000	14	1.20	.65	.41	.05	1.86	.40	.16	.01	.02	.09	139	.19	418,000	18	.4	215	7.3
Jan. 30-31, Feb. 1-10, 1952....	3,370,000	15	1.25	.63	.43	.04	1.75	.46	.16	.02	.02	--	140	.19	640,300	18	.4	229	7.6

COLUMBIA RIVER MAIN STEM--Continued

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

Chemical analyses, water year October 1951 to September 1952--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Per cent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons				
Feb. 11-20, 1952.	2,431,000	17	1.20	0.62	0.40	0.04	1.66	0.44	0.14	0.02	0.03	0.07	140	0.19	471,400	18	0.4	217	7.8
Feb. 21-29	2,200,000	15	1.25	.63	.40	.05	1.69	.46	.16	.02	.02	--	141	.19	418,000	17	.4	226	7.7
Mar. 1-10	2,527,000	14	1.30	.66	.40	.05	1.74	.46	.16	.02	.01	--	140	.19	480,100	17	.4	230	7.7
Mar. 11-20	2,682,000	15	1.30	.67	.43	.05	1.74	.48	.16	.02	.02	.09	147	.20	536,400	18	.4	234	7.7
Mar. 21-31	3,917,000	18	1.30	.68	.37	.07	1.69	.44	.16	.03	.03	--	141	.19	744,200	15	.4	218	7.3
Apr. 1-10	4,229,000	20	1.00	.69	.30	.06	1.47	.31	.14	.03	.04	--	128	.17	718,900	15	.3	184	7.5
Apr. 11-20	4,955,000	18	.90	.52	.32	.06	1.39	.27	.11	.02	.02	.05	115	.16	792,800	18	.4	163	7.5
Apr. 21-30	5,978,000	18	.75	.49	.26	.05	1.11	.25	.09	.02	.03	--	104	.14	836,900	17	.3	142	7.5
May 1-10	7,178,000	16	.75	.41	.18	.04	1.05	.21	.08	.02	.01	--	92	.13	933,100	13	.2	131	7.5
May 11-20	9,566,000	13	.80	.38	.23	.05	1.11	.23	--	.02	.02	.08	93	.13	1,244,000	16	.3	143	7.3
May 21-31	11,600,000	10	.85	.39	.22	.04	1.18	.25	.06	.01	.01	--	93	.13	1,534,000	15	.3	152	7.5
June 1-10	9,477,000	11	.80	.38	.22	.04	1.20	.25	.05	.01	.01	--	93	.13	1,232,000	14	.3	150	7.3
June 11-20	8,102,000	9.6	.85	.36	.21	.04	1.13	.25	.06	.01	.02	.07	91	.12	972,200	15	.3	147	7.3
June 21-30	6,591,000	9.6	.90	.37	.20	.05	1.25	.25	.06	.02	.02	--	95	.13	856,800	13	.3	155	7.6
July 1-10	6,561,000	12	.95	.42	.23	.03	1.38	.25	.10	.01	.01	--	97	.13	852,900	14	.3	160	7.4
July 11-20	5,224,000	12	.95	.43	.23	.04	1.44	.25	.10	.01	.01	.00	97	.13	679,100	14	.3	158	7.5
July 21-31	4,514,000	11	1.00	.45	.27	.05	1.44	.31	.13	.02	.02	--	104	.14	632,000	15	.3	173	7.2
Aug. 1-10	3,273,000	11	1.10	.49	.29	.04	1.44	.33	.14	.02	.01	--	107	.15	491,000	15	.3	179	7.5
Aug. 11-20	2,737,000	9.3	1.05	.49	.33	.05	1.44	.37	.11	.01	.02	.04	113	.15	410,600	17	.4	188	7.3
Aug. 21-31	2,727,000	8.5	1.20	.55	.48	.05	1.57	.46	.16	.01	.02	--	132	.18	490,900	21	.5	217	7.2
Sept. 1-10	2,018,000	9.5	1.20	.60	.52	.04	1.64	.50	.17	.01	.02	--	135	.18	363,200	22	.6	224	7.8
Sept. 11-20	1,885,000	8.3	1.15	.60	.52	.05	1.61	.52	.16	.01	.02	.04	134	.18	339,300	23	.6	225	7.5
Sept. 21-30	1,810,000	8.1	1.15	.59	.52	.05	1.64	.52	.17	.01	.01	--	135	.18	325,800	23	.6	225	7.8
Total or weighted average	a134,700,000	13	1.00	0.49	0.30	0.05	1.39	0.31	0.11	0.02	0.02	--	111	0.15	20,480,000	16	0.3	177	--

a Represents 94 per cent of runoff for water year October 1951 to September 1952.

WILLAMETTE RIVER BASIN

WILLAMETTE RIVER AT SALEM, OREG.

LOCATION.--At bridge on State Highway 22, Polk-Marion County line, 300 feet downstream from gaging station at Salem. DRAINAGE AREA.--7,280 square miles.

RECORDS AVAILABLE.--Chemical analyses: August to December 1910, August 1911 to August 1912, February 1951 to September 1952. Water temperatures: February 1951 to September 1952.

EXTREMES, 1951-52.--Specific conductance: Maximum daily, 92.7 micromhos Sept. 7; minimum daily, 36.8 micromhos Feb. 5. Percent sodium: Maximum, 36 July 11-20; minimum, 20 May 11-20.

EXTREMES, February 1951 to September 1952.--Specific conductance: Maximum daily, 92.7 micromhos Sept. 7, 1952; minimum daily, 36.8 micromhos Feb. 5, 1952.

Percent sodium: Maximum, 36 July 11-20, 1952; minimum, 20 Apr. 11-20, 1951, May 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. Records of discharge for water year October 1951 to September 1952 given in Water-Supply Paper 1248.

Chemical analyses, water year October 1951 to September 1952

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids				So-dium adsorp-tion ratio	Specific conductance (micro-mhos at 25°C)	pH
			Cal-cium (Ca)	Magne-sium (Mg)	So-dium (Na)	Potas-sium (K)	Bicar-bonate (HCO ₃)	Sul-fate (SO ₄)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO ₃)	Boron (B) ppm	Parts per mil-lion	Tons per acre-foot	Total tons				
Oct. 1-10, 1951...	249,100	16	0.25	0.17	0.16	0.05	0.46	0.07	0.06	0.02	0.01	--	56	0.08	19,930	25	0.3	61.1	7.0
Oct. 11-20.....	261,100	15	.25	.17	.15	.04	.43	.04	.06	.02	.01	0.08	53	.07	18,280	24	.3	57.5	7.0
Oct. 21-31.....	810,600	15	.23	.18	.13	.04	.39	.05	.06	.02	.01	--	52	.07	56,740	23	.3	52.1	6.9
Nov. 1, 5-6, 8-10.	136,200	18	.27	.17	.16	.04	.49	.06	.08	.02	.01	--	58	.08	10,900	25	.3	62.2	7.0
Nov. 11-20.....	841,400	16	.24	.19	.14	.04	.43	.06	.06	.02	.01	0.08	53	.07	58,900	24	.3	52.9	7.1
Nov. 21-30.....	637,300	18	.26	.10	.15	.04	.44	.06	.07	.02	.02	--	61	.08	50,980	27	.3	56.2	7.2
Dec. 1-10.....	1,698,000	16	.22	.10	.13	.03	.38	.05	.07	.02	.02	--	58	.08	151,100	27	.3	50.0	7.2
Dec. 11-18.....	532,200	17	.24	.16	.15	.03	.43	.06	.08	.01	.02	.02	53	.07	37,250	26	.3	56.4	7.2
Jan. 7-15, 1952...	643,000	17	.25	.18	.21	.03	.49	.07	.09	.02	.02	.05	56	.08	51,440	31	.5	59.9	7.2
Feb. 4-29.....	2,680,000	16	.24	.17	.19	.02	.46	.06	.07	.02	.02	.02	49	.07	187,600	30	.4	52.1	7.7
Mar. 3-8, 10, 12-15, 24, 27-28, 31	1,012,000	16	.26	.16	.17	.03	.49	.07	.08	.02	.01	.02	55	.07	70,840	28	.4	57.6	7.7
Apr. 1-5, 7, 15-17	647,000	15	.25	.17	.13	.02	.44	.07	.05	.01	.01	.02	44	.06	38,820	22	.3	47.9	6.8
Apr. 21-30.....	568,700	15	.25	.15	.21	.03	.49	.06	.06	.01	.00	--	43	.06	34,120	33	.5	45.9	7.0

WILLAMETTE RIVER BASIN--Continued
WILLAMETTE RIVER AT SALEM, OREG.--Continued

Chemical analyses, water year October 1951 to September 1952 --- Continued

Date of collection	Runoff (acre-feet)	Silica (SiO ₂) ppm	Equivalents per million										Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Boron (B) ppm	Parts per million	Tons per acre-foot	Total tons			
May 1-10, 1952..	445,500	16	0.26	0.17	0.13	0.03	0.46	0.05	0.07	0.02	0.01	--	48	0.07	31,180	22	0.3	49.8
May 11-20.....	501,200	14	0.25	0.15	0.10	0.03	0.39	0.06	0.06	0.01	0.00	0.03	44	0.06	30,070	20	0.2	46.3
May 21-31.....	501,200	16	0.21	0.12	0.13	0.02	0.44	0.04	0.05	--	0.00	--	44	0.06	30,070	27	0.3	50.8
June 1-10.....	329,100	15	0.22	0.14	0.14	0.02	0.43	0.05	0.06	--	0.00	--	49	0.07	23,040	27	0.3	52.4
June 11-20.....	278,500	16	0.23	0.14	0.14	0.02	0.44	0.05	0.06	--	0.01	--	50	0.07	19,500	27	0.3	54.1
June 21-30.....	282,200	17	0.23	0.16	0.14	0.02	0.46	0.04	0.05	--	0.01	--	47	0.06	17,530	26	0.3	53.2
July 1-10.....	375,900	17	0.24	0.16	0.15	0.02	0.48	0.04	0.06	--	0.01	--	46	0.06	22,550	27	0.3	54.7
July 11-20.....	175,100	18	0.26	0.17	0.26	0.02	0.52	0.05	0.06	0.01	0.01	--	55	0.07	12,260	36	0.5	64.3
July 21-31.....	139,800	18	0.30	0.19	0.21	0.04	0.56	0.07	0.10	0.01	0.01	--	61	0.06	11,180	29	0.4	72.5
Aug. 1-10.....	107,700	17	0.31	0.18	0.21	0.04	0.56	0.06	0.11	0.01	0.01	--	63	0.09	9,690	26	0.4	76.2
Aug. 11-20.....	107,900	17	0.35	0.21	0.24	0.03	0.57	0.07	0.11	0.02	0.01	0.04	63	0.09	9,710	29	0.5	73.8
Aug. 21-31.....	112,600	16	0.36	0.19	0.23	0.04	0.56	0.07	0.10	0.01	0.01	--	61	0.08	9,010	26	0.4	73.6
Sept. 1-10.....	99,790	16	0.33	0.19	0.23	0.04	0.56	0.05	0.12	0.02	0.01	--	60	0.08	7,980	29	0.5	74.6
Sept. 11-20.....	105,100	16	0.34	0.20	0.23	0.03	0.59	0.07	0.11	0.02	0.01	0.05	61	0.08	8,410	29	0.4	73.1
Sept. 21-30.....	96,990	15	0.34	0.19	0.23	0.03	0.52	0.07	0.11	0.02	0.01	--	64	0.08	8,730	29	0.4	75.7
Total or weighted average	1,458,000	16	0.24	0.16	0.16	0.03	0.44	0.06	0.07	0.02	0.01	--	52	0.07	1,038,000	27	0.4	54.0

aRepresents 72 percent of runoff for water year October 1951 to September 1952.

INDEX

A

	Page
Agua Fria River below Lake Pleasant Dam, Ariz.	150-151
Alamogordo Dam, N. Mex., Pecos River below	112-113
American River at Fair Oaks, Calif.	165-166
American River basin	165-166
Arkansas City, Kans.	55
Arkansas River at Ralston, Okla.	58-60
at Arkansas City, Kans.	55-57
at Van Buren, Ark.	58-60
below John Martin Reservoir, Colo. ..	53-54
Arkansas River basin	53-63
Artesia, N. Mex., Pecos River near	114-115

B

Bartlett Dam, Ariz., Verde River below ..	148-149
Bighorn, Mont., Bighorn River at	32-33
Bighorn River at Bighorn, Mont.	32-33
at Thermopolis, Wyo.	30-31
Billings, Mont., Yellowstone River at ..	26-27
Blanco, N. Mex., San Juan River near ..	135-136
Boise River at Notus, Idaho	171-172
Boise River basin	171-172
Boron hazard	14
Brady, Nebr., Platte River at	45
Brazos River at Richmond, Tex.	88-89
Brazos River basin	88-89

C

Calaveras River basin	157-158
Cambridge, Nebr., Republican River at ..	49-50
Cameron, Ariz., Little Colorado River at	137-138
Canadian River near Tascosa, Tex.	68-69
near Whitefield, Okla.	70-74
Cheyenne River near Eagle Butte, S. Dak.	40-42
Cheyenne River basin	40-42
Christiansen, J. E.	15
Cimarron River at Mannford, Okla.	64-67
Cisco, Utah, Colorado River near	120-121
Colorado River at Austin, Tex.	90-91
at Lees Ferry, Ariz.	122-124
at Wharton, Tex.	92-93
below Hoover Dam, Ariz. -Nev.	127-128
main stem	118-128
near Cisco, Utah	120-121
near Glenwood Springs, Colo.	118-119
near Grand Canyon, Ariz.	125-126
Colorado River basin (Part 8)	90-93
Colorado River basin (Part 9)	118-151
Columbia River at Grand Coulee Dam, Wash.	167-168
at Maryhill Ferry near Rufus, Oreg.	173-174
Columbia River main stem (Part 12)	167-168
Columbia River main stem (Part 14)	173-174
Comstock, Tex., Pecos River near	117

D

Denison, Tex., Red River at Denison Dam near	75-76
Diversions and return flows at and below Imperial Dam	129

E

Eagle Butte, S. Dak., Cheyenne River River near	40-42
Eagle Pass, Tex., Rio Grande at	110
Eaton, F. M.	13, 15
Elephant Butte Dam, N. Mex., Rio Grande below	105
El Paso, Tex., Rio Grande near	106

Page

Page

Evadale, Tex., Neches River at	83-84
--------------------------------------	-------

F

Fair Oaks, Calif., American River at ..	165-166
Feather River at Nicolaus, Calif.	163-164
Feather River basin	163-164

G

Gila River at Kelvin, Ariz.	141-142
below Gillespie Dam, Ariz.	143-145
Gila River basin	141-151
Gillespie Dam, Ariz., Gila River below.	143-145
Glenwood Springs, Colo., Colorado River near	118-119
Grand Canyon, Ariz., Colorado River near	125-126
Grand Coulee Dam, Wash., Columbia River at	167-168
Grand Junction, Colo., Gunnison River near	131-132
Grand River near Wapala, S. Dak.	38-39
Grand River basin	38-39
Green River, Utah, Green River at	133-134
Green River at Green River, Utah	133-134
Green River basin	133-134
Guadalupe River at Victoria, Tex.	94-95
Guadalupe River basin	94-95
Guernsey Reservoir, Wyo., North Platte River below	43-44
Gunnison River near Grand Junction, Colo.	131-132
Gunnison River basin	131-132

H

Headley, F. B.	13, 15
Hoover Dam, Ariz. -Nev., Colorado River below	127-128
Hudson Bay and upper Mississippi River basins	16
Huffman, Tex., San Jacinto River near .	85-87

I

Irrigation-quality network stations	3, 4
---	------

J

John Martin Reservoir, Colo., Arkansas River below	53-54
Julesburg, Colo., South Platte River at ..	47-48

K

Kansas River basin	49-52
Kelvin, Ariz., Gila River at	141-142
King Hill, Idaho, Snake River at	169-170
Knights Landing, Calif., Sacramento River at	161-162

L

Lake Pleasant, Ariz., Agua Fria River below	150-151
Langtry, Tex., Rio Grande at	109
Lees Ferry, Ariz., Colorado River at ..	122-124
Little Colorado River at Cameron, Ariz.	137-138
Little Colorado River basin	137-138
Littlefield, Ariz., Virgin River at	139-140
Lobatos, Colo., Rio Grande above Culebra Creek near	97-98
Locate, Mont., Powder River near	36-37

	Page		Page
Lower Mississippi River basin	53-79	Ruliff, Tex., Sabine River near	80-82
Lynndyl, Utah, Sevier River near	152-153		
M		S	
Magistad, O. C.	15	Sabine River near Ruliff, Tex.	80-82
Mannford, Okla., Cimarron River at ...	64-67	Sabine River basin	80-82
Mathis, Tex., Nueces River near	96	Sacramento River at Knights Landing,	161-162
Maxwell, Nebr., Supply Canal (Tri-County Diversion) near	46	Calif.	161-162
Miles City, Mont., Tongue River at	34-35	main stem	161-162
Missouri River at Nebraska City, Nebr. .	24-25	Sacramento River basin	175-177
at Pierre, S. Dak.	21-23	Salem, Oreg., Willamette River at	51-52
main stem	18-25	Saline River at Tescott, Kans.	13
near Williston, N. Dak.	18-20	Salinity hazard	146-147
Missouri River basin	18-52	Salt River at Stewart Mountain Dam, Ariz.	99-100
Mokelumne River at Woodbridge, Calif. .	159-160	San Ildefonso, N. Mex., Rio Grande at	85-87
Mokelumne River basin	159-160	Otowi Bridge near	85-87
N		San Jacinto River near Huffman, Tex. .	154-156
Nebraska City, Nebr., Missouri River at	24-25	San Jacinto River basin	154-156
Neches River at Evadale, Tex.	83-84	near Vernalis, Calif.	154-156
Neches River basin	83-85	San Joaquin River basin	135-136
Nicolaus, Calif., Feather River at	163-164	San Juan River near Blanco, N. Mex. .	135-136
North Platte River below Guernsey Reservoir, Wyo.	43-44	San Juan River basin	103-104
Notus, Idaho, Boise River at	171-172	San Marcial, N. Mex. Rio Grande at	7
Nueces River near Mathis, Tex.	96	Schedules for analyses of samples	9, 12, 13, 14
Nueces River basin	96	Scofield, C. S.	152-153
O		Sevier Lake basin	152-153
Old Fort Quitman, Tex., Rio Grande below	107	Sevier River near Lynndyl, Utah	16-17
Orla, Tex., Pecos River near	116	Sheyenne River near Warwick, N. Dak. .	28-29
P		Sidney, Mont., Yellowstone River near .	169-170
Pacific slope basins in California	154-165	Snake River at King Hill, Idaho	169-170
Pacific slope basins in Oregon and Lower Columbia River basin	173-177	main stem	169-170
Pacific slope basins in Washington and Upper Columbia River basin	167	Snake River basin	14
Pecos River below Alamogordo Dam, N. Mex.	112-113	Sodium-adsorption ratio (SAR)	47-48
near Artesia, N. Mex.	114-115	South Platte River at Julesburg, Colo. .	146-147
near Comstock, Tex.	117	River at	157-158
near Orla, Tex.	116	Stockton, Calif., Stockton Diverting	157-158
Percent sodium	9	Canal at	157-158
Pierre, S. Dak., Missouri River at	21-23	Stockton diverting canal at Stockton, Calif.	46
Platte River at Brady, Nebr.	45	Supply canal (Tri-county diversion) near Maxwell, Nebr.	
Platte River basin	43-48		
Powder River near Locate, Mont.	36-37	T	
R		Tabler, Okla., Washita River near	77-79
Ralston, Okla., Arkansas River at	58-60	Tascoma, Tex., Canadian River near ...	68-69
Red River at Denison Dam near Denison, Tex.	75-76	Tescott, Kans., Saline River at	51-52
Red River basin	75-79	The Great Basin	152-153
Red River of the North basin	16-17	Thermopolis, Wyo., Bighorn River at ...	30-31
Republican River at Cambridge, Nebr. .	49-50	Thorne, J. P. and Thorne, D. W.	13, 15
Residual sodium carbonate	14	Tiffany Channel, Rio Grande at	101-102
Richmond, Tex., Brazos River at	88-89	Tongue River at Miles City, Mont.	34-35
Rio Grande at Eagle Pass, Tex.	110	U	
at Langtry, Tex.	109	United States Salinity Laboratory Staff ...	13, 15
at Roma, Tex.	111	Units for reporting data	7, 8
at San Marcial, N. Mex.	103-104	Upper Columbia River basin	167
Tiffany Channel nr. San Marcial, N. Mex.	101-102	Upper Presidio, Tex., Rio Grande at	108
at Upper Presidio, Tex.	108	V	
below Elephant Butte Dam, N. Mex. .	105	Van Buren, Ark., Arkansas River at	61-63
below Old Fort Quitman, Tex.	107	Verde River below Bartlett Dam, Ariz. .	148-149
near El Paso, Tex.	106	Vernalis, Calif., San Joaquin River near .	154-156
above Culebra Creek near Lobatos, Colo.	97-98	Victoria, Tex., Guadalupe River at	94-95
at Otowi Bridge near San Ildefonso, N. Mex.	99-100	Virgin River at Littlefield, Ariz.	139-140
Rio Grande basin	97-117	Virgin River basin	139-140
Roma, Tex., Rio Grande at	111	W	
Rufus, Oreg., Columbia River at Maryhill Ferry near	173-174	Wakpala, S. Dak., Grand River near	38-39
		Warwick, N. Dak., Sheyenne River near .	16-17
		Washita River near Tabler, Okla.	77-79
		Western Gulf of Mexico basins	80-117
		Wharton, Tex., Colorado River at	92-93
		Whitefield, Okla., Canadian River near ..	70-74
		Wilcox, L. V.	15
		Willamette River at Salem, Oreg.	175-176
		Willamette River basin	175-176
		Williston, N. Dak., Missouri River near .	18-20

INDEX

179

	Page		Page
Woodbridge, Calif., Mokelumne River at	159-160	Yellowstone River near Sidney, Mont.	28-29
		Yellowstone River basin	26-37
Y		Yuma, Ariz., Yuma Main Canal below Colorado River siphon at	129-130
Yellowstone River at Billings, Mont.	26-27	Yuma Main Canal below Colorado River siphon at Yuma, Ariz.	129-130

