Quality of Surface Waters for Irrigation Western States 1961

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1886

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

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PREFACE

This report was prepared by the Geological Survey in cooperation with other State and Federal Agencies by personnel of the Water Resources Division under the direction of L. B. Leopold, chief hydrologist, and S. K. Love, chief, Quality of Water Branch. The data were collected under the supervision of the following:

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QUALITY OF SURFACE WATERS FOR IRRIGATION, WESTERN STATES, 1961

INTRODUCTION

The records of chemical analyses, other physical measurements, and discharge given in this report comprise the eleventh annual compilation of data for 73 irrigation network stations in operation west of the Mississippi River.

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

In recognition of this problem the Subcommittee on Hydrology, Interagency Committee on Water Resources (formerly the Federal Interagency River Basin Committee) on February 6, 1950, approved a list of 106 network stations on streams in the western conterminous United States at which water samples were to be collected and analysed with particular reference to the use of these streams' 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).

Irrigation-Quality Network Stations, Western States

[Selected by subcommittee on Hydrology, Interagency Committee on Water Resources, 1950]

Irrigation network no.	Geological Survey station ident. no.	Stream or location	Date established	Date discontinued
1	5-1240	Souris (Mouse) River near Westhope, N. Dak.	June 1954	.....
2	6-3300	Missouri River near Williston, N. Dak	12- 5-50	.....
3	-4400	Missouri River at Pierre, S. Dak.....	10- 3-50	9-30-58
4	-8070	Missouri River at Nebraska City, Nebr.....	1- 4-51	.....
5	-2145	Yellowstone River at Billings, Mont.....	12-15-50	9-30-58
6	-3295	Yellowstone River near Sidney, Mont.....	1- 3-51	.....
7	-2595	Bighorn River at Thermopolis, Wyo.....	1- 1-51	1-21-54
	-2590	Wind River below Boysen Reservoir, Wyo....	11-24-53	9-30-54
8	-2947	Bighorn River at Bighorn, Mont.....	10- 2-50	.....
9	-3085	Tongue River at Miles City, Mont.....	1- 4-51	.....
10	-3265	Powder River near Locate, Mont.....	1- 4-51	.....
11	-3580	Grand River near Wakpala, S. Dak.....	1-17-51	11-20-53
12	-3610	Moreau River at Promise, S. Dak.....	.....	.....
13	-4395	Cheyenne River near Eagle Butte, S. Dak....	1-17-51	11-20-53
14	-4520	White River near Oacoma, S. Dak.....	.....	.....
15	-4760	James River at Huron, S. Dak.....	Aug. 1956	.....
16	-6420	North Platte River below Alcova Dam, Wyo ..	.....	.....
17	-6560	North Platte River below Guernsey Reservoir, Wyo.	12- 7-50	9-30-58
18	-7660	Platte River at Brady, Nebr.....	2-28-51	.....
18a	-7657	Supply Canal (Tri-County Diversion) near Maxwell, Nebr.	3- 1-51	.....
19	-7640	South Platte River at Julesburg, Colo.....	10- 1-45	.....
20	.....	Republican River above Medicine Creek at Cambridge, Nebr.	12-22-50	9-30-58
21	-8535	Republican River near Hardy, Nebr	Aug. 1956	Sept. 1957
22	-8655	Smoky Hill River near Langley, Kans.....	.....	.....
23	-8680	Saline River near Wilson (or Russell), Kans..	.....	10- 3-52
	-8695	Saline River near Tescott, Kans	4- 3-50	9-30-53
24	7-1305	Arkansas River below John Martin, Reservoir, Colo.	1-10-51	.....
25	-1465	Arkansas River at Arkansas City, Kans.....	10- 8-51	.....
26	-1525	Arkansas River at Ralston, Okla.....	1- 1-50	.....
27	-2505	Arkansas River at Van Buren, Ark.....	10- 1-45	.....
28	-1640	Cimarron River at Mannford, Okla.....	10- 1-49	9-30-52
	-1610	Cimarron River at Perkins, Okla	10- 1-52	.....
29	.....	Canadian River near Tascosa, Tex.....	6- 2-48	9-30-53
30	-2450	Canadian River near Whitefield, Okla.....	9- 1-46	.....
31	-3316	Red River at Denison Dam, near Denison, Tex.	5- 1-44	.....
32	-3280	Washita River near Tabler, Okla.....	9-10-46	10- 3-52
33	8- 305	Sabine River near Ruliff, Tex.....	10- 1-47	.....
34	- 410	Neches River at Evadale, Tex	10- 1-47	.....
35	- 665	Trinity River at Romayor, Tex	9- 1-45	.....
36	.....	San Jacinto River near Huffman, Tex.....	9- 1-45	4- 5-54
37	-1140	Brazos River at Richmond, Tex.....	9- 1-45	.....
38	.....	Colorado River at Robert Lee, Tex.....	10- 1-47	9-30-51
39	-1580	Colorado River at Austin, Tex.....	10- 1-47	.....
40	-1620	Colorado River at Wharton, Tex	4-11-44	.....
41	-1765	Guadalupe River at Victoria, Tex	9- 1-45	.....
42	-2110	Nueces River near Mathis, Tex.....	10- 1-47	.....
43	-2492	Rio Grande above Culebra Creek, near Labatos, Colo.	10-11-46	.....
44	-3130	Rio Grande at Otowi Bridge, near San Ildefonso, N. Mex.	10-23-47	.....

Irrigation-Quality Network Stations, Western States--Continued

Irrigation network no.	Geological Survey station ident. no.	Stream or location	Date established	Date discontinued
45	8-3585	Rio Grande at San Marcial, N. Mex.....	7- 1-48	Oct. 1954
	-3583	Rio Grande conveyance channel at San Marcial, N. Mex.	Oct. 1954	.....
	-3584	Rio Grande floodway at San Marcial, N. Mex.	Oct. 1954	.....
46	-3610	Rio Grande below Elephant Butte Dam, N. Mex.	1933	.....
47	-3640	Rio Grande near El Paso, Tex[a].....	1930	.....
48	-3705	Rio Grande at Fort Quitman, Tex[a].....	1930	.....
49	-3715	Rio Grande above Presidio, Tex[a].....	1935	.....
50	-3775	Rio Grande at Langtry, Tex[a].....	1945	.....
51	-4580	Rio Grande at Eagle Pass, Tex[a].....	1938	1-30-55
	-4590	Rio Grande at Laredo, Tex[a].....	7- 1-55	.....
52	-4625	Rio Grande at Roma, Tex[a].....	1944	1-31-55
	-4615	Rio Grande at Chapeno, Tex[a].....	July 1955	9-30-56
	-4613	Rio Grande at Falcon Dam-U. S. tailrace[a] ...	July 1955	.....
53	-3845	Pecos River below Alamogordo Dam, N. Mex	6-26-37	.....
54	-3965	Pecos River near Artesia, N. Mex.....	7- 1-37	.....
55	-4101	Pecos River below Red Bluff Dam, near Orla, Tex.	7- 1-37	.....
56	-4475	Pecos River near Comstock, Tex[a].....	1935	Dec. 1954
	-4474	Pecos River near Shumla, Tex[a]	1- 1-55	.....
57	9- 711	Colorado River near Glenwood Springs, Colo.	Oct. 1941	.....
58	-1805	Colorado River near Cisco, Utah	Oct. 1928	.....
59	-3800	Colorado River at Lees Ferry, Ariz	10- 1-47	.....
60	-4025	Colorado River near Grand Canyon, Ariz....	Oct. 1925	.....
61	-4215	Colorado River below Hoover Dam, Ariz-Nev.	Oct. 1939	.....
62	-4280	Colorado River below Parker Dam, Ariz-Calif.	.....	.....
63	-5255	Colorado River (Yuma Main Canal) below Colorado River Siphon, at Yuma, Ariz.	Oct. 1942	.....
64	-1525	Gunnison River near Grand Junction, Colo...	Oct. 1931	.....
65	-2345	Green River near Greendale, Utah.....	Oct. 1956	.....
66	-3150	Green River at Green River, Utah	Oct. 1928	.....
67	-3565	San Juan River near Blanco, N. Mex.....	10- 1-45	12-31-54
	-3555	San Juan River near Archuleta, N. Mex	12-31-54	.....
68	-3795	San Juan River near Bluff, Utah	Oct. 1929	.....
69	-4012	Little Colorado River at Cameron, Ariz.....	1-17-51	9-30-58
70	-4740	Gila River at Kelvin, Ariz	12- 1-50	.....
71	-5195	Gila River below Gillespie Dam, Ariz.....	12- 1-50	.....
72	-5020	Salt River below Stewart Mountain Dam, Ariz	12- 9-50	.....
73	-5100	Verde River below Bartlett Dam, Ariz	12- 9-50	.....
74	-5136	Agua Fria River below Lake Pleasant Dam, Ariz.	12- 1-50	9-30-58
75	10-1180	Bear River near Collinston, Utah.....	.....	.....
76	-1915	Sevier River below Piute Dam, near Marysvale, Utah.	Mar. 1958	.....
77	-2240	Sevier River near Lynndyl, Utah	3-22-51	.....
78	-3225	Humboldt River at Palisade, Nev	.....	.....
79	-3350	Humboldt River near Rye Patch, Nev.....	12-10-51	.....
80	11-2510	San Joaquin River below Friant Dam, Calif ..	.....	.....
81	-2540	San Joaquin River near Mendota, Calif	.....	.....
82	-3035	San Joaquin River near Vernalis, Calif.....	3- 1-51	.....
83	.....	San Joaquin River at Antioch, Calif	.....	.....
84	11-3105	Calaveras River (Stockton diverting canal) at Stockton, Calif.	3- 1-51	10- 3-52

See footnotes at end of table.

Irrigation-Quality Network Stations, Western States--Continued

Irrigation network no.	Geological Survey station ident.. no.	Stream or location	Date established	Date discontinued
	11-2535	San Joaquin River near Biola, Calif.....	1952	Sept. 1961
85	-3255	Mokelumne River at Woodbridge, Calif.....	3- 1-51	9-30-58
86	-3780	Sacramento River near Red Bluff, Calif.....	.....	.....
87	-3910	Sacramento River at Knights Landing, Calif.	2-26-51	5-31-60
88	-4250	Feather River at Nicolaus, Calif	2-26-51	.....
89	-4465	American River at Fair Oaks, Calif	5- 1-51	.....
90	12-3995	Columbia River at Northport, Wash.....	11-15-51	.....
91	-4365	Columbia River at Grand Coulee Dam, Wash.	11-25-50	9-30-58
92	-3220	Kootenai River at Porthill, Idaho.....	.....	.....
93	-3985	Pend Oreille River near Metaline Falls, Wash.	.....	.....
94	-5105	Yakima River at Kiona, Wash.....	12-30-52	.....
95	13- 375	Snake River near Heise, Idaho	1- 8-53	.....
96	- 815	Snake River near Minidoka, Idaho	.....	.....
97	-1545	Snake River at King Hill, Idaho	3-27-51	.....
98	-2690	Snake River at Weiser, Idaho	.....	.....
99	-3435	Snake River near Clarkston, Wash.....	11-14-51	Feb. 1956
	.....	Snake River at Central Ferry, near Pomeroy, Wash.	9-28-55	9-30-58
100	.....	Boise River near Arrowrock, Idaho.....	.....	.....
101	-2125	Boise River at Notus, Idaho.....	11-21-50	.....
102	14-1057	Columbia River near The Dalles, Oreg.....	12- 1-50	.....
103	-3010	Deschutes River at Moody, near Biggs, Oreg.	Dec. 1952	2-15-54
104	-1910	Willamette River at Salem, Oreg.....	2- 1-51	.....
105	-3615	Rogue River at Grants Pass, Oreg.....	1- 5-53	9-30-58
106	5- 560	Sheyenne River near Warwick, N. Dak[b].....	1- 8-51	.....
107	6-6875	North Platte River at Lewellen, Nebr[b].....	.....	.....
108	-8055	Platte River near Louisville, Nebr[b]	.....	.....
109	9-4150	Virgin River at Littlefield, Ariz[b].....	July 1949	.....

a Operated by International Boundary and Water Commission.
b Stations added by Subcommittee, October 1952.

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

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

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

Plate 1 is a plot of the 109 network stations on streams in the Western States. The 73 stations in operation in 1961 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. Discontinued stations are identified by a half circle.

To facilitate identification, each Geological Survey gaging station and sampling station has been assigned a station number. The station numbers were assigned according to Geological Survey practice in reporting records of streamflow: Stations on tributary streams are listed between stations on the main stem in the order in which those tributaries enter the main stem. However, in this report the numbers will not all appear in increasing numerical order because all the main stem stations on a river are reported before listing the stations on the tributaries.

The complete number for each station has 8 digits, but the station number as shown in this report just to the left of the station name consists of only the digits essential for identification. For example, for a station with the complete number 08-0100.00, this station number shown in this report is 8-100.

ACKNOWLEDGMENTS

Agencies that have each contributed to some part of the data published herein include: The Agriculture Research Service, and the Soil Conservation Service, U. S. Department of Agriculture; the Bureau of Reclamation, U. S. Department of the Interior; the Corps of Engineers, U. S. Army; the State engineers for each of the 19 Western States; and the Ministry of Hydraulic Resources of Mexico.

During 1960-61, 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, Presidio, Langtry, Falcon Dam - U. S. tailrace and it operated the station Pecos River near Shumla, also. The Mexican Section operated the stream gaging station on the main stem at Laredo. Each section operated the gaging stations on the 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 30 and 31 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 1960 and 1961. Analyses for eight Rio Grande main stem stations and for the Pecos River near Shumla, Tex., were obtained from the U. S. Salinity Laboratory, Riverside, Calif.

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

COLLECTION OF SAMPLES

In accordance with the recommendation of the Subcommittee, where practicable, one sample was collected each day throughout the water year. In general, each sample was taken in an 8- or 12-ounce polyethylene bottle provided with a bakelite cap and polyseal insert to prevent escape of dissolved gases. Each sample was integrated in the vertical section of a stream usually at about

midpoint of flow by lowering the open sample bottle to the bottom and returning it to the surface during the filling process.

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

EXAMINATION OF SAMPLES

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

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

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

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/1) and milliequivalents per liter (meq/1). 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 26 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 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, percent sodium, and sodium adsorption ratio, because of their widespread application in the evaluation of analyses of water used for irrigation. The results for specific conductance are based on the measurement made at the laboratory upon receipt of the sample from the field. Data for percent sodium and sodium adsorption ratio were obtained from composite-sample analysis.

Remarks include sources of data and additional explanation concerning the records.

Discharge records were obtained from the responsible Geological Survey Water Resources district offices except for the seven stations operated by the International Boundary and Water Commission. Discharge data are shown in acre-feet, calculated from the daily mean discharge in cubic feet per second by multiplying by the factor 1.983471.

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

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

At the recommendation of the Subcommittee, sodium adsorption ratio (SAR) is published for all network stations beginning October 1952. The term is defined and described under "Sodium" on page 11.

A program for automatically converting and computing the analytical values which are given in this report was established in 1962. Electronic digital computers perform the following calculations: Converting discharge values from cubic feet per second to acre-feet and constituent values from parts per million to equivalents per million; computing tons per acre-foot and total tons of the dissolved solids, percent sodium, sodium adsorption ratio, total discharge in acre-feet, total tons of dissolved solids, and discharge-weighted average of the individual constituents.

CRITERIA OF WATER QUALITY

The quality of an irrigation water is determined by the composition and concentration of the dissolved substances or solutes that are present in the water. The principal solutes are the cations; calcium, magnesium, and sodium, and the anions; bicarbonate, sulfate, and chloride. Boron, fluoride, and nitrate are usually present in low, but significant, concentrations. Small amounts of carbonate are found in many waters, as well as trace amounts of other less important constituents. The concentrations of the several ions show wide variations but, because of solubility limitations, sodium and chloride often predominate in more saline waters.

The analusis of an irrigation water should provide information on the suitability of its use and act as a guide for management practices. The first step in the interpretation of the analysis is the selection of criteria that will yield the type of information desired. The second step is the classification of the criteria in order to evaluate the water quality.

There are four principal hazards related to the chemical character of water for irrigation use. These are: total concentration, sodium, bicarbonate, and boron or other phytotoxic substances. Criteria that measure these hazards have been worked out and are in general use.

Total concentration is probably the more important single criterion for irrigation water quality and may be expressed in terms of parts per million (ppm) of dissolved solids, or as specific conductance (micromhos at 25°C). The latter is preferred. More than half of the irrigation waters in use in the Western States have specific conductance values below 750 micromhos (about 500 ppm

dissolved solids). Saline waters with specific conductance values greater than 2,250 micromhos (about 1,500 ppm dissolved solids) make up less than 10 percent of the total number of waters and an even smaller fraction of the total quantity of water being used. There are very few waters with specific conductance values greater than 5,000 micromhos (about 3,200 ppm dissolved solids) that are being used successfully, although they can be used for certain crops under very special conditions. Such waters are important, however, in that they constitute the only available supply in many arid regions.

Sodium is essentially unique among the cations in its effect upon the soil. When present in the soil in exchangeable form, even at low concentrations as compared with the other cations, it causes adverse chemical and physical conditions to develop. Exchangeable sodium tends to make a moist soil impermeable to air and water. This type of soil, upon drying, is hard and difficult to till, and forms dense crusts that interfere with germination and seedling emergence. The most reliable index of the sodium hazard, or the tendency of the irrigation water to form exchangeable sodium in the soil, is the sodium adsorption ratio, SAR (U.S. Salinity Laboratory Staff, 1954). It is a calculated value and is defined as:

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

where concentrations are expressed in equivalents per million.

A nomogram for determining the SAR value of an irrigation water with an exchangeable-sodium percentage (ESP) scale opposite the SAR scale is shown in figure 1 on page 12. The ESP scale is empirical but is based on a regression equation of high statistical significance. After the SAR value of an irrigation water is determined by use of the nomogram, it is possible to estimate from the central scale the ESP value of a soil that is at equilibrium with the irrigation water. Under field conditions, the actual ESP may be slightly higher than the estimated equilibrium value. This is because the total salt concentration of the soil solution is increased by evaporation and plant transpiration which results in a higher SAR and a correspondingly higher ESP.

Bicarbonate is important primarily in its relation to calcium and magnesium. There is a tendency for calcium to react with the bicarbonate and precipitate as calcium carbonate ($CaCO_3$). The corresponding magnesium salt is more soluble so there is less tendency for it to precipitate but it may be lost from a water by an indirect reaction. Magnesium enters the exchange complex of

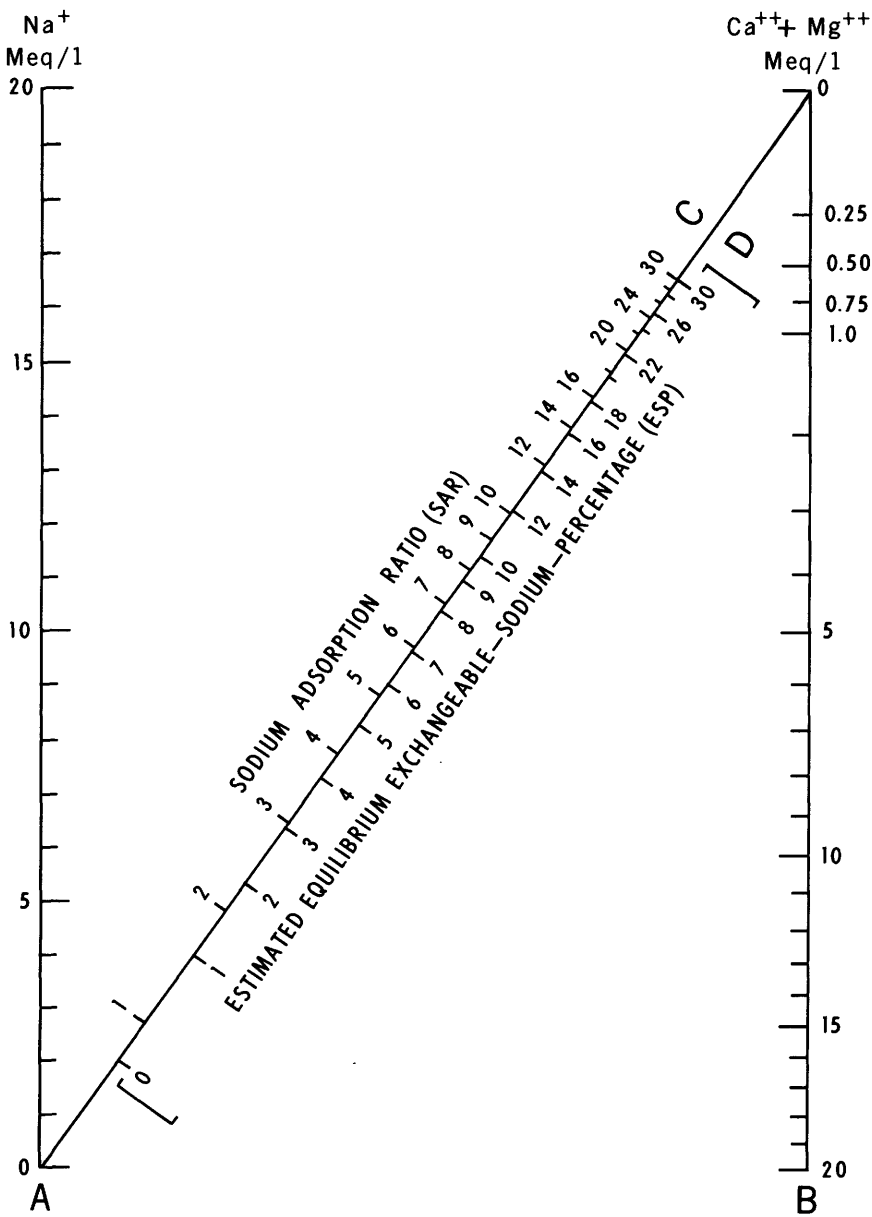

Figure 1. —Nomogram for determining the SAR value of irrigation water and for estimating the corresponding ESP value of a soil that is at equilibrium with the water (U. S. Salinity Laboratory Staff, 1954).

the soil, replacing calcium which reacts with bicarbonate and precipitates as $CaCO_3$. Ordinarily, magnesium will not replace calcium to any great extent but, if calcium is precipitated as it is released, the reaction proceeds toward completion.

As calcium and magnesium are lost from water, the relative proportion of sodium is increased with an attendant increase in the sodium hazard. This hazard can be evaluated in terms of the residual sodium carbonate (RSC) as proposed by Eaton (1950) and defined as:

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

in which the concentrations are expressed in equivalents per million (epm). Studies by Wilcox et al. (1954) indicate that waters with more than 2.5 epm of RSC are probably not suitable for irrigation purposes. Water containing 1.25 epm to 2.5 epm are marginal, and those containing less than 1.25 epm of RSC are probably safe. Some marginal waters, with good management practices and proper use of amendments, particularly gypsum, may be made safe for irrigation use. A condition not provided for by the RSC concept has been encountered in recent years. If the concentrations of both calcium and bicarbonate are about equal and high, i.e., in the order of 10 epm or greater, the RSC will be low or possibly zero. Such waters will precipitate some calcium carbonate and should be considered at least marginal.

Phytotoxic substances: Boron. The occurrence of boron in toxic concentrations in certain irrigation waters makes it necessary to consider this constituent when assessing the quality of water.

Plant species differ markedly in their tolerance to high concentrations of boron. In areas where boron occurs in excess in the soil or in the irrigation water, boron-tolerant crops may grow satisfactorily, whereas sensitive crops may fail.

Other substances. Very few substances other than boron occur in toxic concentrations in natural waters. However, many substances in industrial wastes that are discharged into surface streams are probably toxic to plants. Wilcox (1959) assembled information on a number of such substances for which the phytotoxic properties are known. If the presence of pollutants is suspected, great care should be exercised in the use of the water for irrigation.

The quality of irrigation water is classified by the amount of criterial material determined in a water analysis. A water analysis is classified by plotting, as coordinates, the numerical value for specific conductance and SAR on figure 2, p.14. The position of the point determines the quality classification of the

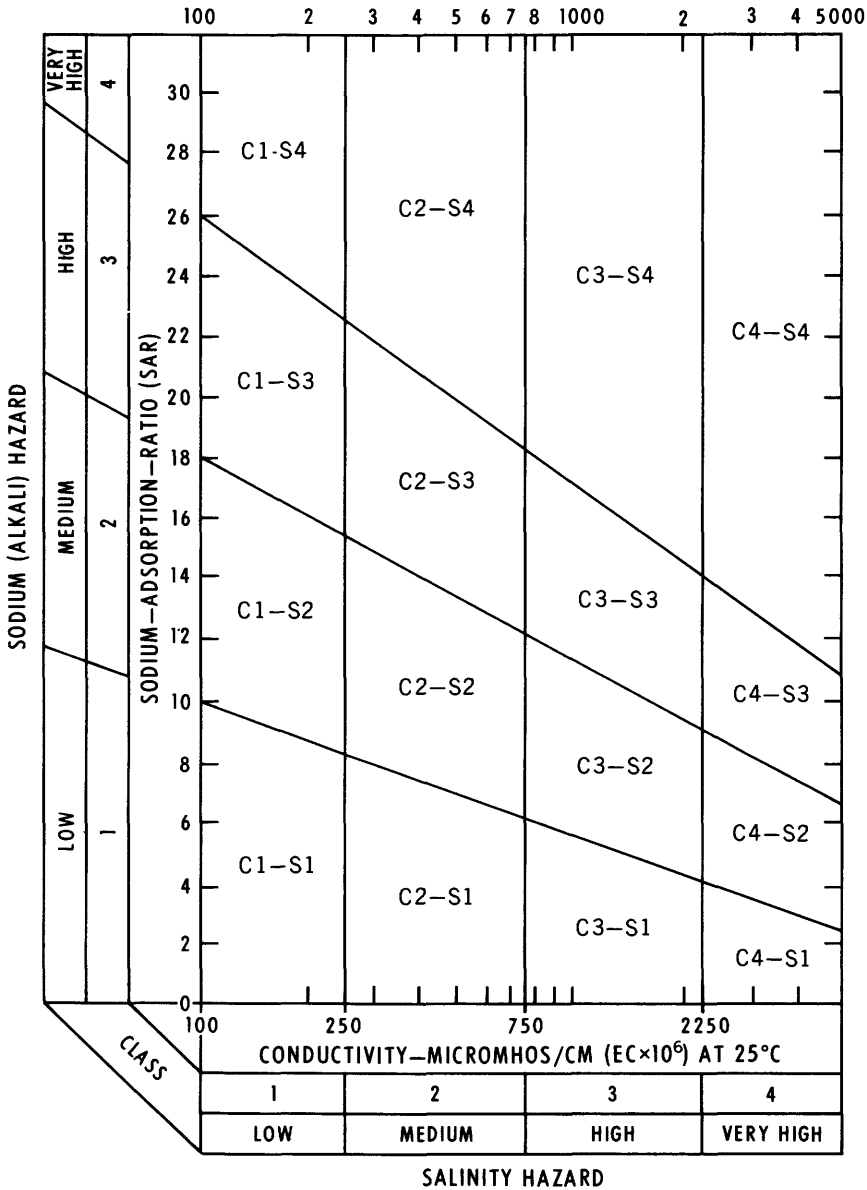

Figure 2.—Diagram for the classification of irrigation waters (U. S. Salinity Laboratory Staff, 1954).

water. The significance and interpretation of these quality ratings are summarized below.

Salinity Classification:

C1. Low-salinity water can be used for irrigation with most crops on most soils, with little likelihood that salinity problem will develop. Some leaching is required, but this occurs under normal irrigation practices except in soils of extremely low permeability.

C2. Medium-salinity water can be used if a moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most instances without special practices for salinity control.

C3. High-salinity water cannot be used on soil with restricted drainage. Even with adequate drainage, special management for salinity control may be required, and plants with good salt tolerance should be selected.

C4. Very high-salinity water is not suitable for irrigation under ordinary conditions but may be used occasionally under very special circumstances. The soil must be permeable, drainage must be adequate, irrigation water must be applied in excess to provide considerable leaching, and very salt-tolerant crops should be selected.

Sodium Classification:

S1. Low-sodium water can be used for irrigation on almost all soils, with little danger of the development of a sodium problem. However, sodium-sensitive crops, such as stone-fruit trees and avocados, may accumulate injuroius amounts of sodium in the leaves.

S2. Medium-sodium water may present a moderate sodium problem in fine-textured (clay) soils unless there is gypsum in the soil. This water can be used on coarse-textured (sandy) or organic soils that take water well.

S3. High-sodium water may produce troublesome sodium problems in most soils and will require special management—good drainage, high leaching, and additions of organic matter. If there is plenty of gypsum in the soil, a serious problem may not develop for some time. If gypsum is not present, it or some similar material may have to be added.

S4. Very-high sodium water is generally unsatisfactory for irrigation except at low- or medium-salinity levels where the use of gypsum or some other amendment makes it possible to use such water. (Wilcox and Durum, 1967.)

DISCUSSION OF RESULTS

HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

Red River of the North basin.--During the 1961 water year, runoff in the Red River of the North basin was much less than the long-term average. The runoff was only about 5 percent of the 31-year average for Souris River near Westhope, N. Dak., and only 12 percent of the 12-year average for Sheyenne River near Warwick. For the Souris River near Westhope, N. Dak., the weighted-average of dissolved-solids content was 814 ppm (1. 11 tons per acre-foot) for 1961 compared with the 7-year average of 454 ppm (0. 62 ton per acre-foot); the total of dissolved-solids content in tons was the lowest on record. For Sheyenne River near Warwick, N. Dak., the weighted-average of dissolved-solids content was 422 ppm (0. 57 ton per acre-foot) for 1961 compared with the 11-year average of 400 ppm (0. 54 ton per acre-foot); the total of dissolved-solids content in tons for this station was also the lowest on record.

MISSOURI RIVER BASIN

Missouri River main stem.--Construction began in 1961 on the Clark Canyon Dam on the Beaverhead River. The following dams regulate the Missouri River: Canyon Ferry and Fort Peck--upstream from Williston, N. Dak.; Garrison, Oahe, Fort Randall, and Gavins Point (Lewis and Clark)--between Williston, N. Dak., and Nebraska City, Nebr. Total amount of water in storage below Williston, N. Dak., in the main-stem reservoirs on Sept. 30, 1961, was 14,071,000 acre-feet, a decrease of 2,678,000 acre-feet from Sept. 30, 1960.

At Williston, N. Dak., runoff during 1961 was about 17 percent less than during 1960 and about 36 percent less than the 18-year average after operational level was reached at Fort Peck Reservoir. The weighted average of dissolved-solids content was 440 ppm (0. 60 ton per acre-foot) compared with the average of 417 ppm (0. 57 ton per acre-foot) for 1951-61. The total tons of dissolved-solids content was the lowest of the 11-year period of record.

At Nebraska City, Nebr., runoff for 1961 was 15 percent less than during 1960 and about 16 percent less than the 32-year average. The weighted average of dissolved-solids content was 440 ppm compared with 436 ppm for the period 1951-61.

Yellowstone River basin.--Runoff from the Yellowstone River basin in 1961 was 46 percent of the long-term average and 23 percent less than in 1960. Most of the drought was in the southeast part of the basin; the Tongue and Powder Rivers yielded only 17 and 14 percent, respectively, of average runoff. The Bighorn River yielded 46 percent of average, and the Yellowstone River upstream from Billings yielded 70 percent of the average.

At all sampling stations in the basin, the annual total loads of dissolved-solids content were less than the 1951-61 averages, although the ratios of tons per acre-foot to runoff were the highest on record. The total loads for the Yellowstone, Bighorn, Tongue, and Powder Rivers were 76, 74, 30, and 32 percent of the 11-year averages. As in previous years the Bighorn River contributed about one half of the total load in the Yellowstone River near Sidney.

Construction began in 1961 in the Yellowtail Dam on the Bighorn River. The major reservoirs in operation in the Yellowstone River basin are Bull Lake, Pilot Butte, and Boysen Reservoirs on the Wind River, Buffalo Bill Reservoir on the Shoshone River, and Tongue River Reservoir in Montana. No significant changes in impoundment of diversions were made during the year. There were no variations in methodology from that proposed for irrigagation network stations.

James River basin.--During the first part of the 1961 water year drought conditions continued and no flow was reported at most gaging stations in the lower reaches of the James River. During the winter months, there was very little precipitation, but spring rains ended the winter drought. The remainder of the year was hot and dry, and runoff was low.

At the gaging station at Huron, S. Dak., runoff for 1961 was only 4 percent of the runoff for 1960 and only 5 percent of the 22-year average. The weighted average of dissolved-solids content for 1961 was 733 ppm (1.00 ton per acre-foot) compared with the 5-year average of 437 ppm (0.60 ton per acre-foot) and 7,920 tons compared with 76,160 tons for 1960. Although the samples for chemical analysis were collected upstream from the gage and upstream from the diversion of water to the city of Huron, the weighted average reflects only the quality of the water passing the gage.

Platte River basin.--Runoff from the North Platte River basin at Wyoming-Nebraska State line was 17 percent less in 1961 than in 1960, 58 percent less than the long-term average, and only 2 percent greater than the all-time minimum. No data are

available for the chemical quality of the water in the Platte River basin in Wyoming for 1961.

Precipitation and runoff varied considerably in the Platte River basin in Nebraska during the 1961 water year. In western Nebraska, runoff was more than average during fall and winter but less than average during the summer. In eastern Nebraska, runoff was more than average during the winter and spring. In general, runoff was less than that of the 1960 water year.

At South Platte River at Julesburg, Colo., runoff was 61 percent greater than that of the previous year and 1 percent less than the 59-year average; the weighted average of dissolved-solids content for 1961 was 1,120 ppm (1.52 tons per acre-foot) compared with the 11-year weighted average of 1,210 ppm (1.64 tons per acre-foot). At Platte River at Brady, Nebr., runoff was 38 percent greater in 1961 than in 1960; the weighted average of dissolved solids for 1961 was 501 ppm (0.68 ton per acre-foot) compared with 479 ppm (0.65 ton per acre-foot) for the 11-year average. At Supply Canal (Tri-County Diversion) near Maxwell, Nebr., the runoff was 8 percent less than that of the previous year; the weighted average of dissolved-solids content for 1961 was 568 ppm (0.77 ton per acre-foot) compared with the 11-year average of 557 ppm (0.76 ton per acre-foot).

LOWER MISSISSIPPI RIVER BASIN

Arkansas River basin.--Runoff in the Arkansas River, Cimarron River, and the Canadian River in Oklahoma was less in 1961 than in the high runoff year of 1960. The largest decreases in runoff occurred in the Cimarron and Canadian Rivers. Runoff in the Cimarron River at Perkins and the Canadian River near Whitefield was about 45 and 60 percent less, respectively, than in 1960. However, only runoff in the Canadian River was less than the long-term average.

The lower runoff in 1961 in the Arkansas River resulted in lower dissolved-solids content in the water at the Arkansas City, Kans., and Ralston, Okla., stations. The dissolved-solids content of the water at Arkansas City was 671 ppm (0.91 ton per acre-foot) in 1960 and 621 ppm (0.84 ton per acre-foot) in 1961. Runoff was about 25 percent less than in 1960. At the Ralston station, the dissolved-solids content was 647 ppm (0.88 ton per acre-foot) in 1960 and 530 ppm (0.72 ton per acre-foot) in 1961. Runoff was only about 15 percent less than in 1960.

Two factors associated with the hydrologic environment probably caused the decrease rather than an increase in dissolved constituents in the Arkansas River. During 1961, two major

peaks of 153,000 cfs and 105,000 cfs occurred at the Arkansas City station. In contrast, high daily mean discharges during 1960 were 155,000 cfs and 40,200 cfs. A larger part of the 1961 runoff consisted of the very dilute storm flow and produced the lower 1961 dissolved-solids content at Arkansas City.

The lower dissolved-solids content of the Arkansas River at Ralston in 1961, is probably related to the lower dissolved-solids content at the Arkansas City station and the yearly variation in the salt contributed to the Arkansas River by the heavily mineralized Salt Fork of the Arkansas River. The runoff in the Salt Fork of the Arkansas River was about 30 percent less in 1961 than in 1960. The runoff in the Arkansas River at Ralston, however, only decreased 15 percent during this same period. The smaller runoff in the Salt Fork of the Arkansas River and the more dilute water in the Arkansas River at Arkansas City apparently caused the decrease in the dissolved-solids content of the Arkansas River at Ralston, Okla., in 1961.

The decrease in runoff in the Cimarron River and the Canadian River resulted in an increase in the dissolved-solids content of these streams in 1961. Dissolved-solids content of the Cimarron River at Perkins, Okla., increased from 2,070 ppm (2.81 tons per acre-foot) in 1960 to 2,320 ppm (3.16 tons per acre-foot) in 1961. In the Canadian River near Whitefield, Okla., the dissolved-solids content increased from 394 ppm (0.54 ton per acre-foot) to 451 ppm (0.61 ton per acre-foot).

Red River basin.--Water discharge of the Red River at Denison Dam near Denison, Tex., was only 83 percent of the near average discharge of 1960 and the minimum dissolved-solids concentration for the year was higher than the maximum dissolved-solids contration for the previous year. The weighted average of dissolved-solids content was 1,230 ppm (1.67 tons per acre-foot), the highest in 18 years of chemical-quality record.

WESTERN GULF OF MEXICO BASINS

In the Western Gulf of Mexico basins in Texas, from the Sabine to the Neuces River, streamflow was generally excessive during the 1961 water year twice the 1960 streamflow at some stations. In all the basins, the weighted average of dissolved-solids content in 1961 was lower than in 1960. Streamflow of the Sabine River at Ruliff, Tex., was 141 percent of the 36-year average, and the weighted average of dissolved-solids content was 90 ppm (0.12 ton per acre-foot), a decrease from 117 ppm (0.16 ton per acre-foot) in 1960. Streamflow of the Brazos River at Richmond was more than twice the average for 41 years of record and 182 percent of the 1960 average. The weighted average of dissolved-solids was 312 ppm (0.42 ton per acre-foot), a decrease from 331 ppm (0.45 ton per acre-foot) in 1960.

Rio Grande basin. --Streamflow varied considerably throughout the Rio Grande basin during 1961. Median discharges along the main stem of the Rio Grande and Pecos River ranged from 40 percent to 135 percent of the long term averages. Despite the variance in streamflow, the average annual dissolved-solids concentrations for the Rio Grande main stem stations were comparable to previous years. Dissolved-solids concentrations in the lower reach of the Pecos River were higher which may be the result of lower flows. However, the fluctuations in the chemical quality of the water do not seem to bear any relationship to streamflow. The intrusion of ground water during low flow has some influence on the chemical quality of the water and should be considered when using these data.

Streamflow of the Pecos River below Red Bluff Dam, near Orla, Tex., was only about 50 percent of the 24-year average, but about twice as great as in 1960. The weighted average of dissolved-solids content decreased from 7,710 ppm (10.5 tons per acre-foot) in 1960 to 6,270 ppm (8.53 tons per acre-foot) in 1961. Storage in Red Bluff Reservoir at the end of the 1961 water year was 50,000 acre-feet, only 17 percent of capacity.

COLORADO RIVER BASIN

Colorado River main stem. --The flow of the Colorado River near Glenwood Springs, Colo., was about 26 percent lower than the previous year. Also, it was only 55 percent of the 62-year mean.

Flow of the Colorado River near Cisco, Utah decreased 25 percent when compared with the previous year. The flow at this station was 47 percent lower than the average for the previous 50-years record.

Although the dissolved-solids content of the water of the Colorado River below Hoover Dam, Ariz.-Nev., increased slightly, the percentage composition of dissolved minerals in the water remained relatively constant due to the mixing effect of Lake Mead.

Gunnison River basin. --The flow of water decreased 27 percent on the Gunnison River near Grand Junction, Colo. Runoff in 1961 was 47 percent lower than the average for 53 years of record at this site.

Green River basin.--Discharge of the Green River near Greendale, Utah was 25 percent lower than what it had been in 1960, and it was 49 percent lower than the average for 11 years of record.

The flow of the Green River at Green River, Utah was 33 percent lower than in 1960, and the average flow in 1961 was 57 percent lower than that of 62 years of record.

San Juan River basin.--The average flow of the San Juan River near Bluff, Utah decreased 30 percent in 1961 and was about 41 percent lower than the average for 47 years of record.

Virgin River basin.--The average discharge of the Virgin River at Littlefield, Ariz., was 30 percent higher in 1961 than in 1960, but it still was 36 percent less than the average for the previous 32 years of record.

THE GREAT BASIN

Sevier Lake basin.--The discharge of the Sevier River below Piute Dam, near Marysvale, Utah was 54 percent lower than the average for 49 years of previous record.

Runoff of the Sevier River near Lynndyl, Utah (at gage) decreased 21 percent as compared with last year's flow, and was 48 percent lower than the average flow for the last 24 years of record. About 2,000 acre-feet of water entered the river during the year from a deep well just downstream from the sampling station and upstream from the gaging station. Discharge data shown in this report differ from those published for the gaging station by the amount added from the well.

Humboldt River basin.--The discharge from the Humboldt River near Rye Patch, Nev., during the 1961 water year was 15 percent of long-term average discharge. Ninety-nine percent of the discharge for this station was represented by analyses between the months of April and July. From weighted averages, the quality of the Humboldt River near Rye Patch is very hard and is predominantly a sodium-chloride water.

PACIFIC SLOPE BASINS IN CALIFORNIA

San Joaquin River basin.--The severe drought observed in the San Joaquin basin during the 1960 water year continued unabated through the 1961 water year. Discharge at the San Joaquin River near Biola station, regulated at the Friant dam, was slightly higher than during the 1960 water year. The weighted averages of dissolved-solids content changed very little. At the San Joaquin River near Vernalis station, discharge during the 1961 water year was 21 percent less than during the 1960 water year and only 13 percent of long-term average discharge. Weighted average dissolved-solids content increased from 539 ppm (0.73 ton per

acre-foot) in 1960 to 545 ppm (0.74 ton per acre-foot) in 1961. During the period July 19-20, a new minimum daily mean discharge of 36 cfs was established.

PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

Columbia River main stem.--Water quality and water discharge for the Columbia River at Northport, Wash., were essentially the same as the 1960 water year. The dissolved-solids content showed a slight decline from 87 ppm (0.12 ton per acre-foot) in 1960 to 83 ppm (0.11 ton per acre-foot) in 1961.

Yakima River basin.--Dissolved-solids content in tons per acre-foot showed a 12 percent increase over the 1960 water year figure and water discharge was 5 percent greater than the previous water year.

SNAKE RIVER BASIN

Snake River main stem.--The average dissolved-solids content decreased from 223 ppm (0.30 ton per acre-foot) to 216 ppm (0.29 ton per acre-foot) at Heise, Idaho, a 17 percent decrease in water discharge caused a 19 percent decrease in average daily salt load. Discharge at King Hill, downstream, decreased 11 percent, but the chemical quality remained essentially the same as the 1960 water year.

Boise River basin.--Although the dissolved-solids content in tons per acre-foot increased 51 percent over the previous water year, water discharge was only 48 percent of the 1960 water year and the dissolved-solids content in tons per day decreased 29 percent.

PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN

Columbia River main stem.--In comparison to previous records there was no significant change in discharge or chemical quality for the station near The Dalles, Oreg.

Willamette River basin.--Although discharge increased 26 percent there were only slight changes in chemical quality from the 1960 water year.

Discharge date and dissolved-solids loads for stations operated in 1960 are summarized in the table on p. 23.

Summary of water discharge, and tonnages of dissolved solids--1960-61

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Red River of the North basin:		
Sheyenne River near Warwick, N. Dak.	4,700	0.56
Souris (Mouse) River near Westhope, N. Dak.	6,850	1.11
Missouri River main stem:		
Missouri River near Williston, N. Dak	10,330,000	.60
Missouri River at Nebraska City, Nebr	20,410,000	.60
Yellowstone River basin:		
Yellowstone River near Sidney, Mont	4,260,000	.70
Bighorn River at Bighorn, Mont.	1,175,000	1.31
Tongue River at Miles City, Mont.	41,440	.93
Powder River near Locate, Mont.	57,500	2.03
James River basin:		
James River at Huron, S. Dak	7,920	1.00
Platte River basin:		
Platte River at Brady, Nebr	254,700	.68
Supply Canal (Tri-County Diversion) near Maxwell, Nebr.	876,520	.77
South Platte River at Julesburg, Colo.	327,100	1.52
Arkansas River basin:		
Arkansas River below John Martin Reservoir, Colo	130,400	2.48
Arkansas River at Arkansas City, Kans.	1,744,000	.84
Arkansas River at Ralston, Okla	5,496,000	.72
Arkansas River at Van Buren, Ark.	31,570,000	.47
Cimarron River at Perkins, Okla	1,049,000	3.16
Canadian River near Whitefield, Okla.	3,163,000	.61
Red River basin:		
Red River at Denison Dam, near Denison,Tex	3,112,000	1.67
Sabine River basin:		
Sabine River near Ruliff, Tex.	8,984,000	.12
Neches River basin:		
Neches River at Evadale, Tex	7,536,000	.10
Trinity River basin:		
Trinity River at Romayor, Tex	7,559,000	.25
Brazos River basin:		
Brazos River at Richmond, Tex	11,670,000	.42
Colorado River basin:		
Colorado River at Austin, Tex.	1,812,000	.38
Colorado River at Wharton, Tex	3,902,000	.30
Guadalupe River basin:		
Guadalupe River at Victoria, Tex	2,798,000	.35
Nueces River basin:		
Nueces River near Mathis, Tex.	613,000	.36
Rio Grande basin:		
Rio Grande above Culebra Creek, near Lobatos, Colo.	143,615	.33
Rio Grande at Otowi Bridge, near San Ildefonso, N. Mex.	675,600	.31
Rio Grande conveyance channel at San Marcial, N. Mex.	288,149	.71
Rio Grande floodway at San Marcial, N. Mex.	144,531	.54
Rio Grande below Elephant Butte Dam, N. Mex.	578,552	.62
Rio Grande near El Paso, Tex.	305,800	1.19
Rio Grande below Old Fort Quitman, Tex	31,800	3.73
Rio Grande at Upper Presidio, Tex.	29,100	2.24
Rio Grande at Langtry, Tex	1,087,700	.86
Rio Grande at Laredo, Tex.	2,737,920	.64
Rio Grande at Falcon Dam - U.S. tailrace	1,988,161	.75
Pecos River below Alamogordo Dam, N. Mex	161,600	1.44
Pecos River near Artesia, N. Mex.	164,175	3.94
Pecos River below Red Bluff Dam, near Orla, Tex	90,630	8.53
Pecos River near Shumla, Tex	172,250	2.47

Summary of water discharge, and tonnages of dissolved solids--1960-61--Continued

Station	Runoff (acre-feet)	Dissolved solids (tons per acre-foot)
Colorado River main stem:		
Colorado River near Glenwood Springs, Colo	1,466,000	0.46
Colorado River near Cisco, Utah	3,084,000	1.11
Colorado River at Lees Ferry, Ariz	6,644,000	1.02
Colorado River near Grand Canyon, Ariz	7,050,000	1.17
Colorado River below Hoover Dam, Ariz.-Nev	8,661,000	.94
Diversions and return flows at and below Imparial Dam:		
Yuma Main Canal below Colorado River siphon, at Yuma, Ariz.	348,970	1.12
Gunnison River basin:		
Gunnison River near Grand Junction, Colo	1,016,000	1.14
Green River basin:		
Green River near Greendale, Utah	747,400	.58
Green River at Green River, Utah	2,026,000	.65
San Juan River basin:		
San Juan River near Archuleta, N. Mex	703,476	.25
San Juan River near Bluff, Utah	1,187,886	.68
Virgin River basin:		
Virgin River at Littlefield, Ariz	108,462	3.11
Gila River basin:		
Gila River at Kelvin, Ariz	56,450	1.58
Gila River below Gillespie Dam, Ariz	9,035	7.96
Salt River below Stewart Mountain Dam, Ariz	566,000	.77
Verde River below Bartlett Dam, Ariz	133,100	.53
Sevier Lake basin:		
Sevier River below Piute Dam, near Marysvale, Utah	74,960	.40
Sevier River near Lynndyl, Utah	71,870	1.86
Humboldt River basin:		
Humboldt River near Rye Patch, Nev	21,360	1.74
San Joaquin River basin:		
San Joaquin River near Biola, Calif	61,660	.07
San Joaquin River near Vernalis, Calif	437,300	.74
Sacramento River basin:		
Feather River at Nicolaus, Calif	2,690,000	.10
American River at Fair Oaks, Calif	1,198,000	.07
Columbia River main stem:		
Columbia River at Northport, Wash	80,420,000	.11
Yakima River basin:		
Yakima River at Kiona, Wash	3,053,000	.18
Snake River main stem:		
Snake River near Heise, Idaho	3,682,000	.29
Snake River at King Hill, Idaho	5,391,000	.44
Boise River basin:		
Boise River at Notus, Idaho	274,500	.59
Columbia River main stem:		
Columbia River near The Dalles, Oreg	136,900,000	.13
Willamette River basin:		
Willamette River at Salem, Oreg	20,521,800	.07

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 (mimiographed).

Kelly, W. P., 1951: Alkali soils their formation, properties and reclamation, Am. Chem. Soc., mono. ser. 111, p. 91-111.

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.

——1940, Salt balance in irrigated areas: Jour. Agriculture Res., v. 61 no. 1, p. 17-40.

——1949, Trends of irrigation development in the United States: Symposium, Am. Chem. Soc., p. 1-11 (mimiographed).

Straus, Michael, 1952, Use of water for irrigation, The physical basis of water supply and its principal uses: Interior and Insular Affairs Committee, U.S. House of Representatives: v. 2.

Thorne, J. P., and Thorne, D. W., 1951, Irrigation waters of Utah; Utah Agriculture Expt. Sta. Bull. 349.

U.S. Geol. Survey, 1951-61, Quality of surface waters for irrigation, Western United States: Water-Supply Papers, 1264, 1362, 1380, 1430, 1465, 1485, 1524, 1575, 1699, 1746, 1886.

U.S. Salinity Laboratory Staff, 1954, Diagnosis and improvement of saline and alkali soils; U.S. Dept. Agriculture, Agriculture Handbook 60, p. 1-160.

Wilcox, L. V., 1955, Classification and use of irrigation waters: U.S. Dept. Agriculture Circ. 969.

——1957, Discharge and salt burden of the Rio Grande above Fort Quitman, Tex., and salt balance conditions of the Rio Grande project for the year 1956: U.S. Dept. Agriculture, Salinity Laboratory research report no. 85, 26 p.

Wilcox, L. V., and Durum, W. H., 1967, Irrigation of agricultural lands; quality of irrigation water: Madison, Wis., Amer. Soc. Agronomy, Agronomy mon. no. 11, sec. 3, chap. 9, p. 104-199.

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PART 5. *HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS*

RED RIVER OF THE NORTH BASIN

5-560. SHEYENNE RIVER NEAR WARWICK, N. DAK.

LOCATION.--At gaging station at highway bridge, 3.3 miles south of Warwick, Benson County.
DRAINAGE AREA.--2,070 square miles, approximately, of which about 1,310 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1961.
Water temperatures: January 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 978 micromhos Mar. 16; minimum daily, 384 micromhos Aug. 25.
Percent sodium: Maximum, 50 Nov. 26; minimum, 12 Sept. 2, 10-30.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 1,940 micromhos Feb. 1, 1955; minimum daily, 208 micromhos Apr. 7, 1960.
Percent sodium: Maximum, 66 July 8-18, 1955; minimum, 10 Aug. 15-31, 1959.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	*Dissolved solids* (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	92	--	4.12		0.96	--	4.05	0.00	--	--	--	--	--	299	0.41	38	19	0.67	474	7.6
Nov. 1-15.....	42	--	4.12		1.70	--	4.34	.00	--	--	--	--	--	340	.46	19	29	1.18	543	7.4
Nov. 16-25.....	24	--	4.40		2.70	--	5.20	.00	--	--	--	--	--	420	.57	14	38	1.82	655	7.4
Nov. 26.....	3	2.9	2.05	2.47	4.70	0.21	6.49	.00	2.48	0.39	0.02	0.00	0.19	560	.76	2	50	3.13	839	7.6
Nov. 27-Dec. 31.	56	20	3.04	1.97	2.48	.15	5.75	.00	1.64	.31	.01	.01	.15	436	.59	33	32	1.57	706	7.9
Jan. 1-17, 1961.	24	--	5.78		2.22	--	6.15	.00	--	--	--	--	--	461	.63	15	28	1.31	723	7.8
Jan. 18-28.....	12	--	5.82		1.65	--	5.98	.00	--	--	--	--	--	428	.58	7	22	.97	676	7.6
Jan. 27-Feb. 17.	31	--	4.90		1.00	--	4.80	.00	--	--	--	--	--	341	.46	14	17	.64	544	7.6
Feb. 18-28.....	31	--	5.82		1.70	--	6.05	.00	--	--	--	--	--	437	.59	18	23	.99	688	7.7
Mar. 1-21.....	250	--	7.04		2.18	--	7.41	.00	--	--	--	--	--	533	.72	181	24	1.16	825	8.0

Mar. 22-26, 1961	607	23	3.24	1.97	1.65	.18	5.15	.00	1.52	.37	.01	.01	.14	413	.56	341	23	1.02	637	7.7
Mar. 27-Apr. 4..	868	--	4.96		3.26	--	5.61	.00	--	--	--	--	--	507	.69	598	40	2.07	778	8.0
Apr. 5-22.....	1,135	--	3.54		2.09	--	3.70	.00	--	--	--	--	--	350	.48	540	37	1.57	555	7.8
Apr. 23-May 9...	671	--	4.48		2.57	--	4.77	.00	--	--	--	--	--	426	.58	389	36	1.71	677	8.0
May 10-31.....	607	--	4.86		2.74	--	5.77	.00	--	--	--	--	--	450	.61	371	36	1.76	713	7.9
June 1-18.....	89	--	4.44		2.91	--	4.93	.00	--	--	--	--	--	429	.58	52	40	1.96	682	7.6
June 19-30.....	14	12	2.15	1.73	1.70	.13	4.00	.00	1.39	.23	.01	.08	.09	333	.45	6	30	1.22	547	7.6
July 1-31.....	86	--	3.66		1.26	--	3.74	.00	--	--	--	--	--	281	.38	33	26	.93	469	7.2
Aug. 1-6.....	6	--	3.32		1.00	--	3.25	.00	--	--	--	--	--	252	.34	2	23	.78	414	7.5
Sept. 2.....	0	--	4.14		.57	--	3.87	.00	--	--	--	--	--	281	.38	0	12	.39	443	7.5
Sept. 10-30.....	42	27	2.64	1.48	.57	.08	3.82	.00	.69	.09	.01	.03	.02	267	.36	15	12	.39	426	7.6
Total or weighted average	a4,700	--	4.62		2.36	--	4.97	0.00	--	--	--	--	--	422	0.57	2,690	33	1.57	661	7.8

RED RIVER OF THE NORTH BASIN--Continued

5-1240. SOURIS (MOUSE) RIVER NEAR WESTHOPE, N. DAK.

LOCATION.--At gaging station, 1,200 feet upstream from second crossing of international boundary, 1 mile downstream from Fish and Wildlife Service Dam 357, 7 miles northeast of Westhope, Bottineau County, 11 miles downstream from Boundary Creek, and at mile 358.2 downstream from international boundary (Geological Survey river plan and profile).
DRAINAGE AREA.--17,600 square miles, approximately, of which about 10,700 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1961.
Water temperatures: October 1954 to September 1955, October 1956 to September 1959, October 1960 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 4,750 micromhos Feb. 21; minimum daily, 598 micromhos Apr. 18.
Percent sodium: Maximum, 72 Aug. 19-31; minimum, 43 Mar. 20-28.
EXTREMES, 1954-61.--Specific conductance: Maximum daily (1956-61), 4,750 micromhos Feb. 21, 1961; minimum daily (1954-55, 1956-61), 232 micromhos Apr. 18, 1957.
Percent soidum: Maximum, 72 Aug. 19-31, 1961; minimum, 29 Mar. 26 to Apr. 12, 1957.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-23, 1960.	1,154	--	5.30		5.70	--	7.38	0.00	3.16	--	--	--	--	701	0.95	1,100	52	3.50	1,010	7.3
Oct. 24-Nov. 8..	416	--	6.14		6.18	--	8.20	.00	3.39	--	--	--	--	764	1.04	432	50	3.53	1,130	7.5
Nov. 9.....	11	20	2.64	4.03	6.61	0.36	9.05	.00	3.73	0.87	0.01	0.19	0.22	826	1.12	12	48	3.62	1,200	7.7
Nov. 10-27.....	150	--	7.42		7.26	--	9.93	.00	4.08	--	--	--	--	918	1.25	187	49	3.77	1,310	7.6
Nov. 28-Dec. 6..	57	--	9.64		9.40	--	12.77	.00	5.21	--	--	--	--	1,180	1.60	92	49	4.28	1,650	7.6
Dec. 7-16.....	80	--	11.62		11.05	--	15.14	.00	6.20	--	--	--	--	1,400	1.90	113	49	4.58	1,950	7.7
Dec. 17-24.....	33	25	6.34	6.91	12.53	.56	17.37	.00	7.12	1.75	.04	.23	.43	1,600	2.18	73	48	4.87	2,170	7.7
Dec. 25.....	0	--	15.02		13.96	--	19.67	.00	7.81	--	--	--	--	1,770	2.41	0	48	5.10	2,390	8.0
Jan. 13-18, 1961	2	--	17.76		16.36	--	23.27	.00	9.04	--	--	--	--	2,100	2.86	7	48	5.49	2,770	8.1
Jan. 19-26.....	2	--	25.80		24.19	--	31.14	2.90	12.97	--	--	--	--	3,020	4.11	7	48	6.73	3,830	8.3
Feb. 8-28.....	29	--	31.40		29.23	--	39.01	2.00	15.39	--	--	--	--	3,650	4.96	145	48	7.38	4,540	8.3
Mar. 1-8.....	49	--	27.20		23.84	--	34.91	.00	11.68	--	--	--	--	3,060	4.16	205	47	6.46	3,900	8.2
Mar. 9-19.....	72	--	21.60		17.84	--	27.37	.00	8.74	--	--	--	--	2,350	3.20	230	45	5.43	3,170	8.1
Mar. 20-28.....	157	17	3.14	4.28	5.83	.38	9.01	.00	3.04	1.16	.03	.24	.21	804	1.09	172	43	3.03	1,220	8.1
Mar. 29-Apr. 30.	373	--	4.36		3.83	--	5.51	.00	2.98	--	--	--	--	501	.68	254	47	2.59	782	7.9

May 1-29, 1961..	575	--	1.45	2.47	4.35	--	5.39	.00	2.29	.68	.02	--	--	515	.70	403	53	3.11	768	7.7
May 30-June 30..	1,288	8.6	1.35	3.04	5.87	.28	7.08	.00	2.56	.96	.02	.05	.25	646	.88	1,132	56	3.96	956	7.5
July 1-14.....	583	--	.95	2.80	7.44	--	7.01	.00	3.00	1.27	.03	--	--	708	.96	561	67	5.44	1,040	7.6
July 15-31.....	597	--	1.25	3.13	8.31	--	7.88	.00	2.50	1.58	.04	--	--	829	1.13	673	66	5.62	1,210	7.5
Aug. 1-18.....	400	--	5.30		10.61	--	9.47	.00	4.60	--	--	--	--	1,010	1.37	549	67	6.52	1,470	7.5
Aug. 19-31.....	260	--	5.44		13.75	--	9.57	.00	6.43	--	--	--	--	1,270	1.73	450	72	8.33	1,820	7.1
Sept. 1-11.....	205	17	1.55	3.62	11.88	.66	7.08	.00	6.87	2.60	.04	.48	.27	1,170	1.59	326	67	7.39	1,670	6.9
Sept. 12-30.....	373	10	1.55	4.03	8.18	.51	5.64	.00	6.16	1.64	.03	.34	.31	905	1.23	459	57	4.90	1,330	6.8
Total or weighted average	a6,850	--	5.49		7.35	--	8.03	0.01	3.65	--	--	--	--	814	1.11	7,580	57	4.49	1,180	7.4

a Represents 100 percent of runoff for water year.

PART 6. MISSOURI RIVER BASIN

MISSOURI RIVER MAIN STEM

6-3300. MISSOURI RIVER NEAR WILLISTON, N. DAK.

LOCATION.--At gaging station at Lewis and Clark Highway bridge, 5 miles southwest of Williston, Williams County, 25 miles downstream from Yellostone River, and at mile 1,553.1.
DRAINAGE AREA.--164,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1961.
Water temperatures: May 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 899 micromhos Feb. 8; minimum daily, 347 micromhos June 14.
Percent sodium: Maximum, 40 Sept. 14-22; minimum, 29 June 8-19.
EXTREMES, 1950-61.--Specific conductance: Maximum daily, 957 micromhos Jan. 10, 12, 1958; minimum daily, 297 micromhos Mar. 19, 1960.
Percent eodium: Maximum, 43 Apr. 25-30, 1957; minimum, 24 May 27 to June 2, 1956.
REMARKS.--Daily samples for chemical analysis composited by discharge. Reports of specific conductance of daily eamples available in district office at Lincoln, Nebr.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	761,300	--	5.20		2.87	--	3.47		--	--	--	--	--	512	0.70	532,900	36	1.8	778	7.6
Nov. 1-30.....	750,300	--	5.26		2.70	--	3.52		--	--	--	--	--	493	.67	502,700	34	1.7	753	7.8
Dec. 1-13.....	263,400	9.2	3.59	2.09	2.87	0.11	3.80		4.62	0.34	0.04	0.00	0.18	540	.73	192,300	33	1.7	807	7.5
Dec. 14-28.....	290,600	--	5.58		2.70	--	3.75		--	--	--	--	--	515	.70	203,400	33	1.6	781	7.6
Dec. 29.....	19,720	9.4	3.44	2.06	2.57	.12	3.79		4.14	.25	.04	.00	.17	504	.69	13,610	31	1.5	757	7.8
Dec.30-Jan. 23, 1961.	617,500	--	5.50		2.61	--	3.64		--	--	--	--	--	516	.70	432,300	32	1.6	763	7.6
Jan. 24-Feb. 1..	166,300	--	5.64		2.74	--	3.69		--	--	--	--	--	522	.71	118,100	33	1.6	783	7.5
Feb. 2-28.....	629,600	--	5.32		2.61	--	3.49		--	--	--	--	--	503	.68	428,100	33	1.6	756	7.5
Mar. 1-15.....	397,300	--	5.02		2.65	--	3.21		--	--	--	--	--	480	.65	258,200	35	1.7	736	7.5
Mar. 16-31.....	484,400	6.8	2.59	2.17	2.61	.10	3.08		3.85	.39	.04	.00	.15	462	.63	305,200	35	1.7	705	7.4
Apr. 1-30.....	664,100	--	5.02		2.61	--	3.38		--	--	--	--	--	487	.66	438,300	34	1.7	735	7.8
May 1-21.....	427,800	--	4.84		2.57	--	3.33		--	--	--	--	--	472	.64	273,800	35	1.7	736	7.9
May 22-27.....	166,200	--	5.04		3.13	--	3.33		--	--	--	--	--	531	.72	119,700	38	1.7	789	7.5
May 28-June 7...	666,800	--	3.70		1.57	--	2.66		--	--	--	--	--	328	.45	300,100	30	1.2	522	7.4
June 8-19.....	812,200	11	1.85	.77	1.09	.06	2.00		1.62	.12	.02	.01	.09	245	.33	268,000	29	1.0	376	7.3

June 20-30, 1961	531,600	--	2.92	1.35	--	2.16	--	--	--	--	--	280	.38	202,000	32	1.1	434	7.5
July 1-15.....	607,500	--	3.88	1.78	--	3.05	--	--	--	--	--	356	.48	291,600	31	1.3	549	7.4
July 16-31.....	462,900	--	4.36	2.00	--	3.06	--	--	--	--	--	405	.55	254,600	31	1.3	625	7.4
Aug. 1-31.....	568,300	--	4.58	2.35	--	3.31	--	--	--	--	--	443	.60	341,000	34	1.5	677	7.5
Sept. 1-13.....	297,200	--	4.68	2.61	--	3.28	--	--	--	--	--	465	.63	187,200	36	1.7	713	7.6
Sept. 14-22.....	349,500	12	3.04 | 1.62	3.22	.12	3.18	4.48	.31	.03	.04	.11	523	.71	248,100	40	2.1	797	7.3
Sept. 23-30.....	395,500	--	4.60	2.83	--	3.10	--	--	--	--	--	489	.67	265,000	38	1.9	728	7.8
Total or weighted average	10,330,000	--	4.58	2.35	--	3.15	--	--	--	--	--	440	0.60	6,176,000	34	1.5	671	--

MISSOURI RIVER MAIN STEM--Continued

6-8070. MISSOURI RIVER AT NEBRASKA CITY, NEBR.

LOCATION.--At gaging station at Waubonsie Highway Bridge at Nebraska City, Otoe County.
DRAINAGE AREA.--414,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1961.
Water temperatures: May 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 892 micromhos Dec. 27; minimum daily, 468 micromhos Mar. 19.
Percent sodium: Maximum, 37 Aug. 1-31; minimum, 23 Mar. 7-25.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 936 micromhos Jan. 6, 1953; minimum daily, 327 micromhos Apr. 4, 1960.
Percent sodium: Maximum, 48 May 29, 1956; minimum, 16 Apr. 11-15, 1960.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-30, 1960.	1,939,240	--	4.50		2.57	--	3.23	0.00	--	--	--	--	--	455	0.62	1,200,001	36	1.71	696	7.8
Oct. 31.....	71,405	11	3.04	1.48	2.65	0.14	3.25	.00	3.69	0.45	0.03	0.03	--	454	.62	44,088	36	1.76	690	8.2
Nov. 1-20.....	1,296,397	--	4.68		2.65	--	3.41	.00	--	--	--	--	--	468	.64	825,131	36	1.73	717	7.6
Nov. 21-30.....	354,843	--	4.96		2.70	--	3.77	.00	--	--	--	--	--	478	.65	230,676	35	1.71	741	7.7
Dec. 1-20.....	607,339	17	3.44	1.73	2.65	.16	3.92	.00	3.31	.71	.03	.05	0.11	491	.67	405,557	33	1.65	749	7.5
Dec. 21.....	21,818	19	3.39	1.65	2.61	.18	3.80	.00	3.46	.48	.03	.03	.12	482	.66	14,302	33	1.64	724	7.5
Dec. 22-27.....	104,132	--	5.64		2.91	--	4.34	.00	--	--	--	--	--	546	.74	77,324	34	1.74	825	7.5
Dec. 28-Jan. 21, 1961.	755,207	--	5.06		2.61	--	3.84	.00	--	--	--	--	--	491	.67	504,297	34	1.64	755	7.5
Jan. 22-Feb. 9..	436,780	--	4.90		2.52	--	3.65	.00	--	--	--	--	--	477	.65	283,348	34	1.61	730	7.4
Feb. 10-16.....	211,041	--	4.28		2.13	--	3.34	.00	--	--	--	--	--	416	.57	119,399	33	1.46	640	7.4
Feb. 17-23.....	232,423	--	4.26		2.00	--	3.23	.00	--	--	--	--	--	407	.55	128,651	32	1.37	631	7.3
Feb. 24-Mar. 6..	616,364	--	3.96		1.57	--	3.10	.00	--	--	--	--	--	368	.50	308,478	28	1.11	568	7.3
Mar. 7-25.....	1,147,914	20	2.74	1.07	1.17	.21	3.03	.00	1.60	.45	.01	.10	.15	329	.45	513,623	23	.85	525	7.5
Mar. 26.....	74,975	17	2.79	1.07	1.31	.19	3.00	.00	1.92	.34	.02	.08	.06	344	.47	35,076	24	.94	524	7.9
Mar. 27-Apr. 5..	673,388	--	4.08		1.26	--	3.21	.00	--	--	--	--	--	337	.46	308,627	24	.88	531	7.6

Apr. 6-19, 1961.	952,740	--	4.76	1.96	--	3.47	.00	--	--	--	--	--	424	.58	549,388	29	1.27	659	7.8
Apr. 20-30.....	703,855	--	5.46	2.35	--	3.61	.00	--	--	--	--	--	467	.64	447,032	30	1.42	713	7.8
May 1-14, 16-31.	2,019,570	--	4.78	2.35	--	3.47	.00	--	--	--	--	--	453	.62	1,244,217	33	1.52	698	7.7
May 15.....	64,860	13	3.09 | 1.73	2.52	.15	3.41	.00	3.44	.54	.03	.04	--	469	.64	41,370	34	1.62	735	7.9
June 1-30.....	2,136,198	14	3.14 | 1.32	2.00	.17	3.28	.00	2.81	.51	.03	.05	.10	418	.57	1,214,386	30	1.34	641	7.3
July 1-31.....	2,014,334	--	4.58	2.61	--	3.21	.00	--	--	--	--	--	453	.62	1,240,991	36	1.72	697	7.3
Aug. 1-31.....	2,022,327	--	4.50	2.61	--	3.13	.00	--	--	--	--	--	454	.62	1,248,666	37	1.74	691	7.4
Sept. 1-30.....	1,950,545	11	3.09 | 1.48	2.70	.15	3.11	.00	3.69	.54	.02	.01	.11	465	.63	1,233,525	36	1.78	719	7.3
Total or weighted average	20,410,000	--	4.58	2.32	--	3.32	0.00	--	--	--	--	--	440	0.60	12,220,000	34	1.53	678	7.5

YELLOWSTONE RIVER BASIN

6-3295. YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Highway 23, 2 miles south of Sidney, Richland County, 4.5 miles downstream from gaging station, 2 miles downstream from Fox Creek, and 30 miles upstream from mouth.
DRAINAGE AREA (revised).--69,103 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1961.
Water temperatures: January 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,380 micromhos Aug. 16; minimum daily, 287 micromhos June 11.
Percent sodium: Maximum, 47 May 1-17, Aug. 5-19, Sept. 1-23; minimum, 30 June 3-27.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 257 micromhos June 15, 1956.
Percent sodium: Maximum, 48 May 1-30, 1953; minimum, 21 June 14-26, 1959.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. No appreciable inflow between gaging station and sampling point.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-13, 1960.	99,737	10	3.89	2.55	4.70	0.12	3.75	0.00	7.10	0.37	0.03	0.03	0.25	728	0.99	98,747	42	2.62	1,030	7.8
Oct. 14-24.....	113,716	--	6.58		4.48	--	3.90	.00	6.77	--	--	--	--	713	.97	110,268	41	2.47	988	7.9
Oct. 25-Nov. 20.	261,717	--	6.46		4.05	--	3.80	.00	6.41	--	--	--	--	675	.92	240,256	39	2.25	964	8.0
Nov. 21-30.....	90,922	--	6.88		4.22	--	4.06	.00	6.60	--	--	--	--	716	.97	88,537	38	2.28	1,010	7.8
Dec. 1-17.....	99,572	--	7.62		4.26	--	4.61	.00	7.20	--	--	--	--	779	1.06	105,491	36	2.18	1,100	7.9
Dec. 18-31.....	86,083	--	7.76		4.13	--	4.87	.00	6.85	--	--	--	--	770	1.05	90,146	35	2.10	1,100	7.9
Jan. 1-15, 1961.	135,283	--	7.11		3.96	--	4.39	.00	6.12	--	--	--	--	626	.85	115,174	36	2.10	1,010	7.6
Jan. 16-31.....	129,513	--	7.17		4.09	--	4.26	.00	6.33	--	--	--	--	676	.92	119,069	36	2.16	1,020	7.7
Feb. 1-10.....	79,537	--	8.06		4.44	--	5.05	.00	7.06	--	--	--	--	778	1.06	84,157	36	2.21	1,100	7.9
Feb. 11-28.....	181,868	--	6.26		3.57	--	3.64	.00	5.48	--	--	--	--	608	.83	150,383	36	2.02	882	7.9
Mar. 1-21.....	239,504	9.7	3.69	2.39	3.48	.11	3.49	.00	5.68	.48	.03	.01	.23	620	.84	201,950	36	2.00	910	7.7
Mar. 22-31.....	79,696	--	6.49		4.52	--	3.33	.00	6.91	--	--	--	--	690	.94	74,787	41	2.51	1,030	7.7
April 1-16.....	108,282	--	6.84		4.79	--	3.34	.00	7.37	--	--	--	--	715	.97	105,293	41	2.59	1,060	7.9
Apr. 17-30.....	59,591	--	7.00		5.87	--	3.41	.00	8.49	--	--	--	--	795	1.08	64,430	46	3.14	1,160	7.8
May 1-17.....	58,098	--	6.64		5.92	--	3.34	.00	8.20	--	--	--	--	798	1.09	63,052	47	3.25	1,150	7.8

May 18-26, 1961.	90,452	--	5.96	4.83	--	3.20	.00	6.89	--	--	--	--	705	.96	88,726	45	2.80	1,020	8.0
May 27-June 2...	301,012	--	4.82	2.22	--	3.26	.00	3.33	--	--	--	--	426	.58	174,394	32	1.43	642	7.8
June 3-27.....	1,121,653	12	1.60 .66	1.00	.04	1.82	.00	1.42	.09	.01	.01	.03	212	.29	323,395	30	.94	334	7.6
June 28-July 13.	238,524	--	3.06	2.22	--	2.88	.00	2.81	--	--	--	--	344	.47	111,591	42	1.79	540	7.7
July 14-30.....	124,491	--	4.62	3.09	--	3.16	.00	4.71	--	--	--	--	504	.69	85,331	40	2.03	746	7.4
July 31-Aug. 4..	37,468	--	4.80	4.13	--	3.75	.00	5.68	--	--	--	--	576	.78	29,351	46	2.67	870	7.8
Aug. 5-19.....	45,997	--	6.28	5.48	--	4.15	.00	7.58	--	--	--	--	750	1.02	46,917	47	3.09	1,090	7.9
Aug. 20-31.....	27,348	--	5.60	5.05	--	3.70	.00	7.22	--	--	--	--	696	.95	25,887	47	3.02	1,010	8.1
Sept. 1-12.....	66,764	--	5.74	5.18	--	3.54	.00	7.27	--	--	--	--	728	.99	66,101	47	3.06	1,040	7.9
Sept. 13-23.....	229,745	13	3.24 1.73	4.57	.14	3.26	.00	5.79	.39	.02	.09	.16	626	.85	195,596	47	2.90	928	7.3
Sept. 24-30.....	153,005	--	4.74	4.13	--	3.11	.00	5.79	--	--	--	--	604	.82	125,684	47	2.68	872	7.9
Total or weighted average	4,260,000	--	4.94	3.14	--	3.15	0.00	4.67	--	--	--	--	515	0.70	2,983,000	39	1.93	760	7.7

YELLOWSTONE RIVER BASIN--Continued

6-2947. BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At gaging station at bridge on U.S. Highway 10, 0.8 mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 4 milee east of Custer.
DRAINAGE AREA.--22,885 square miles.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1961.
Water temperatures: April 1949 to September 1951, August 1952 to November 1958, June 1959 to September 1961.
Sediment records: July 1947 to September 1954, October 1955 to September 1958, October 1959 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,940 micromhos July 10; minimum daily, 624 micromhoe June 1, 2.
Percent sodium: Maximum, 48 Aug. 1-19; minimum, 33 May 28 to June 6.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 1,940 micromhos July 10, 1961; minimum daily, 384 micromhos June 20, 1951.
Percent sodium: Maximum, 49 May 23-28, 1952; minimum, 27 June 20-21, 1955.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office in Worland, Wyo.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-14, 1960.	58,536	--	8.82		6.53	--	4.11	0.00	10.76	--	--	--	--	1,000	1.36	79,609	43	3.11	1,370	7.9
Oct. 15-31.....	49,668	--	9.96		7.05	--	4.44	.00	11.89	--	--	--	--	1,130	1.54	76,330	41	3.16	1,480	8.0
Nov. 1-15.....	42,040	--	10.62		7.22	--	4.65	.00	13.03	--	--	--	--	1,180	1.60	67,465	40	3.13	1,530	7.9
Nov. 16-30.....	38,678	--	10.76		7.09	--	4.84	.00	12.22	--	--	--	--	1,180	1.60	62,070	40	3.06	1,530	7.9
Dec. 1-10.....	25,845	12	7.04	4.61	7.22	0.15	5.31	.00	12.80	0.68	0.04	0.04	0.24	1,270	1.73	44,639	38	2.99	1,620	7.7
Dec. 11-31.....	52,858	--	10.86		6.53	--	5.21	.00	11.35	--	--	--	--	1,130	1.54	81,231	38	2.80	1,480	8.0
Jan. 1-12, 1961.	28,752	--	10.50		6.53	--	5.00	.00	10.58	--	--	--	--	1,050	1.43	41,058	38	2.85	1,420	8.0
Jan. 13-31.....	56,227	--	9.76		6.00	--	4.59	.00	10.06	--	--	--	--	971	1.32	74,252	38	2.72	1,340	8.0
Feb. 1-28.....	108,075	--	8.70		5.13	--	4.06	.00	10.16	--	--	--	--	898	1.22	131,990	37	2.46	1,240	7.8
Mar. 1-15.....	47,722	9.9	5.64	3.62	5.48	.14	4.31	.00	9.89	.56	.03	.02	.18	972	1.32	63,085	37	2.55	1,300	8.0
Mar. 16-31.....	46,937	--	9.42		6.53	--	4.03	.00	11.28	--	--	--	--	1,020	1.39	65,111	41	3.01	1,400	7.9
Apr. 1-19.....	49,632	--	9.72		6.96	--	4.00	.00	11.83	--	--	--	--	1,020	1.39	68,850	42	3.16	1,460	7.8
Apr. 20-30.....	23,236	--	9.28		6.61	--	3.80	.00	11.41	--	--	--	--	1,020	1.39	32,233	42	3.07	1,430	7.8
May 1-15.....	19,220	--	9.56		7.61	--	3.74	.00	12.43	--	--	--	--	1,130	1.54	29,537	44	3.48	1,520	7.9
May 16-27.....	56,196	--	8.20		6.18	--	3.61	.00	9.91	--	--	--	--	938	1.28	71,688	43	3.05	1,310	8.1

May 28-June 6, 1961..	67,458	12	3.54	1.56	2.52	.07	2.66	.00	4.62	.19	.02	.04	.04	501	.68	45,963	33	1.58	733	7.7
June 7-17.....	65,564	--	6.24		4.00	--	2.98	.00	6.72	--	--	--	--	658	.89	58,672	39	2.27	928	8.2
June 18-30.....	36,434	--	7.20		5.13	--	3.18	.00	8.54	--	--	--	--	812	1.10	40,235	42	2.71	1,120	8.2
July 1-9.....	15,084	--	8.12		6.70	--	3.47	.00	11.45	--	--	--	--	986	1.34	20,227	45	3.32	1,350	8.1
July 10-11.....	5,296	21	9.13	3.21	9.09	.20	3.36	.00	18.18	.54	.03	.16	.23	1,460	1.99	10,515	42	3.66	1,820	7.7
July 12-31.....	33,164	--	8.82		7.44	--	3.67	.00	12.64	--	--	--	--	1,110	1.51	50,064	46	3.54	1,480	7.9
Aug. 1-19.....	32,108	--	7.92		7.26	--	3.62	.00	11.62	--	--	--	--	1,020	1.39	44,541	48	3.65	1,410	7.7
Aug. 20-31.....	21,279	--	8.32		7.44	--	3.41	.00	12.18	--	--	--	--	1,060	1.44	30,675	47	3.65	1,440	7.5
Sept. 1-6.....	15,911	13	5.14	3.54	7.22	.13	3.87	.00	11.35	.56	.03	.04	.27	1,070	1.46	23,154	45	3.47	1,430	7.6
Sept. 7-19.....	77,046	--	7.82		6.53	--	3.95	.00	10.26	--	--	--	--	978	1.33	102,477	45	3.30	1,300	7.8
Sept. 20-30.....	102,131	--	7.28		6.44	--	3.90	.00	9.58	--	--	--	--	926	1.26	128,620	47	3.37	1,260	7.7
Total or weighted average	1,175,000	--	8.66		6.10	--	3.99	0.00	10.32	--	--	--	--	966	1.31	1,544,000	41	2.92	1,310	7.9

YELLOWSTONE RIVER BASIN--Continued

6-3085. TONGUE RIVER AT MILES CITY, MONT.

LOCATION.--At gaging station, 4 miles south of Miles City, Custer County, and 8 miles upstream from mouth.
DRAINAGE AREA (revised).--5,379 square miles.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1961.
Water temperatures: April 1949 to September 1961.
Sediment records: June 1946 to September 1951.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,720 micromhos Aug. 17, 18; minimum daily, 593 micromhos July 31.
Percent sodium: Maximum, 53 Oct. 1-16, May 1-16, Sept. 10-22; minimum, 27 Dec. 16-31, Jan. 1-15, June 12-30.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 2,390 micromhos Sept. 11, 1958; minimum daily, 288 micromhos June 21, 1953.
Percent sodium: Maximum, 69 May 4, 1955; minimum, 17 June 7-16, June 30 to July 12, 1957.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-16, 1960.	165	--	8.10		9.31	--	7.70	0.00	10.16	--	--	--	--	1,090	1.48	245	53	4.63	1,550	8.1
Oct. 17-28.....	188	--	8.36		8.96	--	7.82	.00	9.60	--	--	--	--	1,080	1.47	276	52	4.38	1,520	8.1
Oct. 29-Nov. 7..	1,156	--	8.56		4.35	--	5.69	.00	7.29	--	--	--	--	785	1.07	1,235	34	2.10	1,130	8.0
Nov. 8-21.....	3,360	7.8	3.84	5.02	3.78	0.13	5.56	.00	7.16	0.14	0.02	0.00	0.16	773	1.05	3,532	30	1.80	1,110	7.9
Nov. 22-30.....	1,278	--	9.68		4.65	--	6.28	.00	7.91	--	--	--	--	862	1.17	1,498	32	2.12	1,220	7.9
Dec. 1-15.....	2,092	--	11.22		4.96	--	6.98	.00	8.93	--	--	--	--	978	1.33	2,782	31	2.09	1,360	8.2
Dec. 16-31.....	2,228	--	10.12		3.83	--	6.54	.00	7.29	--	--	--	--	830	1.13	2,515	27	1.70	1,180	8.2
Jan. 1-15, 1961.	2,380	--	9.58		3.48	--	6.23	.00	6.62	--	--	--	--	764	1.04	2,473	27	1.59	1,110	7.9
Jan. 16-31.....	2,450	--	10.08		4.05	--	6.62	.00	6.91	--	--	--	--	812	1.10	2,706	29	1.80	1,170	7.9
Feb. 1-9.....	1,610	--	9.38		3.57	--	6.23	.00	6.16	--	--	--	--	762	1.04	1,669	28	1.65	1,130	7.9
Feb. 10-28.....	4,032	--	7.04		2.91	--	4.62	.00	4.91	--	--	--	--	580	.79	3,181	29	1.55	872	7.9
Mar. 1-11.....	2,771	6.5	3.79	2.88	2.78	.11	4.56	.00	4.81	.12	.01	.00	.11	570	.78	2,148	29	1.52	851	7.8
Mar. 12-31.....	2,134	--	7.80		4.35	--	5.13	.00	6.45	--	--	--	--	708	.96	2,055	36	2.20	1,060	8.1
Apr. 1-15.....	589	--	8.20		6.26	--	5.51	.00	8.52	--	--	--	--	884	1.20	708	43	3.09	1,290	8.1
Apr. 16-30.....	155	--	8.28		8.87	--	6.79	.00	10.16	--	--	--	--	1,040	1.41	219	52	4.36	1,510	8.1

May 1-16, 1961..	165	10	3.29	4.20	8.57	.18	7.00	.00	8.91	.19	.02	.03	.34	998	1.36	224	53	4.43	1,450	8.2
May 17-24.....	213	--	6.88		6.87	--	5.77	.00	7.29	--	--	--	--	830	1.13	240	51	3.78	1,190	8.1
May 25-26.....	766	--	6.76		3.57	--	4.33	.13	5.66	--	--	--	--	658	.89	685	35	1.94	928	8.3
May 27-June 1...	696	--	7.10		4.39	--	4.39	.00	6.91	--	--	--	--	718	.97	678	38	2.33	1,050	7.8
June 2-11.....	180	--	8.28		7.05	--	6.16	.00	8.45	--	--	--	--	920	1.25	226	46	3.46	1,340	7.9
June 12-30.....	5,691	--	5.76		2.18	--	3.87	.00	3.91	--	--	--	--	477	.85	3,692	27	1.28	730	8.2
July 1-12.....	933	--	5.84		3.00	--	4.54	.00	4.43	--	--	--	--	528	.72	670	34	1.78	806	8.1
July 13-28.....	374	--	7.46		6.70	--	6.41	.00	8.35	--	--	--	--	888	1.21	452	47	3.47	1,280	8.1
July 29-31.....	780	--	4.72		4.79	--	5.82	.00	3.87	--	--	--	--	582	.79	617	50	3.11	874	8.1
Aug. 1-18.....	214	--	7.88		9.22	--	7.21	.00	10.60	--	--	--	--	1,090	1.48	318	54	4.65	1,550	8.1
Aug. 19-31.....	229	--	6.14		6.44	--	5.90	.00	7.39	--	--	--	--	800	1.09	250	51	3.67	1,180	8.1
Sept. 1-9.....	114	--	7.92		9.18	--	7.08	.30	10.37	--	--	--	--	1,080	1.47	168	54	4.61	1,540	8.3
Sept. 10-22.....	3,094	11	2.05	1.48	4.13	.15	3.87	.00	3.79	.01	.01	.05	.16	494	.67	2,079	53	3.11	751	7.6
Sept. 23-30.....	1,373	--	5.86		3.26	--	4.31	.00	4.93	--	--	--	--	570	.78	1,064	36	1.91	845	7.9
Total or weighted average	41,440	--	7.61		3.78	--	5.25	0.00	5.96	--	--	--	--	685	0.93	38,605	33	1.98	1,000	7.9

YELLOWSTONE RIVER BASIN--Continued

6-3265. POWDER RIVER NEAR LOCATE, MONT.

LOCATION.--At gaging station at bridge on U.S. Highway 12, at present site of Locate (5 miles west of former site of Locate), Custer County, 3 miles upstream from Locate Creek, and 25 miles east of Miles City.
DRAINAGE AREA (revised).--13,189 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1961.
Water temperatures: February 1951 to May 1954, October 1954 to September 1961.
Sediment records: March 1950 to September 1953.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 4,410 micromhos July 13; minimum daily, 317 micromhos July 5.
Percent sodium: Maximum, 69 Sept. 9-22; minimum, 18 July 5-8.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 9,270 micromhos Dec. 16, 1955; minimum daily, 317 micromhos July 5, 1961.
Percent sodium: Maximum, 83 Oct. 22-24, 1953; minimum, 17 Aug. 11-13, 1955.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 2-9, 1960..	6	--	15.10		16.53	--	4.28	0.00	27.48	--	--	--	--	2,280	3.10	20	52	8.02	2,820	6.0
Oct. 10-19.....	28	8.7	9.63	7.16	20.05	0.26	4.64	.00	32.06	1.78	0.02	0.00	0.25	2,650	3.60	100	54	6.92	3,210	7.6
Oct. 20-31.....	76	--	15.10		18.01	--	4.90	.00	27.90	--	--	--	--	2,370	3.22	245	54	6.55	2,940	8.0
Nov. 1-17.....	260	--	15.28		17.84	--	5.18	.00	28.11	--	--	--	--	2,330	3.17	823	54	6.46	2,920	8.0
Nov. 18-28.....	421	--	17.72		12.70	--	4.93	.00	24.36	--	--	--	--	2,140	2.91	1,228	42	4.27	2,800	8.0
Nov. 29-Dec. 19.	608	--	21.60		17.49	--	7.41	.00	31.02	--	--	--	--	2,770	3.77	2,291	45	5.32	3,290	7.9
Dec. 20-31.....	221	--	19.98		14.22	--	7.56	.00	25.82	--	--	--	--	2,370	3.22	713	42	4.50	2,860	7.9
Jan. 1-15, 1961.	556	--	16.86		12.22	--	6.64	.00	19.99	--	--	--	--	1,730	2.35	1,309	42	4.21	2,380	8.0
Jan. 16-31.....	549	--	19.80		13.14	--	7.62	.00	22.49	--	--	--	--	1,990	2.71	1,486	40	4.18	2,640	8.0
Feb. 1-10.....	762	--	17.60		12.09	--	6.06	.00	20.20	--	--	--	--	1,940	2.64	2,010	41	4.08	2,430	7.9
Feb. 11-21.....	943	--	15.48		10.61	--	4.92	.00	18.49	--	--	--	--	1,690	2.30	2,166	41	3.82	2,180	7.9
Feb. 22-Mar. 3..	1,680	--	12.68		8.05	--	3.92	.00	15.12	--	--	--	--	1,340	1.62	3,062	39	3.20	1,770	7.9
Mar. 4-13.....	6,188	8.1	8.58	2.22	6.79	.17	3.36	.00	12.18	1.78	.02	.04	.16	1,210	1.65	10,184	38	2.92	1,630	8.0
Mar. 14-24.....	7,265	--	11.68		6.79	--	3.82	.00	14.28	--	--	--	--	1,340	1.82	13,241	43	3.64	1,840	7.6
Mar. 25-Apr. 12.	7,914	--	14.40		10.79	--	4.31	.00	17.61	--	--	--	--	1,620	2.20	17,436	43	4.02	2,120	7.7

Apr.13-30, 1961	2,028	--	14.52	13.35	--	4.21	.00	20.61	--	--	--	--	1,800	2.45	4,964	48	4.96	2,370	7.9
May 1-18.....	1,507	11	8.98 | 5.51	13.79	0.21	4.11	.00	21.03	2.60	0.02	0.01	0.19	1,970	2.68	4,037	48	5.12	2,480	8.0
May 19-31.....	7,246	--	16.12	10.35	--	4.34	.00	18.70	--	--	--	--	1,770	2.41	17,442	39	3.65	2,250	7.7
June 1-19.....	10,326	--	11.24	8.35	--	3.36	.00	14.16	--	--	--	--	1,280	1.74	17,975	43	3.52	1,730	7.9
June 20-28.....	609	--	13.34	15.14	--	3.36	.17	22.49	--	--	--	--	1,910	2.60	1,581	53	5.86	2,490	8.4
June 29-July 4.	55	--	14.80	15.96	--	3.87	.00	26.65	--	--	--	--	2,170	2.95	162	52	5.87	2,730	7.9
July 5-8.....	30	9.3	1.55 | .51	.61	.64	2.10	.00	.69	.11	.03	.05	.28	322	.44	13	18	.60	338	6.9
July 9-12.....	79	--	.94	16.97	--	15.00	.60	2.54	--	--	--	--	1,080	1.47	117	95	24.75	1,650	8.4
July 13-15.....	827	18	20.51 | 11.52	22.64	.31	5.38	.00	43.93	6.21	.03	.01	.41	3,780	5.14	4,252	41	5.71	4,200	7.5
July 16-28.....	570	--	23.80	18.84	--	4.90	.00	37.89	--	--	--	--	3,050	4.15	2,364	44	5.46	3,540	7.6
July 29-31.....	1,244	--	3.88	4.35	--	4.03	.00	4.39	--	--	--	--	540	.73	913	53	3.12	806	8.1
Aug. 1-5.....	571	--	6.48	5.00	--	3.23	.00	8.35	--	--	--	--	774	1.05	601	44	2.78	1,090	8.1
Aug. 6-18.....	227	--	11.54	12.92	--	4.02	.00	20.20	--	--	--	--	1,650	2.24	509	53	5.38	2,160	7.9
Aug. 19-31.....	90	--	8.72	12.09	--	4.49	.00	16.97	--	--	--	--	1,440	1.96	177	58	5.79	1,950	8.0
Sept. 1-3.....	6	--	6.33 | 5.76	15.53	--	4.85	.00	24.78	--	--	--	--	2,100	2.86	17	52	5.85	2,630	8.1
Sept. 9-15.....	2,999	11	1.70 | .72	5.79	.14	3.82	.00	4.16	.02	.02	.13	.17	538	.73	2,194	69	5.26	806	7.8
Sept. 16-22....	833		2.45 | 1.07	7.83		3.54	.00	7.72	--	--	--	--	778	1.06	881	69	5.91	1,130	7.9
Sept. 23-30....	778		11.03 | 5.43	13.92		4.26	.00	25.82	--	--	--	--	2,190	2.98	2,316	46	4.85	2,640	8.1
Total or weighted average	57,500	9.9	12.77	9.76	--	4.07	0.00	16.16	--	--	--	--	1,490	2.03	116,800	43	3.96	1,960	7.8

JAMES RIVER BASIN

6-4760. JAMES RIVER AT HURON, S. DAK.

LOCATION.--Just upstream from Chicago and North Western Railway Co. bridge, 135 feet upstream from gaging station, 150 feet upstream from city dam at Huron, Beadle County, and 300 feet upstream from bridge on U.S. Highway 14.
DRAINAGE AREA.--16,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April 1950 to September 1951, August 1956 to September 1961.
Water temperatures: August 1956 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,400 micromhos Feb. 28; minimum daily, 281 micromhos Mar. 5.
Percent sodium: Maximum, 64 Sept. 1-30; minimum, 28 Mar. 4-8.
EXTREMES, 1956-61.--Specific conductance: Maximum daily, 2,640 micromhos Mar. 1, 1959; minimum daily, 176 micromhos Mar. 30, Apr. 2, 1960.
Percent sodium: Maximum, 64 Sept. 1-30, 1961; minimum, 24 Mar. 29-31, 1960.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. During some periods, all flow is diverted from the channel near the sampling site and, therefore, does not pass the gaging station.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	6	--	6.56		4.35	--	5.85	0.00	3.98	--	--	--	--	682	0.93	6	40	2.40	1,050	7.5
Nov. 1-30.....	6	--	6.96		4.70	--	6.11	.00	4.39	--	--	--	--	727	.99	6	40	2.52	1,110	7.6
Dec. 1-13.....	3	--	7.78		5.18	--	6.74	.00	5.02	--	--	--	--	819	1.11	3	40	2.62	1,220	7.8
Dec. 14-31.....	4	16	4.89	4.11	5.74	0.56	7.56	.00	5.75	2.06	0.02	0.03	0.47	918	1.25	4	38	2.71	1,360	7.8
Jan. 1-18, 1961.	4	--	9.54		6.18	--	7.83	.00	6.23	--	--	--	--	978	1.33	5	39	2.83	1,440	7.9
Jan. 19-28.....	2	--	11.04		6.96	--	8.29	.00	7.87	--	--	--	--	1,120	1.52	3	39	2.96	1,620	7.7
Jan. 29-Feb. 27.	6	--	15.00		9.14	--	10.00	.00	11.24	--	--	--	--	1,530	2.08	12	38	3.34	2,080	7.6
Feb. 28-Mar. 1..	50	--	17.84		10.44	--	11.33	.00	13.53	--	--	--	--	1,790	2.43	121	37	3.50	2,370	8.0
Mar. 2.....	383	--	17.52		9.44	--	11.29	.00	13.53	--	--	--	--	1,720	2.34	895	35	3.19	2,300	8.1
Mar. 3.....	484	16	4.74	3.62	4.79	.41	5.05	.00	6.91	1.33	.02	.16	.35	860	1.17	566	35	2.34	1,240	8.0
Mar. 4-5.....	869	--	1.92		.74	--	1.31	.00	1.39	--	--	--	--	200	.27	236	28	.75	319	7.6
Mar. 6-8.....	601	--	2.12		.83	--	1.39	.00	1.54	--	--	--	--	220	.30	180	28	.80	341	7.3
Mar. 9-13.....	585	--	4.52		2.13	--	2.87	.00	3.37	--	--	--	--	442	.60	352	32	1.42	678	7.4
Mar. 14-23,26-31	1,723	13	3.39	3.29	3.74	.31	4.47	.00	4.98	1.04	.02	.03	.27	666	.91	1,561	35	2.05	991	7.7
Apr. 1-6, 10-11, 14-16.....	506	--	5.94		4.39	--	4.72	.00	4.37	--	--	--	--	648	.88	446	43	2.55	1,010	7.8
Apr. 26-30.....	45	--	6.24		5.05	--	4.87	.00	5.08	--	--	--	--	717	.98	44	45	2.86	1,100	7.8

May 1-7, 1961...	1	--	6.52	5.48	--	5.00	.00	5.56	--	--	--	--	762	1.04	1	46	3.04	1,160	7.5
May 8.....	58	--	6.60	5.61	--	5.02	.00	5.79	--	--	--	--	784	1.07	61	46	3.09	1,180	8.0
May 12.....	22	--	6.84	5.87	--	5.06	.00	6.14	--	--	--	--	809	1.10	24	46	3.18	1,220	7.5
May 13 15, 17-18	307	--	7.16	6.35	--	5.08	.00	6.83	--	--	--	--	873	1.19	365	47	3.36	1,310	7.4
May 19-31.....	1,096	--	8.14	7.61	--	5.29	.00	8.45	--	--	--	--	1,020	1.39	1,520	48	3.77	1,490	7.8
June 1-24.....	1,238	11	4.19 | 3.45	6.18	.38	5.34	.00	6.93	1.97	.01	.01	.44	939	1.28	1,581	43	3.16	1,300	7.6
June 25.....	2	--	4.04 | 3.29	6.53	--	5.70	.00	6.12	2.37	.02	--	--	881	1.20	2	47	3.41	1,330	7.6
July 1-31.....	6	--	3.54 | 3.29	7.18	--	5.59	.00	6.16	2 60	.02	--	--	900	1.22	8	51	3.88	1,360	7.7
Aug. 1-31.....	6	--	5.72	8.70	--	5.03	.00	6.33	--	--	--	--	963	1.31	8	60	5.14	1,480	7.3
Sept. 1-30.....	4	11	2.15 | 3.99	11.70	.56	5.44	.00	7.79	4.65	.03	.04	.92	1,160	1.58	6	64	6.67	1,770	7.3
Total or weighted average	a7,920	--	6.68	4.52	--	4.47	--	5.60	--	--	--	--	733	1.00	8,010	40	2.47	1,060	--

a Represents 100 percent of runoff for water year.

PLATTE RIVER BASIN

6-7660. PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging station at highway bridges, 0.5 mile and 2.5 miles south of Brady, Lincoln County, and 18 miles downstream from confluence of North Platte and South Platte Rivers.
DRAINAGE AREA.--56,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1961.
Water temperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,060 micromhos July 5 (chan. 1); minimum daily, 420 micromhos Apr. 11 (chan. 1).
Percent sodium: Maximum, 43 July 23 to Aug. 17; minimum, 29 Mar. 1-31.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 1,250 micromhos June 17, 1959 (chan. 1); minimum daily, 305 micromhos Jan. 13, 1956, Jan. 10, 1957 (chan. 1).
Percent sodium: Maximum, 46 Aug. 1-22, 1955; minimum, 22 Nov. 26, 1952.
REMARKS.--Daily samples for chemical analysis from each of two major channels composited by discharge. Composite periods normally identical to those of Supply Canal (Tri-County Diversion) near Maxwell, Nebr. Records of specific conductance of daily samples taken at each of the two major channels available in district office at Lincoln, Nebr.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	7,010	--	4.22		2.26	--	3.61	0.00	--	--	--	--	--	443	0.60	4,223	35	1.56	653	7.2
Nov. 1-27.....	6,908	--	4.22		2.09	--	3.59	.00	--	--	--	--	--	435	.59	4,087	33	1.44	640	7.5
Nov. 28-Dec. 24.	10,497	40	3.04	1.32	2.09	0.25	3.64	.00	2.60	0.45	0.03	0.03	0.08	430	.58	6,138	31	1.41	637	7.4
Dec. 25.....	496	44	2.89	1.07	1.87	.24	3.52	.00	2.29	.31	.03	.02	.08	396	.54	267	31	1.33	588	7.6
Dec. 26-Jan. 20, 1961.....	10,572	--	4.10		1.91	--	3.49	.00	--	--	--	--	--	414	.56	5,952	32	1.34	602	7.5
Jan. 21-Feb. 2..	7,478	--	4.46		2.18	--	3.72	--	--	--	--	--	--	460	.63	4,678	33	1.46	670	7.6
Feb. 3-28.....	9,489	--	4.12		1.83	--	3.39	.00	--	--	--	--	--	409	.56	5,278	31	1.27	603	7.5
Mar. 1-31.....	13,466	38	2.94	1.32	1.83	.25	3.51	.00	2.29	.39	.03	.04	.09	410	.56	7,509	29	1.25	606	7.6
Apr. 1-6.....	1,987	--	4.44		2.04	--	3.51	.00	--	--	--	--	--	438	.60	1,184	32	1.37	650	7.7
Apr. 7-11.....	2,083	--	3.90		1.65	--	3.41	.00	--	--	--	--	--	381	.52	1,079	30	1.18	563	7.9
Apr. 12-30.....	8,216	--	4.46		2.00	--	3.59	.00	--	--	--	--	--	443	.60	4,950	31	1.34	644	7.8
May 1-16.....	7,712	--	4.48		1.91	--	3.54	.00	--	--	--	--	--	434	.59	4,552	30	1.28	635	7.3
May 17-24.....	6,379	--	4.56		2.00	--	3.67	.00	--	--	--	--	--	454	.62	3,939	30	1.33	649	7.4
May 25-31.....	3,624	--	4.68		2.18	--	3.67	.00	--	--	--	--	--	467	.64	2,302	32	1.42	677	7.5
June 1-30.....	48,020	28	4.84	2.06	3.31	.28	3.67	.00	5.89	.68	.03	.01	.15	701	.95	45,780	32	1.78	956	7.3

July 1-22, 1961.	39,927	--	4.30	3.13	--	3.87	.00	--	--	--	--	--	485	.66	26,336	42	2.14	726	7.6
July 23-31.....	18,030	--	3.94	3.00	--	3.87	.00	--	--	--	--	--	460	.63	11,279	43	2.14	694	7.6
Aug. 1-14.....	24,436	--	3.96	2.96	--	3.82	.00	--	--	--	--	--	458	.62	15,221	43	2.10	685	7.3
Aug. 15-17.....	13,014	--	4.24	3.22	--	3.80	.00	--	--	--	--	--	501	.68	8,867	43	2.21	744	7.4
Aug. 18-31.....	8,081	--	4.32	2.83	--	3.79	.00	--	--	--	--	--	490	.67	5,385	40	1.92	720	7.9
Sept. 1-30.....	7,379	33	2.99 | 1.32	2.57	.26	3.61	.00	2.77	.51	.03	.02	.16	460	.63	4,616	36	1.75	686	7.3
Total or weighted average	254,700	--	4.74	2.70	--	3.70		--	--	--	--	--	501	0.68	173,500	36	1.76	727	--

6-7657. SUPPLY CANAL (TRI-COUNTY DIVERSION) NEAR MAXWELL, NEBR.

LOCATION.--At gaging station at Parshall Flume in sec. 28, T. 13 N., R. 29 W., near Maxwell, Lincoln County.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1961.
Water temperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,180 micromhos July 7; minimum daily, 579 micromhos Mar. 10, 12.
Percent sodium: Maximum, 44 Aug. 1-31; minimum, 33 Mar. 1-31, June 1-30.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 1,440 micromhos Mar. 1, 1958; minimum daily, 403 micromhos Jan. 9, 1957.
Percent sodium: Maximum, 48 Aug. 1 to Sept. 15, 1955; minimum, 32 Feb. 25 to Mar. 22, May 19-28, 1957.
REMARKS.--Daily samples for chemical analysis composited by discharge. Composite periods normally identical to those of Platte River at Brady, Nebr. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year given in reports of State Engineer.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	57,798	--	3.84		2.70	--	3.47	0.00	--	--	--	--	--	442	0.60	34,744	41	1.95	865	7.2
Nov. 1-27.....	51,412	--	3.92		2.48	--	3.44	.00	--	--	--	--	--	437	.59	30,555	39	1.77	853	7.2
Nov. 28-Dec. 24.	52,215	29	2.79	1.32	2.70	0.28	3.52	.00	3.16	0.54	0.03	0.03	0.14	455	.62	32,311	38	1.88	862	7.7
Dec. 25.....	2,102	35	2.84	1.23	2.44	.25	3.39	.00	2.98	.37	.04	.00	.10	434	.59	1,241	38	1.71	650	7.4
Dec. 26-Jan. 20, 1961.	49,198	--	4.52		2.74	--	3.54	.00	--	--	--	--	--	491	.87	32,852	38	1.82	722	7.4
Jan. 21-Feb. 2..	28,003	--	5.44		3.44	--	3.85	.00	--	--	--	--	--	603	.82	22,964	39	2.08	862	7.5
Feb. 3-28.....	49,250	--	4.88		2.85	--	3.74	.00	--	--	--	--	--	514	.70	34,427	35	1.70	753	7.5
Mar. 1-31.....	56,753	35	3.29	1.32	2.39	.26	3.38	.00	3.04	.54	.02	.03	.10	477	.65	38,817	33	1.58	693	7.4
Apr. 1-6.....	10,259	--	5.08		2.70	--	3.46	.00	--	--	--	--	--	537	.73	7,492	35	1.70	782	8.0
Apr. 7-11.....	10,038	--	5.12		2.78	--	3.34	.00	--	--	--	--	--	543	.74	7,412	35	1.74	788	7.7
Apr. 12-30, 1960	37,912	--	5.28		2.78	--	3.48	0.00	--	--	--	--	--	553	0.75	28,513	35	1.71	801	7.6
May 1-16.....	37,765	--	5.68		3.26	--	3.46	.00	--	--	--	--	--	610	.83	31,330	36	1.94	657	7.6
May 17-24.....	16,534	--	5.42		2.96	--	3.47	.00	--	--	--	--	--	569	.77	12,795	35	1.80	814	7.6
May 25-31.....	13,051	--	6.32		3.48	--	3.41	.00	--	--	--	--	--	657	.69	11,682	36	1.96	929	7.4
June 1-30.....	99,491	24	4.89	2.96	3.96	.28	3.72	.00	7.35	.82	.04	.01	.18	795	1.08	107,570	33	2.00	1,070	7.3
July 1-22.....	85,984	--	7.38		4.35	--	3.62	.00	--	--	--	--	--	789	1.07	92,242	37	2.28	1,090	7.4
July 23-31.....	38,148	--	5.28		3.70	--	3.62	.00	--	--	--	--	--	597	.81	30,973	41	2.28	875	7.5
Aug. 1-14.....	58,314	--	4.46		3.52	--	3.82	.00	--	--	--	--	--	527	.72	41,795	44	2.36	790	7.5
Aug. 15.....	1,186	--	4.20		3.35	--	3.80	.00	--	--	--	--	--	483	.66	779	44	2.31	751	7.4
Aug. 18-31.....	34,850	--	4.16		3.31	--	3.59	.00	--	--	--	--	--	491	.67	23,271	44	2.29	747	7.4
Sept. 1-30.....	86,281	21	3.04	1.07	3.18	.26	3.79	.00	3.02	.59	.03	.02	.16	474	.84	55,620	42	2.21	732	7.3
Total or weighted average	a876,520	--	5.24		3.21	--	3.59	0.00	--	--	--	--	--	570	0.77	677,400	38	1.99	821	7.4

a Represents 100 percent of runoff for water year.

6-7640. SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on U.S. Highway 385 (revised), 0.9 mile southeast of Julesburg, Sedgwick County, 3 miles upstream from Colorado-Nebraska State line, and 8 miles downstream from Lodgepole Creek.
DRAINAGE AREA.--23,138 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1961.
Water temperatures: October 1945 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,310 micromhos Jan. 27; minimum daily, 943 micromhos June 16.
Percent sodium: Maximum, 38 July 27 to Aug. 31; minimum, 32 Nov. 1-30, June 1-16.
EXTREMES, 1945-61.--Specific conductance: Maximum daily, 2,350 micromhos Apr. 13, 1955; minimum daily, 617 micromhos Aug. 19, 1953.
Percent sodium: Maximum, 82 Mar. 1-12, 1947; minimum, 29 Aug. 6-10, 1951, Aug. 19, 1953, Sept. 14-17, 1956.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	4,341	--	14.70		7.13	--	5.16	0.00	--	--	--	--	--	1,540	2.09	9,092	33	2.63	1,950	7.4
Nov. 1-30.....	5,617	--	14.76		7.00	--	5.20	.00	--	--	--	--	--	1,520	2.07	11,612	32	2.58	1,930	7.4
Dec. 1.....	143	35	12.43	4.77	8.53	0.51	7.08	.00	16.53	2.06	0.03	0.07	0.28	1,720	2.34	334	33	2.91	2,160	7.4
Dec. 2-31.....	12,496	30	10.98	5.10	8.70	.46	5.90	.00	16.76	2.00	.04	.04	.31	1,660	2.26	28,211	34	3.07	2,070	7.5
Jan. 1-31, 1961.	14,573	--	16.16		8.70	--	6.00	.00	--	--	--	--	--	1,670	2.27	33,097	35	3.06	2,080	7.5
Feb. 1-28.....	13,051	--	15.24		8.48	--	5.21	.00	--	--	--	--	--	1,600	2.18	28,399	36	3.07	2,000	7.8
Mar. 1.....	280	31	9.73	4.94	7.96	.38	4.90	.00	14.32	2.03	.04	.05	.25	1,510	2.05	574	35	2.94	1,830	8.0
Mar. 2-31.....	13,626	27	9.88	4.85	8.18	.38	4.85	.00	15.57	1.95	.04	.05	.27	1,560	2.12	28,910	35	3.01	1,980	7.7
Apr. 1-30.....	15.888	--	14.80		7.96	--	4.69	.00	--	--	--	--	--	1,580	2.15	34,139	35	2.93	1,970	7.7
May 1-7.....	1,351	--	14.54		8.00	--	4.69	.00	--	--	--	--	--	1,550	2.11	2,848	36	2.97	1,920	8.0
May 8-21.....	3,610	--	13.58		7.79	--	4.20	.00	--	--	--	--	--	1,470	2.00	7,217	36	2.99	1,860	7.8
May 22-31.....	37,944	--	9.62		5.13	--	3.69	.00	--	--	--	--	--	1,010	1.37	52,120	35	2.34	1,350	7.8
June 1-16.....	129,418	17	5.69	2.47	3.96	.22	3.39	.00	7.85	.90	.04	.02	.20	818	1.11	143,974	32	1.96	1,120	7.3
June 17-30.....	49,706	--	9.80		5.26	--	3.85	.00	--	--	--	--	--	1,010	1.37	68,276	35	2.38	1,340	7.5
July 1-26.....	6,601	--	11.92		6.96	--	3.97	.00	--	--	--	--	--	1,280	1.74	11,491	37	2.85	1,660	7.5
July 27-31, 1961	1,507	--	9.32		5.66	--	3.33	.00	--	--	--	--	--	1,020	1.39	2,091	38	2.62	1,360	7.4
Aug. 1-31.....	5,103	--	13.06		7.96	--	4.03	.00	--	--	--	--	--	1,420	1.93	9,856	38	3.12	1,790	7.3
Sept. 1-30.....	11,841	29	9.23	4.61	7.35	.41	4.29	.00	14.84	1.81	.04	.04	.24	1,510	2.05	24,317	34	2.79	1,900	7.4
Total or weighted average	a327,100	--	10.78		5.66	--	4.03	0.00	--	--	--	--	--	1,120	1.52	496,000	34	2.40	1,460	--

a Represents 100 percent of runoff for water year.

PART 7. LOWER MISSISSIPPI RIVER BASIN

ARKANSAS RIVER BASIN

7-1305. ARKANSAS RIVER BELOW JOHN MARTIN RESERVOIR, COLO.

LOCATION.--At gaging station, 1.1 miles upstream from Caddoa Creek, 1.7 miles downstream from John Martin Dam, Bent County, and 2.9 miles southeast of Hasty.
DRAINAGE AREA.--18,917 square miles, of which 785 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: August 1942 to August 1943, October 1945 to July 1949 (intermittent and weekly samples); January 1951 to September 1961 (daily samples).
Water temperatures: January 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 4,870 micromhos Dec. 17; minimum daily, 1,030 micromhos June 2.
Percent sodium: Maximum, 41 Mar. 1-28, Mar. 31 to Apr. 2, June 12-18; minimum, 27 Aug. 6.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 5,180 micromhos Apr. 21, 1955; minimum daily, 643 micromhos July 6, 1960.
Percent sodium: Maximum, 42 Feb. 1-10, 1954, July 13, 1956, Nov. 1-2, 1959; minimum, 23 July 1-10, 1955.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-18, 1960.	700	--	17.71	12.26	19.49	--	3.41		--	--	--	--	--	3,380	4.60	3,217	39	5.03	3,800	7.6
Oct. 19-20.....	1,619	--	14.47	8.97	11.66	--	2.77		--	--	--	--	--	2,400	3.26	5,283	33	3.41	2,760	7.9
Oct. 21-31.....	3,709	19	11.93	6.99	9.05	0.21	3.74		22.49	1.64	0.04	0.09	0.23	1,940	2.64	9,786	32	2.94	2,290	7.8
Nov. 1-3.....	565	--	12.38	8.39	11.22	--	3.61		--	--	--	--	--	2,210	3.01	1,699	35	3.48	2,560	7.8
Nov. 4-22.....	2,212	--	16.07	10.36	15.83	--	4.16		--	--	--	--	--	2,910	3.96	8,755	37	4.36	3,280	7.8
Nov. 23-30.....	601	--	17.56	11.68	18.10	--	4.31		--	--	--	--	--	3,320	4.52	2,715	38	4.73	3,670	7.7
Dec. 1-31.....	172	--	20.46	13.74	22.66	--	5.51		--	--	--	--	--	3,920	5.33	918	40	5.48	4,260	7.8
Jan. 1-31, 1961.	184	21	21.96	12.83	22.53	.21	6.29		46.64	4.23	.04	.12	.47	3,960	5.39	993	39	5.40	4,310	7.9
Feb. 1-28.....	200	--	20.71	13.08	22.32	--	5.61		--	--	--	--	--	3,950	5.37	1,074	40	5.43	4,220	7.8
Mar. 1-28.....	172	--	20.46	13.57	23.49	--	5.03		--	--	--	--	--	4,060	5.52	951	41	5.69	4,310	7.7
Mar. 29-30.....	15	--	15.57	13.24	18.31	--	5.93		--	--	--	--	--	3,330	4.53	66	39	4.82	3,620	7.8
Mar. 31-Apr. 2..	21	--	20.06	13.57	23.32	--	4.69		--	--	--	--	--	4,030	5.48	117	41	5.69	4,290	7.9
Apr. 3-28.....	26,868	12	15.22	11.76	15.27	.21	3.95		35.60	2.60	.04	.05	.32	3,000	4.08	109,622	36	4.16	3,290	7.8
Apr. 29-May 25..	2,860	--	16.87	13.16	19.79	--	3.15		--	--	--	--	--	3,560	4.84	13,846	40	5.11	3,820	7.7
May 26-28.....	2,029	--	11.23	6.58	9.70	--	3.23		--	--	--	--	--	1,940	2.64	5,354	35	3.25	2,280	7.6
May 29-June 3...	4,594	--	5.64	3.37	4.26	--	2.72		--	--	--	--	--	909	1.24	5,679	32	2.01	1,190	7.8
June 4-11.....	59	--	15.07	11.35	17.84	--	4.49		--	--	--	--	--	3,120	4.24	249	40	4.91	3,470	7.7
June 12-18.....	35	--	17.71	12.67	21.32	--	5.08		--	--	--	--	--	3,670	4.99	173	41	5.47	3,970	7.8

June 19-27, 1961	9,193	--	8.88	5.76	8.27	--	2.74		--	--	--	--	--	1,610	2.19	20,130	36	3.05	1,940	7.8
June 28	290	--	13.22	8.39	13.22	--	3.43		--	--	--	--	--	2,460	3.35	969	38	4.02	2,790	7.7
June 29-30	1,174	--	8.48	4.20	6.26	--	3.33		--	--	--	--	--	1,300	1.77	2,076	33	2.49	1,640	7.8
July 1	1,216	--	7.49	3.13	4.74	--	3.21		--	--	--	--	--	894	1.22	1,478	31	2.06	1,340	7.8
July 2	1,031	--	8.48	4.36	7.18	--	2.95		--	--	--	--	--	1,320	1.80	1,852	36	2.83	1,700	7.8
July 3-8	4,939	--	7.98	3.95	5.79	--	3.15		--	--	--	--	--	1,210	1.65	8,127	33	2.37	1,530	7.7
July 9	1,932	--	6.99	3.29	5.13	--	2.95		--	--	--	--	--	1,040	1.41	2,732	33	2.26	1,350	7.8
July 10-16	7,928	--	9.08	5.35	6.96	--	3.51		--	--	--	--	--	1,470	2.00	15,850	33	2.59	1,800	7.6
July 17-20	1,682	--	11.38	6.83	8.96	--	3.67		--	--	--	--	--	1,880	2.56	4,300	33	2.97	2,210	7.6
July 21	248	--	13.72	7.32	11.22	--	3.87		--	--	--	--	--	2,220	3.02	749	35	3.46	2,580	7.7
July 22	476	--	15.72	8.31	12.44	--	4.20		--	--	--	--	--	2,460	3.35	1,593	34	3.59	2,830	7.7
July 23-26	1,849	--	11.98	6.83	8.18	--	3.67		--	--	--	--	--	1,870	2.54	4,701	30	2.67	2,170	7.7
July 27-29	412	--	15.22	8.80	14.14	--	3.41		--	--	--	--	--	2,610	3.55	1,464	37	4.08	2,960	7.9
July 30-31	333	--	18.96	10.28	17.84	--	4.26		--	--	--	--	--	3,250	4.42	1,473	38	4.66	3,570	7.9
Aug. 1-2	698	--	9.63	5.02	6.96	--	3.00		--	--	--	--	--	1,520	2.07	1,443	32	2.57	1,860	8.0
Aug. 3-4	1,071	--	10.63	5.76	8.00	--	3.52		--	--	--	--	--	1,710	2.33	2,491	33	2.80	2,060	7.7
Aug. 5	1,127	--	7.68	4.44	5.18	--	2.84		--	--	--	--	--	1,180	1.60	1,808	30	2.10	1,510	7.7
Aug. 6	1,186	--	10.38	6.42	6.13	--	3.06		--	--	--	--	--	1,630	2.22	2,629	27	2.12	1,910	7.6
Aug. 7-16	10,552	--	7.68	3.95	5.00	--	2.88		--	--	--	--	--	1,140	1.55	16,360	30	2.07	1,460	7.7
Aug. 17-18	2,428	--	10.68	4.69	6.83	--	3.25		--	--	--	--	--	1,560	2.12	5,151	31	2.46	1,890	7.8
Aug. 19-23	5,290	--	8.08	4.08	5.00	--	3.20		--	--	--	--	--	1,170	1.59	8,410	29	2.03	1,490	7.7
Aug. 24-26	1,950	--	8.98	4.78	6.00	--	3.46		--	--	--	--	--	1,360	1.85	3,610	30	2.29	1,700	7.8
Aug. 27-29	1,369	--	10.18	5.68	7.31	--	3.74		--	--	--	--	--	1,620	2.20	3,015	32	2.60	1,970	7.9
Aug. 30-Sept. 1.	2,035	--	9.28	5.02	6.57	--	3.33		--	--	--	--	--	1,450	1.97	4,013	31	2.46	1,800	7.9
Sept. 2-5	1,825	--	11.33	6.50	9.14	--	3.61		--	--	--	--	--	1,890	2.57	4,690	34	3.06	2,260	7.8
Sept. 6-7	1,595	--	8.73	5.02	6.61	--	3.16		--	--	--	--	--	1,400	1.90	3,036	32	2.52	1,780	7.9
Sept. 8	873	--	7.44	4.20	5.26	--	3.21		--	--	--	--	--	1,150	1.56	1,365	31	2.18	1,470	7.8
Sept. 9-19	9,687	15	6.29	3.45	4.09	.12	3.02		9.89	.82	.05	.11	.15	921	1.25	12,134	29	1.85	1,230	7.9
Sept. 20-28	8,158	--	7.09	3.78	5.00	--	2.95		--	--	--	--	--	1,080	1.47	11,982	32	2.15	1,390	7.9
Sept. 29-30	1,238	--	7.93	4.28	5.70	--	3.31		--	--	--	--	--	1,240	1.69	2,087	32	2.31	1,560	8.0
Total or weighted average	130,400	--	10.48	6.66	8.92	--	3.36		--	--	--	--	--	1,820	2.48	323,400	34	3.05	2,140	--

ARKANSAS RIVER BASIN--Continued

7-1465. ARKANSAS RIVER AT ARKANSAS CITY, KANS.

LOCATION.--At gaging station at bridge on U.S. Highway 166, 0.1 mile downstream from St. Louis-San Francisco Railway Co. bridge, 0.5 mile west of Arkansas City, Cowley County, and 5.4 miles upstream from Walnut River.
DRAINAGE AREA.--43,713 square miles, of which 7,607 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1961.
Water temperatures: October 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,930 micromhos Jan. 27; minimum daily, 246 micromhos May 7.
Percent sodium: Maximum, 69 Oct. 10-13; minimum, 39 July 22-25, Aug. 20-21.
Sodium-adsorption-ratio: Maximum, 8.61 Oct. 10-13; minimum, 1.21 July 22-25.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 5,770 micromhos Jan. 16, 1957; minimum daily, 227 micromhos Aug. 28, 1960.
Percent sodium: Maximum, 79 Apr. 28, 1955; minimum, 27 Aug. 15, 1960.
Sodium-adsorption-ratio: Maximum, 16 Oct. 5, 1953, Aug. 7, 1955; minimum, 1.1 Aug. 5, 1960.
REMARKS.--Sodium (Na) and potassium (K) are calculated and reported as sodium. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-4, 1960..	10,251	--	3.99	1.40	8.44		3.08	0.00	2.42	8.24	--	0.10	--	823	1.12	11,473	61	5.14	1,440	8.1
Oct. 5-9.....	8,757	--	4.94	2.06	11.09		4.00	.00	3.21	11.14	--	.07	--	1,130	1.54	13,458	61	5.93	1,880	8.2
Oct. 10-13.....	6,284	--	5.59	2.22	17.01		3.67	.00	4.02	17.07	--	.06	--	1,470	2.00	12,562	69	8.61	2,570	8.2
Oct. 14-20.....	55,676	--	2.10	.54	3.09		1.93	.00	.94	2.82	--	.05	--	346	.47	26,199	54	2.69	615	7.9
Oct. 21-25.....	20,469	--	3.29	1.23	6.18		2.95	.00	1.81	5.92	--	.00	--	661	.90	18,401	58	4.11	1,140	7.1
Oct. 26-27.....	19,498	--	1.80	.64	2.31		1.84	.00	.92	1.97	--	.00	--	290	.39	7,690	49	2.09	504	7.2
Oct. 28-30.....	18,149	--	2.99	1.15	5.35		2.59	.00	1.92	4.94	--	.01	--	566	.77	13,970	56	3.72	994	7.7
Oct. 31.....	16,760	--	1.50	.50	1.83		1.51	.00	.73	1.58	--	--	--	234	.32	5,334	48	1.83	416	7.8
Nov. 1-3.....	30,050	--	1.90	.90	3.05		1.97	.00	1.12	2.76	--	.01	--	352	.48	14,385	52	2.57	579	7.0
Nov. 4-10.....	19,813	--	4.49	1.97	8.53		3.70	.00	2.77	8.46	--	.09	--	891	1.21	24,008	57	4.74	1,510	8.2
Nov. 11-20.....	18,803	19	5.29	2.63	9.83	0.21	4.26	.00	3.35	10.58	0.02	.07	0.71	1,100	1.50	28,130	55	4.94	1,840	8.0
Nov. 21-30.....	16,542	--	5.44	2.88	10.70		4.33	.00	3.58	11.00	--	.10	--	1,130	1.54	25,422	56	5.25	1,890	7.9
Dec. 1-11.....	20,967	--	5.29	2.22	10.88		4.20	.00	3.62	10.44	--	.10	--	1,080	1.47	30,797	59	5.61	1,810	8.2
Dec. 12-15.....	16,518	--	3.74	1.73	6.53		3.21	.00	2.69	6.07	--	.07	--	708	.96	15,905	54	3.95	1,220	8.0
Dec. 16-20.....	13,745	--	4.79	1.97	9.66		3.97	.00	3.23	9.17	--	.10	--	967	1.32	18,077	59	5.25	1,640	7.6

Dec. 21-31, 1960	23,760	20	5.79	2.22	12.27	.14	4.33	.00	3.62	11.57	.02	.15	.48	1,310	1.78	42,331	60	6.13	2,040	7.6
Jan. 1-21, 1961.	40,820	19	5.84	1.97	12.70	.15	4.16	.27	3.91	11.85	.03	.16	.31	1,270	1.73	70,504	61	6.43	2,050	8.4
Jan. 22-28.....	7,345	--	7.14	2.80	16.53		4.72	.20	4.73	16.64	--	.15	--	1,710	2.33	17,081	62	7.42	2,630	8.4
Jan. 29-31.....	6,087	--	6.24	3.70	10.92		4.88	.00	4.04	11.71	--	.19	--	1,350	1.84	11,176	52	4.90	2,060	6.1
Feb. 1-9.....	16,227	22	5.19	2.30	12.70	.15	3.93	.27	3.69	11.85	.03	.19	.31	1,290	1.75	28,468	62	6.56	2,000	8.4
Feb. 10-18.....	21,850	--	4.94	2.22	10.79		3.87	.13	3.56	10.30	--	.15	--	1,060	1.44	31,499	60	5.70	1,830	6.3
Feb. 19-21.....	17,691	--	3.04	1.40	5.00		2.62	.00	2.08	4.65	--	.06	--	557	.76	13,401	53	3.36	975	8.2
Feb. 22.....	3,094	--	3.64	1.89	7.22		2.72	.20	2.77	6.91	--	.13	--	755	1.03	3,177	57	4.34	1,300	8.4
Feb. 23-28.....	15,055	--	4.89	2.22	10.14		3.77	.00	3.79	9.59	--	.10	--	1,040	1.41	21,293	59	5.38	1,750	8.2
Mar. 1-10.....	18,803	16	5.64	2.14	12.44	.14	4.59	.00	4.31	11.28	.02	.11	.30	1,210	1.65	30,943	61	6.31	1,980	8.1
Mar. 11-18.....	14,233	--	5.39	2.80	11.66		4.26	.00	4.21	11.28	--	.12	--	1,230	1.67	23,810	59	5.76	2,020	8.1
Mar. 19-26.....	32,561	--	4.14	2.22	6.57		3.31	.00	2.91	6.63	--	.13	--	832	1.13	36,843	51	3.68	1,310	8.2
Mar. 27-29.....	32,769	--	2.54	.90	3.61		2.33	.00	1.44	3.22	--	.06	--	425	.58	18,940	51	2.75	702	8.2
Mar. 30.....	4,245	--	3.69	1.81	7.00		2.75	.27	2.48	6.91	--	.11	--	810	1.10	4,676	56	4.22	1,280	8.5
Mar. 31.....	3,828	--	4.69	2.55	10.96		3.08	.47	3.48	11.00	--	.12	--	1,170	1.59	6,091	60	5.76	1,850	8.6
Apr. 1-4.....	14,694	--	4.39	2.22	8.31		3.21	.40	3.19	8.04	--	.07	--	902	1.23	18,025	56	4.57	1,500	8.6
Apr. 5-8.....	9,457	--	5.09	2.55	10.40		4.33	.00	3.50	10.16	--	.01	--	1,060	1.44	13,633	58	5.32	1,810	8.2
Apr. 9-15.....	37,307	15	3.69	1.32	6.22	.14	2.98	.13	2.23	5.98	.02	.05	.26	695	.95	35,263	55	3.93	1,170	8.3
Apr. 16-22.....	17,314	--	5.04	2.39	10.88		4.00	.13	3.48	10.58	--	.06	--	1,090	1.48	25,666	59	5.64	1,840	8.4
Apr. 23-30.....	16,423	--	4.64	2.80	10.92		3.47	.00	3.77	11.06	--	.04	--	1,100	1.50	24,569	59	5.66	1,880	7.9
May 1-2.....	15,213	--	2.89	.99	4.35		2.49	.00	1.83	3.89	--	.00	--	500	.68	10,345	53	3.12	841	7.6
May 3.....	5,058	--	3.59	1.65	6.74		2.88	.13	2.44	6.43	--	.08	--	739	1.01	5,083	56	4.17	1,230	8.3
May 4-5.....	50,856	--	2.40	.80	3.31		2.13	.00	1.35	3.02	--	.00	--	421	.57	29,118	51	2.62	679	7.1
May 6-8.....	178,691	--	1.30	.46	1.74		1.44	.00	.73	1.27	--	.04	--	197	.27	47,875	50	1.86	331	7.6
May 9-11.....	50,501	--	2.50	.78	3.70		2.43	.00	1.02	3.53	--	.00	--	401	.55	27,541	53	2.89	700	7.2
May 12-13.....	15,431	--	3.59	1.81	6.26		3.21	.00	1.81	6.63	--	.01	--	683	.93	14,334	54	3.81	1,190	7.7
May 14-31.....	74,297	15	4.89	1.89	9.48	.19	3.51	.20	2.98	9.65	.02	.05	.20	1,010	1.37	102,054	58	5.15	1,710	8.4
June 1-4.....	10,013	--	4.79	2.22	11.88		3.28	.20	3.66	11.71	--	.03	--	1,150	1.56	15,660	63	6.34	1,930	8.4
June 5.....	5,395	--	2.64	.99	4.70		2.03	.13	1.71	4.37	--	.06	--	533	.72	3,911	56	3.49	908	8.5
June 6-14.....	32,186	11	3.89	1.73	8.44	.10	3.15	.00	2.71	8.18	.03	.06	.19	868	1.18	37,995	60	5.03	1,480	7.7

ARKANSAS RIVER BASIN--Continued

7-1465. ARKANSAS RIVER AT ARKANSAS CITY, KANS.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 15-17, 1961	26,061	--	2.30	0.82	3.65		2.16	0.00	1.31	3.24	--	0.05	--	409	0.56	14,507	54	2.93	695	8.2
June 18-19.....	10,651	--	3.29	1.32	6.92		2.82	.00	2.35	6.35	--	.01	--	693	.94	10,039	60	4.56	1,180	7.8
June 20-21.....	11,980	--	2.89	1.07	4.92		2.52	.07	1.73	4.51	--	.07	--	554	.75	9,026	55	3.49	930	8.3
June 22-23.....	8,569	--	3.79	1.23	7.48		3.02	.00	2.27	7.19	--	.01	--	792	1.08	9,229	60	4.72	1,290	7.9
June 24-30.....	20,396	--	4.89	1.89	10.09		3.61	.13	3.37	9.73	--	.06	--	1,040	1.41	28,848	60	5.48	1,700	8.4
July 1-2.....	4,364	--	5.19	2.55	11.53		3.80	.00	3.58	11.85	--	.01	--	1,200	1.63	7,121	60	5.86	1,950	7.3
July 3-4.....	4,403	--	5.59	2.55	14.44		3.80	.00	4.27	14.44	--	.01	--	1,460	1.99	8,743	64	7.16	2,280	7.5
July 5-6.....	4,066	--	5.14	2.14	11.53		3.74	.00	3.64	11.43	--	.01	--	1,210	1.65	6,691	61	6.04	1,920	8.0
July 7.....	5,098	--	2.59	.62	4.26		2.07	.07	1.50	4.01	--	.07	--	488	.66	3,383	56	3.26	810	8.3
July 8.....	3,491	--	3.34	1.32	6.13		2.49	.07	2.56	5.53	--	.11	--	676	.92	3,209	57	4.02	1,080	8.3
July 9-17.....	15,406	9.4	5.09	2.39	12.53	0.16	3.61	.00	3.75	12.41	0.03	.05	0.32	1,240	1.69	25,980	62	6.48	2,070	8.1
July 18-19.....	4,443	--	4.09	1.65	10.35		3.15	.00	2.71	10.16	--	.01	--	1,010	1.37	6,103	64	6.11	1,670	7.3
July 20.....	3,987	--	3.79	1.65	8.79		2.75	.27	2.50	8.60	--	.08	--	944	1.28	5,118	62	5.33	1,500	8.5
July 21.....	12,912	--	2.20	.99	3.05		2.20	.00	1.25	2.68	--	.06	--	396	.54	6,954	49	2.41	632	8.1
July 22-25.....	119,802	--	1.20	.56	1.13		1.51	.00	.42	.90	--	.06	--	185	.25	30,180	39	1.21	287	8.0
July 26-27.....	17,455	--	2.00	.80	2.57		2.10	.00	.83	2.43	--	.01	--	347	.47	8,237	48	2.17	556	7.4
July 28-31.....	16,860	--	3.29	1.40	5.96		3.15	.00	1.83	5.59	--	.06	--	681	.93	15,615	56	3.89	1,100	8.1
Aug. 1-8.....	18,375	--	4.24	2.80	8.53		3.57	.13	2.81	8.97	--	.05	--	942	1.28	23,540	55	4.54	1,590	8.3
Aug. 9-10.....	5,891	--	3.04	1.40	6.26		2.69	.00	1.83	6.07	--	.07	--	640	.87	5,127	59	4.20	1,090	8.1
Aug. 11-13.....	7,837	--	3.84	1.40	8.96		3.08	.00	2.27	8.75	--	.06	--	851	1.16	9,070	63	5.54	1,440	7.9
Aug. 14-15.....	26,283	--	2.69	1.40	4.65		2.75	.00	1.52	4.49	--	.00	--	531	.72	18,981	53	3.25	902	7.6
Aug. 16.....	35,345	--	1.80	.64	1.57		1.93	.00	.60	1.50	--	.00	--	258	.35	12,402	39	1.42	406	7.8
Aug. 17-19.....	26,283	--	2.69	1.40	4.65		2.75	.00	1.52	4.49	--	.00	--	531	.72	18,981	53	3.25	902	7.6
Aug. 20-21.....	35,345	--	1.80	.64	1.57		1.93	.00	.60	1.50	--	.00	--	258	.35	12,402	39	1.42	406	7.8
Aug. 22-25.....	36,004	--	2.50	.50	3.09		2.29	.00	1.04	2.71	--	.06	--	386	.52	18,901	51	2.52	633	7.8

Aug. 26-28, 1961	16,800	--	2.84	.96	4.66		2.75	.00	1.48	4.17	--	.06	--	524	.71	11,980	55	3.38	872	8.2
Aug. 29-31.....	11,170	--	3.69	1.47	5.99		3.31	.00	1.98	5.78	--	.08	--	676	.92	10,280	54	3.72	1,150	8.2
Sept. 1-10.....	26,162	--	4.29	2.14	7.57		3.44	.13	2.75	7.62	--	.05	--	841	1.14	29,923	54	4.22	1,440	8.3
Sept. 11-12.....	4,185	--	4.54	1.97	9.87		3.87	.00	3.06	9.45	--	.01	--	994	1.35	5,658	60	5.47	1,650	7.6
Sept. 13.....	10,810	--	2.89	.99	5.57		2.23	.00	1.89	5.22	--	.08	--	590	.80	8,674	59	4.00	1,010	8.2
Sept. 14-20.....	78,349	--	1.85	.82	2.35		1.97	.00	.90	2.09	--	.06	--	313	.43	33,352	47	2.03	525	7.8
Sept. 21-38.....	54,141	--	2.40	.99	3.48		2.46	.00	1.29	3.05	--	.06	--	414	.56	30,483	51	2.68	707	8.0
Sept. 29-30.....	7,418	--	3.69	1.48	5.96		3.25	.00	2.19	5.64	--	.07	--	673	.92	6,790	54	3.71	1,140	7.9
Total or weighted average	a1,744,000	--	3.15	1.32	5.68		2.72	--	1.92	5.44	--	0.06	--	621	0.84	1,474,000	56	3.80	1,030	--

a Represents 99 percent of runoff for water year.

ARKANSAS RIVER BASIN--Continued

7-1525. ARKANSAS RIVER AT RALSTON, OKLA.

LOCATION.--At gaging station on State Highway 18 at Ralston, Pawnee County, 2 miles downstream from Salt Creek, and 2 miles upstream from Grayhorse Creek.
DRAINAGE AREA.--54,465 square miles, of which 7,615 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: January 1950 to September 1961.
Water temperatures: January 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,540 micromhos Jan. 27; minimum daily, 234 micromhos Sept. 13.
Percent sodium: Maximum, 66 Oct. 6-15; minimum, 22 Aug. 14.
Sodium-adsorption-ratio: Maximum, 7.00 Mar. 7-20; minimum, 0.59 Aug. 14.
EXTREMES, 1950-61.--Specific conductance: Maximum daily, 7,510 micromhos Sept. 14, 1955; minimum daily, 234 micromhos Sept. 13, 1961.
Percent sodium: Maximum, 87 May 1-2, 1957; minimum, 21 Aug. 14, 1961.
Sodium-adsorption-ratio (1951-61): Maximum, 25 May 1-2, 1957; minimum, 0.6 Aug. 14, 1961.
REMARKS.--Dashes omitted in potassium (K) column indicate sodium (Na) and potassium (K) are calculated and reported as sodium. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla. Records of discharge for water year October 1960 to September 1981 given in Surface Water Records of Oklahoma, 1981.

Chemical analyses, water year October 1960 to September 1981

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-3, 1960..	17,018	--	2.94	0.99	6.44		2.23	0.00	1.75	6.35	--	0.05	--	626	0.85	14,489	82	4.59	1,100	8.0
Oct. 4-5.....	7,319	--	3.89	1.48	9.40		2.98	.00	2.46	9.31	--	.04	--	870	1.18	8,660	64	5.73	1,510	8.1
Oct. 6-15.....	24,674	--	4.24	1.97	11.88		3.08	.00	3.14	11.85	--	.02	--	1,080	1.47	36,242	66	6.74	1,900	8.1
Oct. 16-19.....	42,668	--	1.80	1.07	3.87		1.87	.00	1.12	3.72	--	.04	--	407	.55	23,618	57	3.23	733	7.9
Oct. 20-23.....	41,988	--	2.94	1.07	7.00		2.36	.00	1.81	6.77	--	.05	--	a 634	.86	36,202	64	4.94	1,180	8.0
Oct. 24-27.....	24,000	--	3.79	1.65	9.87		2.66	.00	2.71	9.87	--	.04	--	948	1.29	30,943	64	5.99	1,590	8.1
Oct. 28-31.....	74,277	--	2.69	.90	4.52		2.23	.00	1.50	4.34	--	.05	--	484	.66	48,892	56	3.37	862	8.0
Nov. 1-5.....	114,843	--	2.00	.99	2.91		1.74	.00	1.06	3.05	--	.05	--	361	.49	56,383	49	2.39	636	8.0
Nov. 6-10.....	36,536	--	3.74	1.89	8.79		2.95	.00	2.50	8.89	--	.05	--	853	1.16	42,384	61	5.24	1,470	8.2
Nov. 11-30.....	84,853	--	5.29	2.55	11.53		4.00	.20	3.37	11.71	--	.05	--	1,150	1.56	132,710	60	5.82	1,940	8.3
Dec. 1-9.....	33,453	16	5.99	2.39	11.53	0.13	4.29	.27	3.75	12.41	0.02	.06	0.46	1,240	1.69	56,416	58	5.63	2,100	8.4
Dec. 10-15.....	42,486	--	5.39	1.97	10.01		3.97	.13	3.52	9.73	--	.05	--	1,040	1.41	60,092	58	5.21	1,730	8.3
Dec. 16-20.....	29,950	--	4.09	1.81	8.92		3.02	.00	3.14	8.60	--	.05	--	881	1.20	35,885	60	5.19	1,500	7.8
Dec. 21-31.....	47,018	--	5.44	2.39	12.40		4.10	.07	3.69	12.27	--	.07	--	1,210	1.65	77,373	61	6.27	2,040	8.3
Jan. 1-31, 1961.	107,728	12	6.39	2.63	13.40	.10	4.43	.07	4.10	13.54	.02	.08	.43	1,340	1.82	196,320	59	6.31	2,230	8.3

a Calculated from determined constituents.

Feb. 1-20, 1961.	70,056	16	5.79	2.80	12.70	.13	4.26	.00	3.98	13.54	.02	.11	.30	1,340	1.82	127,670	59	6.13	2,190	8.2
Feb. 21-25.....	45,917	--	4.14	1.65	6.74		2.98	.00	2.66	6.83	--	.10	--	781	1.06	48,772	54	3.96	1,290	8.2
Feb. 26-28.....	15,608	--	4.79	1.97	10.53		3.54	.00	3.39	10.30	--	.08	--	1,050	1.43	22,288	61	5.72	1,770	8.2
Mar. 1-5.....	21,759	--	5.19	2.22	12.05		3.61	.33	3.81	11.62	--	.08	--	1,230	1.67	36,398	62	6.26	1,960	8.6
Mar. 6.....	8,529	--	2.99	.82	4.18		2.23	.07	1.27	4.37	--	.07	--	514	.70	5,962	52	3.02	775	8.4
Mar. 7-20.....	54,593	9	4.54	2.22	12.88	.14	3.34	.00	3.71	12.13	.01	.02	.34	1,120	1.52	83,156	65	7.00	1,880	7.6
Mar. 21-24.....	31,855	--	5.09	2.22	9.53		3.57	.13	3.23	9.82	--	.10	--	1,070	1.46	46,355	57	4.98	1,710	8.4
Mar. 25-28.....	37,646	--	4.44	1.97	8.00		3.11	.20	2.96	8.04	--	.09	--	944	1.28	48,332	56	4.47	1,470	8.4
Mar. 29-31.....	90,030	--	2.30	.78	2.39		2.13	.00	.94	2.34	--	.07	--	364	.50	44,568	44	1.93	576	8.2
Apr. 1.....	17,851	--	3.29	1.07	3.96		2.36	.27	1.15	4.51	--	.06	--	522	.71	12,673	48	2.68	873	8.3
Apr. 2-5.....	58,235	--	3.84	1.73	7.18		3.28	.00	2.42	7.05	--	.01	--	779	1.06	61,696	56	4.30	1,310	8.1
Apr. 6-10.....	47,583	--	4.89	2.30	9.66		3.47	.27	3.06	10.01	--	.04	--	1,020	1.39	66,008	57	5.09	1,690	8.4
Apr. 11-12.....	42,446	--	4.09	1.48	4.87		3.21	.27	2.00	4.94	--	.05	--	646	.88	37,292	47	2.92	1,060	8.4
Apr. 13-15.....	57,523	--	2.94	1.15	4.22		2.69	.00	1.50	4.09	--	.01	--	516	.70	40,367	51	2.95	853	7.6
Apr. 16-20.....	52,066	--	4.29	2.14	9.74		3.21	.33	2.85	9.73	--	.04	--	997	1.36	70,597	60	5.43	1,640	8.5
Apr. 21-30.....	84,853	12	4.44	1.97	9.83	.13	3.41	.00	2.91	9.59	.02	.02	.26	964	1.31	111,246	60	5.49	1,630	8.2
May 1.....	11,722	--	3.19	1.07	5.26		2.43	.13	1.64	5.30	--	.06	--	602	.82	9,597	55	3.61	977	8.5
May 2-6.....	244,760	--	2.10	.46	1.57		2.03	.00	.77	1.30	--	.03	--	244	.33	81,221	38	1.39	393	8.2
May 7-9.....	807,471	--	1.50	.34	.96		1.64	.07	.48	.59	--	.03	--	157	.21	172,411	34	1.00	250	8.3
May 10.....	127,736	--	2.10	.70	2.09		1.97	.13	.77	1.97	--	.05	--	305	.41	52,985	43	1.77	488	8.4
May 11-13.....	126,922	--	2.94	1.23	3.57		2.62	.07	1.21	3.81	--	.04	--	464	.63	80,093	46	2.47	816	8.3
May 14-21.....	149,141	15	5.09	1.81	7.92	.16	3.74	.33	2.48	8.41	.02	.05	.18	910	1.24	184,577	53	4.26	1,530	8.5
May 22.....	30,942	--	4.54	1.89	5.52		3.28	.40	2.12	6.07	--	.07	--	717	.98	30,172	46	3.08	1,190	8.6
May 23-27.....	157,983	--	3.09	1.48	3.83		2.56	.13	1.48	4.23	--	.04	--	524	.71	112,585	46	2.53	880	8.3
May 28-31.....	50,618	--	4.29	2.71	8.22		3.47	.00	2.60	9.17	--	.00	--	904	1.23	62,232	54	4.39	1,570	7.4
June 1-2.....	19,061	--	4.24	1.97	10.44		2.79	.27	2.94	10.58	--	.04	--	1,060	1.44	27,479	63	5.92	1,720	8.6
June 3.....	15,332	--	3.04	1.15	6.66		2.20	.20	1.89	6.49	--	.06	--	675	.92	14,075	61	4.60	1,130	8.5
June 4.....	14,479	--	3.74	1.89	9.27		2.49	.20	2.52	9.59	--	.05	--	966	1.31	19,022	62	5.52	1,550	8.6
June 5-8.....	56,870	--	3.89	1.81	7.48		2.95	.13	2.42	7.62	--	.05	--	822	1.12	63,576	57	4.43	1,350	8.5
June 9.....	24,000	--	3.09	1.40	4.61		2.52	.33	1.62	4.51	--	.11	--	578	.79	18,866	51	3.08	928	8.6

ARKANSAS RIVER BASIN--Continued

7-1525. ARKANSAS RIVER AT RALSTON, OKLA.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 10, 1961...	23,405	--	2.40	0.99	4.09		2.10	0.07	1.19	4.09	--	0.05	--	458	0.62	14,578	55	3.14	778	8.4
June 11-16.....	92,077	11	3.59	1.65	7.44	0.08	3.02	.00	2.08	7.39	0.03	.05	0.21	753	1.02	94,294	58	4.60	1,320	8.2
June 17.....	22,612	--	3.04	1.23	3.61		2.49	.07	1.54	3.72	--	.07	--	475	.65	14,607	46	2.47	795	8.4
June 18-19.....	32,430	--	3.19	1.23	6.31		2.43	.13	1.83	6.26	--	.04	--	661	.90	29,153	59	4.24	1,120	8.4
June 20-22.....	34,947	--	3.99	1.81	10.74		2.95	.07	2.71	10.72	--	.03	--	1,020	1.39	48,478	65	6.31	1,690	8.3
June 23-30.....	62,678	--	4.54	2.06	11.18		3.54	.07	2.94	11.14	--	.03	--	1,110	1.51	94,618	63	6.16	1,830	8.3
July 1-6.....	30,228	--	5.24	2.55	11.79		3.61	.40	3.16	12.41	--	.02	--	1,240	1.69	50,977	60	5.97	1,960	8.6
July 7-8.....	12,734	--	4.39	1.89	9.48		3.41	.00	2.52	9.82	--	.03	--	996	1.35	17,249	60	5.35	1,610	7.9
July 9-13.....	33,997	--	4.09	1.48	6.74		3.05	.00	2.12	7.05	--	.06	--	805	1.09	37,220	55	4.04	1,250	8.1
July 14-16.....	41,790	--	2.40	.68	3.00		2.00	.00	.71	3.36	--	.01	--	383	.52	21,767	49	2.42	634	7.8
July 17-22.....	53,459	10	3.09	1.73	6.26	.06	2.82	.00	1.67	5.92	.03	.03	.18	628	.85	45,658	56	4.03	1,090	8.1
July 23-24.....	85,289	--	2.10	.78	2.00		2.10	.00	.73	2.03	--	.01	--	299	.41	34,682	41	1.67	495	7.5
July 25-28.....	194,777	--	1.60	.40	1.00		1.61	.00	.37	.96	--	.05	--	187	.25	49,536	33	1.00	306	8.0
July 29.....	15,074	--	2.30	.82	2.52		2.23	.07	.77	2.54	--	.06	--	364	.50	7,462	45	2.02	575	8.4
July 30-31.....	22,750	--	3.09	1.07	4.61		2.88	.00	1.29	4.57	--	.01	--	552	.75	17,079	53	3.20	891	7.9
Aug. 1-12.....	70,024	--	4.24	1.97	7.66		3.57	.13	2.23	7.90	--	.04	--	828	1.13	78,853	55	4.34	1,430	8.3
Aug. 13.....	6,843	--	2.45	.90	3.22		2.23	.00	.83	3.41	--	.09	--	392	.53	3,648	49	2.49	685	8.2
Aug. 14.....	27,174	--	1.80	.36	.61		2.00	.00	.13	.56	--	.06	--	169	.23	6,246	22	.59	260	8.2
Aug. 15-18.....	98,539	--	2.25	.63	2.78		1.97	.00	.87	2.76	--	.05	--	320	.44	42,884	49	2.32	545	8.1
Aug. 19-20.....	21,937	--	2.84	1.15	5.26		2.26	.13	1.25	5.59	--	.06	--	574	.78	17,125	57	3.72	971	8.3
Aug. 21-26.....	170,182	--	2.40	.82	3.70		2.13	.00	1.06	3.70	--	.06	--	421	.57	97,439	53	2.92	721	8.2
Aug. 27-31.....	65,574	--	3.54	1.32	8.40		2.66	.00	2.44	8.18	--	.00	--	804	1.09	71,701	63	5.39	1,390	7.3
Sept. 1-6.....	47,246	--	4.64	1.73	9.14		3.11	.20	3.02	9.17	--	.03	--	936	1.27	60,143	59	5.12	1,600	8.4
Sept. 7-10.....	42,938	--	3.89	1.73	6.74		2.95	.00	2.00	7.33	--	.04	--	770	1.05	44,965	55	4.02	1,280	8.1
Sept. 11-12.....	15,669	--	3.64	.99	6.00		2.39	.00	1.94	6.21	--	.06	--	683	.93	14,555	56	3.95	1,120	7.9
Sept. 13-15.....	423,491	--	1.50	.42	.70		1.61	.00	.29	.68	--	.03	--	158	.21	91,000	27	.71	269	7.7
Sept. 16-18.....	178,929	--	1.70	.62	1.17		1.90	.00	.44	1.13	--	.04	--	209	.28	50,859	34	1.09	348	7.8
Sept. 19-25.....	158,836	--	2.84	.90	2.87		2.75	.00	.94	2.88	--	.05	--	407	.55	87,919	43	2.10	670	8.2
Sept. 26-27.....	44,350	--	3.74	1.32	3.87		3.64	.00	1.29	3.95	--	.01	--	539	.73	32,511	43	2.43	879	7.9
Sept. 28-30.....	62,182	--	2.69	.99	3.13		2.66	.00	1.08	3.05	--	.00	--	420	.57	35,518	46	2.31	685	7.8
Total or weighted average	5,496,000	--	2.94	1.15	4.64		2.56	--	1.50	4.63	--	0.04	--	530	0.72	3,965,000	53	3.24	886	--

7-1610. CIMARRON RIVER AT PERKINS, OKLA.

LOCATION.--At gaging station at bridge on State Highway 40, 1 mile south of Perkins, Payne County, 1.5 miles upstream from Dugout Creek, and 4 miles downstream from Wildhorse Creek.
DRAINAGE AREA.--17,852 square miles, of which 4,926 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1961.
Water temperatures: October 1952 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 17,600 micromhos July 29; minimum daily, 583 micromhos Sept. 28.
Percent sodium: Maximum, 92 July 31; minimum, 51 June 8.
Sodium-adsorption-ratio: Maximum, 51.57 July 29-30; minimum, 2.58 June 8, Sept. 28.
EXTREMES, 1952-61.--Specific conductance: Maximum daily, 32,400 micromhos Mar. 18, 1957; minimum daily, 438 micromhos Oct. 5, 1955.
Percent sodium: Maximum, 94 Feb. 18-20, 1955, Apr. 1-2, 1957; minimum, 51 June 8, 1961.
Sodium-adsorption-ratio: Maximum, 98 Feb. 18-20, 1955; minimum, 1.5 Oct. 5-7, 1955.
REMARKS.--Records of specific conductance of daily samples available in district office at Oklahoma City, Okla.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1960.	5,296	21	11.18	4.77	88.74	0.31	3.93	0.00	10.33	90.27	0.01	--	1.10	6,270	8.53	45,159	85	31.42	10,300	8.1
Oct. 11-15.....	3,650	16.	9.18	4.94	71.34		3.84	.00	9.43	71.94	.01	--	--	5,160	7.02	25,611	83	26.85	8,400	8.2
Oct. 16-19.....	19,398	15	5.14	2.63	29.88		2.69	.00	5.33	29.62	.02	--	--	2,240	3.05	59,095	79	15.16	3,840	7.9
Oct. 20-21.....	34,294	--	2.25	.90	9.09		1.93	.00	1.50	8.69	--	0.07	--	744	1.01	34,700	74	7.24	1,310	8.0
Oct. 22-25.....	12,893	15	4.19	1.81	24.75		2.10	.00	4.04	24.54	.02	.05	--	1,880	2.56	32,964	80	14.29	3,140	7.9
Oct. 26-27.....	5,950	--	7.49	3.62	73.08		3.28	.00	6.89	73.91	--	--	--	5,200	7.07	42,081	87	31.01	8,570	8.2
Oct. 28.....	6,843	--	3.14	1.65	16.01		2.49	.00	2.81	15.37	--	.11	--	1,300	1.77	12,098	77	10.35	2,250	8.1
Oct. 29-30.....	29,375	--	1.80	.80	5.39		1.80	.00	1.04	5.08	--	.06	--	492	.67	19,656	68	4.74	859	7.9
Oct. 31.....	12,655	--	3.59	1.65	20.10		2.00	.00	3.73	19.46	--	.10	--	1,570	2.14	27,020	79	12.42	2,670	8.0
Nov. 1-2.....	9,878	--	2.84	1.56	9.27		1.87	.00	2.81	8.97	--	.00	--	822	1.12	11,042	68	6.24	1,420	7.6
Nov. 3-10.....	12,916	14	6.94	3.04	40.02		3.44	.00	7.06	39.49	.02	--	--	3,030	4.12	53,226	80	17.92	5,110	7.9
Nov. 11-20.....	9,084	11	9.98	4.85	59.16		5.18	.00	9.49	59.24	.02	--	--	4,410	6.00	54,484	80	21.72	7,280	8.1
Nov. 21-30.....	7,498	18	8.98	5.92	64.38	.24	4.82	.00	10.31	67.70	.02	--	.76	4,940	6.72	50,371	81	23.58	8,270	8.2
Dec. 1-10.....	8,370	13	10.78	6.00	70.04		5.28	.00	11.08	70.53	.02	--	--	5,320	7.24	60,560	81	24.18	8,550	8.2
Dec. 11-15.....	7,468	11	8.98	5.43	53.07		4.56	.47	8.74	53.60	.02	--	--	4,140	5.63	42,047	79	19.77	6,730	8.4

ARKANSAS RIVER BASIN--Continued

7-1610. CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Dec. 16-18, 1960	4,201	12	9.98	6.00	65.69		4.69	0.00	10.66	66.29	0.02	--	--	5,010	6.81	28,624	80	23.23	8,040	8.0
Dec. 19-20	2,701	--	13.07	7.57	147.03		4.75	.00	12.91	150.08	--	--	--	10,200	13.87	37,475	88	45.77	16,300	8.0
Dec. 21-31	11,127	21	10.53	6.99	98.31	0.16	5.03	.00	11.66	101.27	.02	--	0.85	7,330	9.97	110,926	85	33.21	11,900	8.2
Jan. 1-20, 1961	17,772	17	10.18	5.76	83.09	.19	4.92	.00	12.03	78.99	.03	--	.35	5,820	7.92	140,668	84	29.43	9,360	8.2
Jan. 21-25	3,451	12	9.68	6.09	80.91		4.43	.00	12.03	80.40	.02	--	--	5,960	8.11	27,974	84	28.82	9,500	8.1
Jan. 26	516	--	3.89	4.11	41.06		2.62	.00	6.39	40.06	--	--	--	2,940	4.00	2,062	84	20.53	5,050	8.2
Jan. 27	496	--	8.78	6.66	96.57		2.16	.00	13.66	96.20	--	--	--	6,930	9.42	4,673	86	34.75	10,900	8.0
Jan. 28-31	2,785	10	9.88	6.09	75.69		5.18	.00	11.64	74.76	.02	--	--	5,500	7.48	20,830	83	26.79	9,030	8.1
Feb. 1-9	7,462	16	10.08	5.18	72.65	.19	4.85	.00	11.51	71.94	.02	--	.47	5,520	7.51	56,017	82	26.30	8,810	8.1
Feb. 10-12	2,541	7.4	10.08	5.76	86.13		4.59	.00	11.18	86.04	.02	--	--	6,110	8.31	21,113	84	30.61	9,970	8.1
Feb. 13-14	2,055	5.8	9.08	5.51	73.95		4.52	.00	10.62	73.35	--	--	--	5,420	7.37	15,147	84	27.38	8,890	7.9
Feb. 15-18	5,887	7.4	10.93	5.68	117.89		4.11	.00	12.28	117.92	.02	--	--	8,110	11.03	64,931	88	40.91	13,100	8.1
Feb. 19-26	9,933	7.4	8.98	5.02	72.21		4.52	.00	9.66	71.94	.02	--	--	5,220	7.10	70,518	84	27.29	8,600	8.1
Feb. 27-28	2,003	7.2	9.63	5.92	90.48		4.38	.00	11.58	89.99	.02	--	--	6,310	8.58	17,192	85	32.45	10,400	8.0
Mar. 1-19	13,868	7.8	9.73	6.66	88.31	.14	4.05	.27	12.08	87.17	.02	--	.50	6,430	8.74	121,277	84	30.84	10,300	8.4
Mar. 20-22	12,895	7.8	8.78	5.51	57.42		3.74	.00	10.14	57.83	.03	--	--	4,520	6.15	79,265	80	21.48	7,450	7.6
Mar. 23-24	5,415	--	9.33	5.84	94.40		3.23	.00	10.58	95.63	--	--	--	6,740	9.17	49,635	86	34.27	11,000	7.6
Mar. 25-26	3,816	--	7.98	5.10	63.08		3.67	.00	10.22	62.06	--	--	--	4,590	6.24	23,822	83	24.66	7,680	7.6
Mar. 27-30	8,291	11	9.28	5.51	83.52		4.06	.00	11.06	83.22	.03	--	--	5,940	8.08	66,977	85	30.71	9,760	8.2
Mar. 31	2,321	--	5.04	3.54	29.19		2.88	.00	6.68	28.21	--	--	--	2,310	3.14	7,291	77	14.09	3,950	8.2
Apr. 1-2	4,998	--	6.19	3.37	26.80		4.00	.00	6.45	25.95	--	.00	--	2,240	3.05	15,227	74	12.26	3,690	8.2
Apr. 3	7,180	--	8.28	5.02	60.47		3.05	.33	10.41	59.81	--	--	--	4,600	6.26	44,919	82	23.45	7,450	8.4
Apr. 4-5	9,540	--	5.59	2.88	23.45		2.62	.00	7.02	22.29	--	.00	--	1,990	2.71	25,820	73	11.39	3,300	7.5
Apr. 6-9	8,108	13	9.08	4.36	64.82		3.34	.27	10.39	64.32	.02	--	--	4,870	6.62	53,704	83	25.00	7,810	8.4
Apr. 10-15	15,780	14.	10.38	2.22	44.37	.16	3.87	.13	8.64	45.14	.02	--	.41	3,640	4.95	78,120	78	17.68	5,940	8.3
Apr. 16-18	5,064	--	11.33	6.25	104.40		4.25	.00	13.41	104.09	--	--	--	7,360	10.01	50,687	86	35.21	11,800	7.6
Apr. 19-30	12,496	12	9.58	5.84	71.78		3.64	.00	13.10	70.53	.02	--	--	5,300	7.21	90,070	82	25.85	8,590	8.2
May 1-4	4,253	11	9.38	6.25	68.30		4.56	.27	12.74	66.29	.02	--	--	5,200	7.07	30,074	81	24.43	8,230	8.4
May 5-7	39,588	10	4.54	2.47	21.62		1.97	.13	5.04	21.44	.02	.03	--	1,820	2.48	97,988	76	11.55	3,010	8.4
May 8	12,139	--	7.19	2.63	39.80		2.00	.13	8.54	38.93	--	--	--	3,160	4.30	52,168	80	17.96	5,110	8.3

May 9, 1961.....	9,025	--	5.04	2.47	19.62		1.90	.07	6.75	18.34	--	.06	--	1,730	2.35	21,234	72	10.13	2,810	8.3
May 10-13.....	20,136	14	4.69	2.14	13.83		1.90	.13	4.71	13.82	.02	.05	--	1,330	1.81	36,422	67	7.49	2,190	8.3
May 14-15.....	3,689	--	7.09	3.54	30.41		3.02	.00	7.50	30.47	--	--	--	2,560	3.48	12,845	74	13.19	4,120	7.8
May 16-21.....	7,926	15	8.58	4.44	42.63	.23	3.41	.27	9.33	43.73	.02	--	.38	3,600	4.90	38,805	76	16.70	5,860	8.4
May 22.....	5,157	--	6.39	3.21	34.28		2.56	.13	7.35	33.85	--	--	--	2,780	3.78	19,498	78	15.65	4,410	8.4
May 23-24.....	7,498	--	3.39	1.97	10.96		2.69	.00	2.94	10.72	--	.01	--	1,050	1.43	10,706	67	6.69	1,750	7.9
May 25.....	4,145	--	6.69	3.29	35.50		2.26	.20	7.22	35.83	--	--	--	2,920	3.97	16,462	78	15.89	4,660	8.4
May 26-27.....	3,784	--	4.29	2.71	16.57		2.29	.00	4.89	16.36	--	.01	--	1,470	2.00	7,566	70	8.86	2,460	7.8
May 28-29.....	2,487	--	7.58	3.70	32.45		3.25	.00	8.35	32.16	--	--	--	2,810	3.82	9,505	74	13.66	4,450	7.9
May 30-31.....	1,904	--	9.78	4.61	56.55		3.57	.00	10.26	56.98	--	--	--	4,460	6.07	11,550	80	21.08	7,070	7.8
June 1-2.....	1,579	--	10.28	6.75	63.51		3.77	.00	10.31	66.29	--	--	--	4,990	6.79	10,715	79	21.77	8,040	8.1
June 3.....	1,916	--	4.54	2.63	26.36		2.13	.07	4.48	26.80	--	.08	--	2,050	2.79	5,342	79	13.92	3,540	8.3
June 4-5.....	39,174	--	2.40	1.07	8.22		2.20	.00	1.52	7.96	--	.01	--	733	1.00	39,051	70	6.25	1,250	8.0
June 6-7.....	25,884	--	2.89	2.39	8.66		2.03	.00	3.02	8.80	--	.04	--	851	1.16	29,957	62	5.33	1,450	8.0
June 8.....	19,577	--	2.50	.70	3.26		1.90	.00	1.69	2.76	--	.09	--	435	.59	11,582	51	2.58	671	8.2
June 9.....	18,863	--	3.59	1.48	10.35		1.87	.00	3.23	10.21	--	.08	--	983	1.34	25,217	67	6.50	1,620	8.2
June 10-14.....	25,904	11	4.94	2.47	43.24	.16	2.39	.07	5.10	42.32	.03	--	.41	2,960	4.03	104,280	85	22.47	5,060	8.3
June 15-16.....	17,236	--	4.29	2.71	31.23		3.02	.00	4.16	31.03	--	--	--	2,270	3.09	53,212	82	16.69	3,990	8.2
June 17.....	16,939	--	4.29	2.30	15.23		2.43	.13	4.06	15.09	--	.09	--	1,340	1.82	30,869	70	8.38	2,260	8.3
June 18-19.....	12,337	--	3.29	1.65	7.92		2.03	.00	3.39	7.39	--	.02	--	809	1.10	13,574	62	5.04	1,350	8.1
June 20.....	2,777	--	5.19	1.97	12.83		2.23	.13	4.75	12.84	--	.05	--	1,260	1.71	4,758	64	6.78	2,070	8.4
June 21-22.....	3,903	--	7.14	3.04	30.06		3.41	.00	5.83	31.03	--	--	--	2,550	3.47	13,537	75	13.32	4,130	7.8
June 23-25.....	4,034	15	7.88	3.95	40.24		3.80	.00	7.29	40.90	.02	--	--	3,180	4.32	17,448	77	16.54	5,220	7.6
June 26-28.....	3,921	16	8.48	4.69	48.72		3.87	.00	8.54	49.37	.02	--	--	3,850	5.24	20,532	79	18.98	6,200	7.9
June 29.....	1,559	--	6.34	3.78	37.02		3.28	.40	6.77	36.67	--	--	--	2,900	3.94	6,149	79	16.46	4,820	8.5
June 30.....	1,021	--	5.34	2.96	22.62		3.34	.20	5.41	21.86	--	.08	--	1,860	2.53	2,584	73	11.10	3,100	8.5
July 1.....	893	--	6.49	3.29	32.71		2.92	.27	6.87	32.44	--	--	--	2,640	3.59	3,205	77	14.79	4,280	8.5
July 2-6.....	3,293	18	8.58	4.44	47.85		3.84	.00	8.43	48.52	.02	--	--	3,890	5.29	17,419	79	18.75	6,140	8.0
July 7-9.....	3,308	11	5.69	3.54	33.63		3.11	.00	5.83	33.85	.02	--	--	2,700	3.67	12,149	78	15.66	4,420	8.1
July 10-11.....	1,277	--	6.99	4.52	43.24		3.93	.00	7.08	43.73	--	--	--	3,450	4.69	5,993	79	18.02	5,500	8.2

ARKANSAS RIVER BASIN--Continued

7-1610. CIMARRON RIVER AT PERKINS, OKLA.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 12-13, 1961	1,190	--	7.78	5.18	53.94		3.97	0.00	8.64	54.16	--	--	--	4,220	5.74	6,830	81	21.18	6,650	7.8
July 14.....	831	--	5.99	2.22	40.89		2.92	.20	6.45	39.49	--	--	--	3,110	4.23	3,515	83	20.18	4,950	8.4
July 15-17.....	15,156	11	4.34	2.47	27.93		2.33	.00	4.16	28.21	0.02	--	--	2,210	3.01	45,552	80	15.14	3,610	8.2
July 18.....	2,182	--	5.79	2.88	43.94		2.43	.07	7.29	42.88	--	--	--	3,380	4.60	10,029	84	21.10	5,410	8.3
July 19-20.....	3,618	--	8.38	4.85	63.95		2.49	.00	9.58	64.88	--	--	--	4,920	6.69	24,208	83	24.86	7,790	7.9
July 21.....	1,321	--	10.18	3.45	82.22		2.56	.20	9.99	83.22	--	--	--	6,140	8.35	11,031	86	31.49	9,620	8.4
July 22-24.....	4,082	16	7.39	3.21	60.47		2.92	.13	7.29	60.65	.02	--	--	4,390	5.97	24,371	85	26.27	7,240	8.4
July 25.....	1,428	--	4.69	2.55	30.06		2.82	.13	4.68	29.62	--	--	--	2,400	3.26	4,661	81	15.80	3,970	8.4
July 26-28.....	3,344	15	6.99	3.37	55.25		3.05	.20	7.29	55.01	.02	--	--	3,980	5.41	18,101	84	24.27	6,520	8.4
July 29-30.....	2,690	--	10.53	5.35	145.29		3.10	.00	9.51	148.67	--	--	--	9,840	13.38	35,993	90	51.57	15,700	7.9
July 31.....	922	--	5.59	2.80	92.66		2.85	.13	6.25	91.68	--	--	--	6,200	8.43	7,777	92	45.25	10,300	8.4
Aug. 1-14.....	7,081	20	6.09	4.03	63.51		3.08	.13	6.97	63.47	.03	--	--	4,520	6.15	43,528	86	28.24	7,490	8.3
Aug. 15-16.....	2,626	--	5.44	4.36	48.72		3.61	.20	5.31	49.37	--	--	--	3,470	4.72	12,393	83	22.01	5,830	8.5
Aug. 17-18.....	6,724	--	3.99	3.54	26.19		2.49	.00	4.37	26.80	--	0.03	--	1,980	2.69	18,106	78	13.50	3,450	8.2
Aug. 19-22.....	19,517	14	5.09	1.89	37.24		1.93	.00	4.21	38.08	.02	--	--	2,760	3.75	73,260	84	19.93	4,660	8.2
Aug. 23-24.....	10,255	--	3.99	1.40	17.66		1.80	.00	4.33	16.93	.00	--	--	1,390	1.89	19,385	77	10.76	2,430	7.8
Aug. 25-26.....	6,565	--	7.68	2.96	63.51		2.16	.00	6.87	64.88	--	--	--	4,550	6.19	40,626	86	27.53	7,540	8.0
Aug. 27-31.....	6,873	17	5.69	2.63	46.11		2.69	.13	6.20	45.14	.03	--	--	3,220	4.38	30,097	85	22.61	5,470	8.4
Sept. 1-3.....	2,196	19	8.58	3.62	67.86		3.54	.00	8.74	67.70	.03	--	--	4,870	6.62	14,543	85	27.47	8,000	8.2
Sept. 4-9.....	5,117	13	5.59	3.13	41.67		2.95	.13	5.52	41.75	.02	--	--	3,070	4.18	21,366	83	19.96	5,280	8.3
Sept. 10.....	1,127	--	7.44	4.20	58.73		3.08	.27	7.70	59.24	--	--	--	4,320	5.88	6,619	83	24.35	7,250	8.4
Sept. 11-12.....	1,571	--	3.69	2.14	22.97		2.49	.00	3.71	22.57	--	.00	--	1,720	2.34	3,675	80	13.45	3,050	8.1
Sept. 13-16.....	199,220	10	1.70	.54	3.52		1.51	.00	1.02	3.16	.02	.04	--	345	.47	93,474	61	3.33	614	8.2
Sept. 17.....	4,066	--	2.40	1.23	7.66		1.90	.07	1.89	7.33	--	.05	--	681	.93	3,766	68	5.68	1,180	8.3
Sept. 18-19.....	5,197	--	3.74	1.89	14.27		2.69	.00	3.06	14.11	--	.01	--	1,230	1.67	8,693	72	8.50	2,130	8.2
Sept. 20-21.....	4,165	--	5.44	3.13	19.18		3.64	.00	4.37	19.75	--	.01	--	1,750	2.38	9,920	69	9.20	2,960	8.0
Sept. 22-24.....	4,165	--	5.44	3.13	19.18		3.64	.00	4.37	19.75	--	.01	--	1,750	2.38	9,913	69	9.27	2,960	8.0
Sept. 25-27.....	5,998	18	5.59	4.03	26.36		3.57	.00	4.83	27.50	.02	.02	--	2,210	3.01	18,028	73	12.02	3,780	8.2
Sept. 28.....	16,977	8.4	1.80	.99	5.57		1.57	.00	1.46	5.22	.03	.05	--	498	.68	11,498	67	4.72	900	7.7
Sept. 29-30.....	6,030	--	1.70	.74	2.87		1.51	.00	.90	2.82	--	.10	--	334	.45	2,739	54	2.60	583	7.7
Total or weighted average	1,049,000	--	4.94	2.55	30.33		2.62	--	5.02	30.18	--	--	--	2,320	3.16	3,313,000	80	15.67	3,840	--

7-2505. ARKANSAS RIVER AT VAN BUREN, ARK.

LOCATION.--At gaging station on downstream side of pier of bridge on U.S. Highways 64 and 71, at Van Buren, Crawford County, 1.3 miles downstream from Lee Creek, 8.6 miles downstream from Poteau River, and at mile 353.4.
DRAINAGE AREA.--150,483 square miles, of which 22,241 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1961.
Water temperatures: October 1945 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 5,950 micromhos Jan. 31; minimum daily, 259 micromhos July 14-19.
Percent sodium: Maximum, 78 Jan. 31; minimum, 30 June 1-2.
EXTREMES, 1945-61.--Specific conductance: Maximum daily, 8,980 micromhos Apr. 1, 1954; minimum daily, 132 micromhos May 11, 1948.
Percent sodium: Maximum, 80 Oct. 21-24, 1946, Aug. 3-4, 1956; minimum, 18 July 22, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Little Rock, Ark.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-5, 1960..	86,876	7.6	3.69	1.48	8.70	0.19	2.69	0.00	2.37	9.03	0.02	0.05	0.08	905	1.23	106,927	62	5.41	1,590	7.5
Oct. 6-11.....	77,736	6.5	3.34	1.15	6.70	.24	2.66	.00	1.92	6.77	.02	.09	.08	730	.99	77,176	59	4.47	1,310	7.5
Oct. 12-14.....	32,626	--	3.69	1.15	8.44	.18	2.75	.00	2.02	8.75	--	.05	.10	908	1.23	40,289	63	5.42	1,520	7.5
Oct. 15.....	9,937	--	3.24	1.15	6.22	.15	2.85	.00	1.50	6.21	--	.04	.05	608	.83	8,217	58	4.20	1,240	8.0
Oct. 16-17.....	20,212	--	3.84	1.40	9.31	.21	3.05	.00	2.21	9.31	--	.04	.13	935	1.27	25,701	63	5.75	1,630	7.9
Oct. 18.....	9,600	--	2.50	1.07	5.05	.12	2.07	.00	1.50	5.08	--	.05	.08	500	.68	6,528	58	3.78	983	8.0
Oct. 19-20.....	30,585	--	3.34	1.65	7.53	.18	2.69	.00	2.37	7.62	--	.06	.18	816	1.11	33,942	59	4.77	1,400	8.0
Oct. 21-26.....	263,246	9.4	3.29	1.15	6.96	.21	2.56	.00	2.00	7.05	.03	.08	.44	773	1.05	276,746	60	4.67	1,350	7.7
Oct. 27-Nov. 3..	410,658	8.0	2.79	.82	4.92	.13	2.36	.00	1.79	4.51	.03	.09	.23	583	.79	325,602	57	3.66	980	7.7
Nov. 4-8.....	380,430	8.2	2.10	.68	2.26	.11	1.97	.00	1.04	2.12	.03	.07	.01	324	.44	167,633	44	1.92	571	8.1
Nov. 9-16.....	264,992	7.1	2.89	.90	4.00	.12	2.49	.00	1.50	3.72	.03	.05	.15	492	.67	177,311	51	2.90	865	8.1
Nov. 17-21.....	102,248	7.9	3.29	1.23	5.83	.14	2.95	.00	1.58	5.92	.02	.09	.01	664	.90	92,334	56	3.87	1,180	7.7
Nov. 22-27.....	84,758	9.8	3.79	1.65	7.79	.17	3.28	.00	2.19	7.96	.03	.05	.23	864	1.18	99,594	58	4.72	1,520	8.0
Nov. 28-29.....	20,926	--	4.59	1.97	11.48	.20	3.54	.00	2.75	11.57	--	.05	.10	1,140	1.55	32,443	63	6.34	2,020	7.9
Nov. 30-Dec. 5..	79,140	7.6	3.34	1.40	6.18	.15	2.95	.00	1.89	6.15	.03	.05	.17	722	.98	77,710	56	4.01	1,250	7.7

ARKANSAS RIVER BASIN--Continued

7-2505. ARKANSAS RIVER AT VAN BUREN, ARK.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Dec. 6-8, 1960..	48,692	--	1.50	0.71	2.31	0.07	1.34	0.00	0.79	2.40	--	0.04	0.08	286	0.39	18,939	50	2.20	536	7.9
Dec. 9.....	30,744	--	2.40	1.15	4.22	.11	2.26	.00	1.23	4.37	--	.04	.03	a448	.61	18,732	54	3.17	861	7.9
Dec. 10.....	39,273	--	1.90	.77	2.61	.09	1.77	.00	.92	2.68	--	.06	.04	a306	.42	16,344	49	2.26	590	8.1
Dec. 11-14.....	318,545	5.8	2.40	.90	3.87	.10	2.10	.00	1.19	3.95	0.02	.05	.03	458	.62	198,416	53	3.01	823	7.7
Dec. 15.....	81,719	--	1.80	.72	2.22	.09	1.64	.00	.77	2.40	--	.06	.02	a274	.37	30,452	46	1.98	535	8.0
Dec. 16.....	69,025	--	2.59	.99	4.18	.11	2.16	.00	1.21	4.51	--	.06	.03	a451	.61	42,337	53	3.12	849	8.2
Dec. 17-18.....	121,388	--	1.45	.71	2.35	.09	1.38	.00	.79	2.40	--	.04	.04	285	.39	47,050	51	2.26	529	8.0
Dec. 19-20.....	117,818	--	2.89	1.07	4.18	.11	2.43	.00	1.46	4.37	--	.05	.05	510	.69	81,719	51	2.97	916	7.7
Dec. 21-26.....	230,281	12	2.99	1.23	4.79	.12	2.72	.00	1.75	4.65	.03	.07	.22	609	.83	190,728	52	3.29	1,020	8.0
Dec. 27-29.....	78,545	--	3.39	1.65	8.18	.15	2.88	.00	2.02	8.46	--	.07	.07	862	1.17	92,080	61	5.15	1,560	8.2
Dec. 30-31.....	53,752	--	2.69	1.32	6.44	.12	2.23	.00	1.50	6.77	--	.07	.10	699	.95	51,099	61	4.55	1,250	8.0
Jan. 1-5, 1961..	140,826	9.8	3.14	1.48	8.27	.14	2.56	.00	1.81	8.75	.02	.06	.04	870	1.18	166,626	63	5.44	1,510	8.0
Jan 6-10.....	103,339	9.4	3.29	1.15	6.79	.13	2.62	.00	1.77	6.91	.02	.07	.03	752	1.02	105,687	60	4.55	1,310	8.1
Jan. 11-15.....	93,382	8.6	3.84	1.56	9.09	.15	3.11	.00	2.25	9.17	.03	.07	.02	966	1.31	122,681	62	5.53	1,880	8.2
Jan. 16-29.....	235,089	9.6	3.59	1.15	6.79	.13	2.88	.00	1.89	6.77	.02	.06	.12	774	1.05	247,464	58	4.41	1,330	8.2
Jan. 30.....	9,937	--	2.05	1.48	11.44	1.69	8.85	5.00	2.60	11.43	--	.03	.19	a1,340	1.82	18,110	69	8.62	3,100	8.8
Jan. 31.....	8,608	--	.70	.58	19.66	4.12	13.87	1.67	3.87	19.75	--	.05	.25	a2,290	3.11	26,810	78	24.55	5,950	8.9
Feb. 1	10,612	--	1.65	1.40	13.22	2.17	11.54	6.00	2.94	12.98	--	.03	.18	a1,570	2.14	22,658	72	10.72	3,900	8.8
Feb. 2-9.....	95,746	9.9	4.19	1.89	10.09	.15	3.41	.00	2.46	10.21	.03	.06	.24	1,080	1.47	140,632	62	5.79	1,820	8.2
Feb. 10-14.....	85,567	7.4	2.74	1.40	6.13	.11	2.36	.00	1.87	6.15	.03	.05	.02	684	.93	79,598	59	4.26	1,190	8.1
Feb. 15-18.....	62,559	10	3.29	1.65	9.05	.08	2.51	.00	2.19	9.31	.02	.08	.05	897	1.22	76,317	64	5.76	1,480	7.3
Feb. 19-20.....	55,736	--	2.05	1.15	4.39	.11	1.77	.00	1.42	4.51	--	.05	.04	500	.68	37,900	57	3.47	910	7.8
Feb. 21-28.....	444,615	18	2.64	1.15	4.92	.08	2.16	.00	1.37	5.42	.01	.05	--	542	.74	327,735	56	3.57	968	8.0
Mar. 1-11.....	584,655	13	2.35	.90	4.00	.07	1.95	.00	1.29	3.98	.01	.05	--	431	.59	330,978	55	3.14	770	8.1
Mar. 12-14.....	124,959	--	2.74	1.07	4.26	.11	2.26	.00	1.48	4.51	--	.06	.02	522	.71	88,711	52	3.09	937	8.2

a Calculated from determined constituents.

Mar. 15-16, 1961	60,694	--	2.54	1.23	5.39	.13	2.10	.00	1.67	5.36	--	.05	.04	602	.82	49,692	58	3.92	1,080	8.2
Mar. 17-29.....	723,531	15	2.54	.77	4.00	.07	1.93	.00	1.27	4.23	.01	.05	--	443	.60	435,913	54	3.11	793	7.8
Mar. 30-31.....	339,372	--	2.00	.99	2.48	.10	2.00	.00	1.00	2.54	--	.07	.02	350	.48	161,541	45	2.03	622	8.2
Apr. 1-5.....	856,661	13	2.50	.80	3.05	.07	2.07	.00	1.25	3.05	.02	.03	.00	417	.57	485,830	47	2.37	676	6.6
Apr. 6-9.....	377,653	17	3.09	1.15	6.48	.09	2.36	.00	1.96	6.35	.02	.10	.05	684	.93	351,308	60	4.45	1,120	7.1
Apr. 10-30.....	1,598,638	13	2.69	.90	4.13	.08	2.23	.00	1.37	4.18	.02	.05	--	465	.83	1,010,979	53	3.08	845	7.7
May 1-5.....	484,562	15	2.50	.79	3.00	.07	2.11	.00	1.17	2.96	.02	.06	.12	413	.56	272,169	47	2.34	884	7.3
May 6-31.....	9,334,215	14	1.80	.51	1.26	.07	1.70	.00	.62	1.27	.02	.05	--	217	.30	2,754,713	35	1.17	381	7.8
June 1-2.....	487,934	--	1.70	.44	.96	.07	1.64	.00	.52	.93	--	.06	.05	186	.25	123,428	30	.93	342	8.0
June 3-8.....	903,630	13	1.95	.61	2.09	.07	1.72	.00	.73	2.12	.02	.04	.18	305	.41	374,826	44	1.85	490	7.1
June 9-30.....	1,708,800	13	2.50	.82	3.92	.10	2.07	.00	1.21	3.81	.02	.05	--	429	.58	996,982	53	3.04	782	7.0
July 1-10.....	313,587	26	2.94	1.07	4.83	.10	2.46	.00	1.35	4.71	.02	.05	--	521	.71	222,195	54	3.41	922	7.8
July 11-13.....	127,339	12	1.45	.49	1.52	.06	1.41	.00	.73	1.41	.01	.00	.60	a212	.29	36,714	43	1.55	368	7.1
July 14-19.....	1,104,040	15	1.20	.34	.87	.06	1.15	.00	.35	.87	.02	.03	.38	171	.23	256,755	35	.99	259	7.0
July 20-26.....	1,209,461	16	1.65	.46	1.39	.07	1.48	.00	.54	1.41	.02	.06	.42	238	.32	391,478	39	1.36	374	6.8
July 27.....	174,545	--	--	--	--	--	--	--	1.19	2.88	--	.05	--	b353	.48	83,796	--	--	635	--
July 28-31.....	540,456	15	2.05	.60	1.61	.16	1.87	.00	.65	1.69	.02	.14	.10	323	.44	237,412	36	1.40	485	7.0
Aug. 1-4.....	277,686	18	2.10	.61	1.83	.09	1.95	.00	.67	1.92	.02	.08	.00	306	.42	115,562	40	1.57	490	6.9
Aug. 5-7.....	112,641	14	2.59	.77	4.65	.10	2.31	.00	1.00	4.57	.01	.02	1.20	505	.69	77,362	57	3.59	838	7.3
Aug. 8-9.....	51,174	24	3.24	.79	6.53	.12	2.90	.00	1.25	6.80	.02	.01	1.50	a643	.87	44,750	61	4.59	1,150	7.9
Aug. 10-15.....	132,932	17	1.60	.47	1.44	.08	1.46	.00	.54	1.47	.02	.04	.30	211	.29	38,148	40	1.41	380	6.9
Aug. 16-22.....	844,582	23	1.80	.52	1.91	.08	1.66	.00	.58	1.95	.02	.05	.12	292	.40	335,400	44	1.78	456	7.0
Aug. 23-31.....	463,597	20	2.59	.82	5.87	.10	1.85	.00	1.69	5.59	.02	.05	.40	597	.81	376,403	63	4.49	982	7.0
Sept. 1-4.....	123,769	22	2.79	.90	7.26	.10	2.16	.00	1.69	6.83	.03	.12	.10	694	.94	116,818	66	5.34	1,150	7.2
Sept. 5-9.....	460,959	19	1.85	.54	2.09	.07	1.70	.00	.69	2.06	.02	.05	--	300	.41	188,071	46	1.91	482	7.3
Sept. 10-22.....	2,460,674	11	1.50	.48	1.09	.21	1.70	.00	.44	.93	.02	.13	--	190	.26	835,838	33	1.09	339	7.1
Sept. 23-30.....	1,202,935	19	2.00	.58	1.48	.10	2.00	.00	.62	1.44	.02	.05	.10	282	.38	428,630	36	1.30	423	7.3
Total or weighted average	31,570,000	14.1	2.11	0.68	2.62	0.10	1.90	0.00	0.92	2.61	0.02	0.06	0.18	340	0.47	14,730,000	48	2.09	593	7.3

a Calculated from determined constituents.
b Estimated.

ARKANSAS RIVER BASIN--Continued

7-2450. CANADIAN RIVER NEAR WHITEFIELD, OKLA.

LOCATION.--At gaging station at bridge on State Highway 2, 0.8 mile north of Whitefield, Haskell County, and 5.5 miles upstream from Snake Creek.
DRAINAGE AREA.--47,576 square miles, of which 9,700 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: September 1944 to February 1945, September 1946 to September 1961.
Water temperatures: September 1944 to February 1945, September 1946 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,820 micromhos Feb. 1; minimum daily, 301 micromhos July 16.
Percent sodium: Maximum, 62 Aug. 19-20; minimum, 38 June 1-6.
Sodium-adsorption-ratio: Maximum, 5.4 Oct. 1-9; minimum, 1.5 July 14-20.
EXTREMES, 1944-61.--Specific conductance: Maximum daily, 22,900 micromhos Nov. 11, 1956; minimum daily, 71.7 micromhos Jan. 2, 1948.
Percent sodium: Maximum, 80 Nov. 6-14, Dec. 21-23, 1947; minimum, 21 Mar. 5, 1959.
Sodium-adsorption-ratio (1951-61): Maximum, 33 Nov. 11, 1956; minimum, 0.4 Mar. 5, 1959.
REMARKS.--Dashes omitted in potassium (K) column indicate sodium (Na) plus potassium (K) are calculated. Records of specific conductance of daily samples available in district office at Oklahoma City, Okla.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-9, 1960..	21,390	--	3.69	2.15	9.21		2.95		3.10	8.97	--	0.03	--	957	1.30	27,860	61	5.4	1,570	8.2
Oct. 10-15.....	5,350	--	3.39	2.09	8.20		3.08		1.81	8.74	--	.05	--	869	1.18	6,320	60	4.9	1,460	8.2
Oct. 16-20.....	33,160	--	2.69	1.51	5.60		2.49		2.48	4.79	--	.04	--	610	.83	27,540	57	3.9	1,030	8.2
Oct. 21-23.....	44,410	--	2.50	1.46	4.70		2.43		1.67	4.51	--	.05	--	546	.74	33,010	54	3.3	920	8.2
Oct. 24-31.....	114,400	--	3.04	1.44	5.53		2.72		2.44	4.79	--	.06	--	630	.86	98,100	55	3.7	1,040	8.2
Nov. 1-10.....	58,390	7.8	2.69	1.63	4.35	0.14	2.62		1.77	4.23	0.02	.04	0.47	524	.71	41,650	49	3.0	904	8.1
Nov. 11-20.....	19,740	--	3.44	2.28	5.33		3.44		2.33	5.22	--	.06	--	662	.90	17,790	48	3.2	1,100	7.8
Nov. 21-30.....	15,000	--	4.09	2.55	7.19		3.97		2.62	7.19	--	.05	--	819	1.11	16,720	52	4.0	1,370	8.1
Dec. 1-9.....	27,320	--	3.89	2.71	6.70		3.47		2.19	7.61	--	.03	--	814	1.11	30,280	50	3.7	1,360	8.0
Dec. 10.....	10,530	--	2.69	1.31	4.44		2.36		.87	5.02	--	.06	--	543	.74	7,780	53	3.1	895	8.4
Dec. 11-15.....	101,600	--	1.90	.58	2.33		1.77		.58	2.43	--	.03	--	300	.41	41,500	48	2.1	498	8.2
Dec. 16-20.....	27,810	--	2.99	1.65	3.90		2.66		1.48	4.29	--	.04	--	530	.72	20,060	46	2.6	845	8.3
Dec. 21-31.....	37,690	13	4.29	2.31	6.31	.10	3.67		2.44	6.49	.02	.04	.40	798	1.09	40,940	49	3.5	1,330	8.4
Jan. 1-10, 1961.	65,610	13	3.14	1.78	4.31	.08	2.62		1.44	5.50	.02	.05	.58	631	.86	56,360	46	2.8	1,030	7.7
Jan. 11-14.....	11,010	--	4.24	2.46	6.64		4.06		2.10	7.11	--	.07	--	861	1.17	12,900	50	3.6	1,350	8.2

Jan. 15-17, 1961	15,550	--	2.74	1.42	4.30		2.66		1.29	4.46	--	.05	--	553	.75	11,710	51	3.0	862	8.1
Jan. 18-20.....	8,910	--	3.54	1.98	6.42		3.90		1.73	6.26	--	.05	--	732	1.00	8,870	54	3.9	1,140	8.2
Jan. 21-31.....	20,410	--	4.79	3.01	7.63		4.26		2.37	8.60	--	.07	--	960	1.31	26,670	49	3.9	1,530	8.4
Feb. 1-8.....	15,380	--	4.94	3.26	8.39		4.13		2.29	9.59	--	.05	--	990	1.35	20,730	51	4.1	1,650	8.4
Feb. 9-22.....	84,440	14	3.79	2.01	5.96	.11	3.11		2.25	6.54	.03	.06	.33	830	1.13	95,400	50	3.5	1,220	8.3
Feb. 23-28.....	35,980	--	2.54	1.86	4.42		2.49		1.50	4.79	--	.04	--	520	.71	25,470	50	3.0	908	8.2
Mar. 1-6.....	25,730	--	3.09	2.31	4.80		2.88		1.87	5.22	--	.03	--	599	.81	20,980	47	2.9	1,020	8.4
Mar. 7-11.....	44,670	--	2.30	1.90	4.08		2.03		1.44	4.79	--	.02	--	500	.68	30,400	49	2.8	852	8.1
Mar. 12-26.....	68,790	11	3.04	2.26	5.66	.08	3.08		1.94	5.92	.01	.02	.29	671	.91	62,830	51	3.5	1,110	7.7
Mar. 27-29.....	66,390	--	2.10	.90	3.08		1.80		1.21	3.05		.02	--	402	.55	36,330	51	2.5	633	8.0
Mar. 30-31.....	162,000	--	1.55	.89	2.03		1.54		.73	1.95	--	.01	--	279	.38	61,540	48	1.9	438	8.1
Apr. 1-5.....	165,400	--	1.75	.97	2.39		1.77		.77	2.54	--	.03	--	311	.42	70,040	47	2.0	529	8.1
Apr. 6-20.....	138,000	13	3.09	1.63	4.83	.08	2.66		1.75	5.13	.02	.02	.30	614	.84	115,400	50	3.2	1,010	8.3
Apr. 21-30.....	29,610	--	3.44	2.36	6.47		3.15		1.71	7.33	--	.01	--	748	1.02	30,150	53	3.8	1,250	8.3
May 1-4.....	10,060	--	3.69	2.71	7.49		3.25		1.42	8.88	--	.01	--	910	1.24	12,470	54	4.2	1,430	8.5
May 5-10.....	279,300	--	1.60	.64	2.29		1.57		.79	2.14	--	.03	--	285	.39	108,300	51	2.2	448	8.1
May 11-18.....	73,770	--	2.30	2.00	2.71		2.23		1.23	3.52	--	.03	--	425	.58	42,680	39	1.8	733	8.2
May 19-25.....	100,400	9.0	2.50	.90	4.39	.10	2.23		1.06	4.31	.02	.04	.08	469	.64	64,100	56	3.4	814	8.4
May 25-31.....	64,130	--	1.70	1.26	2.13		1.80		.56	2.71	--	.02	--	315	.43	27,500	42	1.8	537	8.1
June 1-6.....	30,070	--	2.15	2.09	2.55		2.36		.79	3.55	--	.02	--	415	.56	16,990	38	1.8	703	8.3
June 7.....	6,230	--	1.50	1.10	2.08		1.77		.58	2.31	--	.02	--	284	.39	2,410	44	1.8	488	8.2
June 8-12.....	65,910	--	2.69	1.63	3.95		2.03		1.98	4.23	--	.03	--	541	.74	48,540	48	2.7	875	8.1
June 13-16.....	43,360	--	3.09	1.83	4.76		2.26		2.50	4.85	--	.04	--	653	.89	38,540	49	3.0	1,020	8.3
June 17-27.....	93,280	6.4	2.00	1.52	3.12		2.10		1.15	3.33	.03	.03	.15	414	.56	52,570	47	2.4	710	7.1
June 28-30.....	11,880	--	3.44	2.00	6.22		2.69		1.92	7.05	--	.00	--	778	1.06	12,580	53	3.8	1,220	7.3

ARKANSAS RIVER BASIN--Continued

7-2450. CANADIAN RIVER NEAR WHITEFIELD, OKLA.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 1-8, 1961..	20,770	11	2.64	1.84	4.67		2.69		1.44	4.96	0.03	0.03	0.21	554	0.75	15,660	51	3.1	951	7.7
July 9-11.....	28,320	--	2.30	1.70	3.57		2.10		.50	4.94	--	.03	--	503	.68	19,390	47	2.5	809	8.2
July 12-13.....	11,960	--	1.50	1.06	2.89		1.57		.33	3.55	--	.00	--	353	.48	5,750	53	2.6	571	8.0
July 14-20.....	221,400	--	1.20	.72	1.47		1.31		.31	1.75	--	.02	--	220	.30	66,310	43	1.5	360	8.0
July 21-23.....	62,020	--	1.20	2.16	2.72		1.74		1.15	3.16	--	.03	--	404	.55	34,110	45	2.1	630	8.2
July 24-31.....	160,100	--	1.35	.89	1.74		1.61		.42	1.92	--	.03	--	257	.35	56,030	44	1.6	407	8.1
Aug. 1-3.....	18,490	--	1.75	.97	2.37		2.03		.50	2.54	--	.02	--	309	.42	7,780	47	2.0	525	7.5
Aug. 4-5.....	5,670	--	2.40	1.60	3.73		2.62		.85	4.26	--	.00	--	463	.63	3,580	48	2.6	782	8.1
Aug. 6-15.....	16,300	--	2.64	2.16	5.38		2.69		.98	6.34	--	.04	--	612	.83	13,580	53	3.5	1,090	8.4
Aug. 16-18.....	18,820	--	2.30	1.62	4.05		2.43		.83	4.71	--	.00	--	490	.67	12,560	51	2.9	831	7.6
Aug. 19-20.....	16,050	--	2.94	1.26	6.73		2.03		1.42	7.47	--	.01	--	656	.89	14,330	62	4.6	1,080	8.0
Aug. 21.....	4,010	--	1.90	1.26	3.67		1.64		.40	4.74	--	.05	--	436	.59	2,380	54	2.9	731	8.0
Aug. 22-24.....	8,910	--	1.80	1.32	3.01		1.84		.40	3.89	--	.00	--	382	.52	4,630	49	2.4	651	7.4
Aug. 25-31.....	18,890	--	3.19	1.85	4.96		2.52		2.54	4.94	--	.00	--	618	.84	15,890	50	3.1	1,020	7.7
Sept. 1-2.....	3,420	--	3.69	2.51	6.97		3.28		2.42	7.47	--	.00	--	799	1.09	3,720	53	4.0	1,350	8.2
Sept. 3-6.....	5,660	--	2.79	1.81	5.53		2.62		1.44	6.06	--	.01	--	618	.84	4,760	55	3.6	1,070	8.2
Sept. 7-8.....	8,190	--	3.59	2.31	8.94		2.43		1.83	10.58	--	.00	--	902	1.23	10,060	60	5.2	1,570	8.1
Sept. 9-13.....	12,690	--	2.64	1.76	6.39		2.26		1.19	7.33	--	.01	--	660	.90	11,400	59	4.3	1,150	8.2
Sept. 14-26.....	225,300	--	1.35	1.45	2.63		2.16		.69	2.54	--	.04	--	305	.41	93,540	48	2.2	546	7.9
Sept. 27-30.....	42,430	--	2.30	1.26	3.09		2.07		1.39	3.16	--	.03	--	400	.54	23,100	46	2.3	701	7.9
Total or weighted average	3,163,000	--	2.25	1.40	3.57		2.20		1.21	3.78	--	0.03	--	451	0.61	1,942,000	49	2.6	743	--

7-3316. RED RIVER AT DENISON DAM, NEAR DENISON, TEX.

LOCATION.--Immediately below Denison Dam, 1.7 miles upstream from Sand Creek, 4 miles northwest of Denison, Grayson County, and 3 miles upstream from gaging station near Colbert, Bryan County, Okla.
DRAINAGE AREA.--39,719 square miles upstream from dam, 39,777 square miles upstream from gaging station, of which 5,936 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: May 1944 to September 1961.
Water temperatures: October 1945 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,340 micromhos Jan. 11; minimum daily, 1,940 micromhos Oct. 3, 9, 11.
Percent sodium: Maximum, 59 Nov. 1 to Sept. 30; minimum, 58 Oct. 1-31, Mar. 1-31.
EXTREMES, 1944-61.--Specific conductance: Maximum daily, 3,520 micromhos Aug. 14, 1944; minimum daily, 656 micromhos Oct. 16, 1945.
Percent sodium: Maximum, 66 Dec. 1-31, 1958; minimum, 31 Nov. 1-10, 1945.
REMARKS.--Sodium (Na) and potassium (K) values are calculated, and reported as sodium. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge are given for gaging station near Colbert, Okla. for water year October 1960 to September 1961. No appreciable inflow between dam and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	740,311	9.4	5.49	2.71	11.44		2.10		5.95	11.57	--	0.01		1,170	1.59	1,177,982	58	5.65	2,010	7.6
Nov. 1-30.....	193,031	6.6	5.49	2.71	11.96		2.02		6.06	12.07	0.01	.01		1,200	1.63	315,027	59	5.91	2,060	7.8
Dec. 1-31.....	307,315	10.0	5.69	2.55	11.88		2.03		6.04	11.99	.02	.02		1,210	1.65	505,718	59	5.85	2,080	7.7
Jan. 1-31, 1961.	304,917	9.9	5.84	2.71	12.09		2.13		6.33	12.13	.02	.02		1,240	1.69	514,212	59	5.85	2,120	7.8
Feb. 1-28.....	117,961	11.0	5.69	2.47	11.92		2.15		6.20	11.71	.03	.01		1,210	1.65	194,117	59	5.90	2,050	7.5
Mar. 1-31.....	165,832	13.0	5.89	2.80	11.92		2.21		6.37	11.99	.02	.03		1,240	1.69	279,659	59	5.72	2,110	7.7
Apr. 1-30.....	361,607	9.4	6.09	2.47	12.22		2.29		6.20	12.27	.02	.01		1,250	1.70	614,731	59	5.91	2,150	7.5
May 1-31.....	149,599	9.6	5.94	2.88	12.44		2.34		6.45	12.41	.02	.04		1,270	1.73	258,388	59	5.93	2,170	7.4
June 1-30.....	179,464	10.0	6.19	2.71	12.57		2.39		6.33	12.69	.02	.05		1,290	1.75	314,852	59	5.96	2,160	7.5
July 1-31.....	209,980	11.0	6.04	2.71	12.53		2.39		6.16	12.69	.02	.01		1,270	1.73	362,678	59	5.99	2,170	7.1
Aug. 1-31.....	168,783	10.0	6.24	2.63	12.70		2.46		6.33	12.75	.02	.02		1,290	1.75	296,114	59	6.03	2,140	7.8
Sept. 1-30.....	213,798	11.0	5.99	3.04	13.05		2.26		6.50	13.26	.02	.05		1,320	1.80	383,811	59	6.14	2,210	7.7
Total or weighted average	3,112,000	9.9	5.84	2.71	12.09		2.20		6.18	12.15	0.02	0.02		1,230	1.67	5,197,000	59	5.86	2,100	--

PART 8. WESTERN GULF OF MEXICO BASINS

SABINE RIVER BASIN

8-305. SABINE RIVER NEAR RULIFF, TEX.

LOCATION.--At gaging station at bridge on State Highway 12, 2.4 miles north of Ruliff, Newton County, 4.2 miles upstream from The Kansas City Southern Railway Co. bridge, 4.5 miles downstream from Cypress Creek, and at mile 40.
DRAINAGE AREA (revised).--9,329 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1947 to September 1961.
Water temperatures: October 1947 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 423 micromhos Oct. 3; minimum daily, 54 micromhos Sept. 17.
Percent sodium: Maximum, 77 Oct. 2-3, 5; minimum, 50 Mar. 21-26.
EXTREMES, 1945-46, 1947-61.--Specific conductance: Maximum daily, 774 micromhos Dec. 26, 1948; minimum daily, 33 micromhos May 22, 1953.
Percent sodium: Maximum, 86 Dec. 26-27, 1948; minimum, 14 Sept. 18-22, 27, 1958.
REMARKS.--Where no potassium (K) is reported, sodium and potassium are calculated and reported as sodium (Na). Records of specific conductance of daily samples available in district office at Austin, Tex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1, 4, 6-10, 1960....	37,085	8.8	0.35	0.24	1.57		0.39		0.25	1.52	--	0.01		134	0.18	6,758	73	2.89	244	6.8
Oct. 2-3, 5.....	15,114	12	.50	.32	2.74		.57		.33	2.65	--	.00		216	.29	4,440	77	4.28	402	6.8
Oct. 11-20.....	34,929	12	.40	.23	1.65		.34		.31	1.64	--	.01		144	.20	6,840	72	2.95	257	6.6
Oct. 21-29.....	29,276	12	.39	.21	1.57		.38		.25	1.52	--	.01		136	.18	5,415	72	2.87	244	6.5
Oct. 30-31.....	12,595	13	.30	.17	1.09		.34		.21	.99	--	.01		102	.14	1,747	70	2.24	169	6.7
Nov. 1-6.....	45,259	7.4	.26	.17	.96		.28		.18	.90	--	.01		86	.12	5,293	69	2.06	158	6.2
Nov. 7-11.....	20,727	13	.47	.28	1.96		.49		.29	1.92	--	.01		169	.23	4,764	72	3.19	310	6.6
Nov. 12-19.....	58,854	10	.34	.24	1.44		.28		.29	1.41	--	.01		126	.17	10,085	71	2.67	230	6.4
Nov. 20-30.....	164,989	10	.27	.21	.96		.25		.27	.93	--	.01		94	.13	21,092	66	1.94	168	6.4
Dec. 1-10.....	107,802	14	.42	.33	1.26		.30		.42	1.30	--	.01		131	.18	19,206	63	2.06	233	6.3
Dec. 11.....	19,736	10	.31	.21	.83		.20		.35	.79	--	.01		89	.12	2,389	61	1.61	151	5.9
Dec. 12-20.....	354,526	9.1	.22	.21	.48		.15		.25	.51	--	.01		62	.08	29,894	53	1.03	102	5.8
Dec. 21-31.....	552,000	8.3	.29	.21	.57		.23		.19	.62	--	.01		68	.09	51,049	53	1.14	122	5.9
Jan. 1-8, 1961..	532,998	12.	.30	.19	.61		.25		.20	.62	0.01	.01		74	.10	53,641	55	1.23	125	6.2
Jan. 9-11.....	280,086	54.	.47	.20	.91	0.05	.87		.19	.51	.02	.02		144	.20	54,852	56	1.58	168	7.4

Jan. 12-17, 1961	531,610	41	.35	.17	.57	.05	.59		.18	.34	.01	.01		105	.14	75,914	50	1.11	118	6.9
Jan. 16-24.....	474,426	31	.36	.20	.70	.06	.46		.29	.54	.02	.01		107	.15	69,039	53	1.32	145	6.7
Jan. 25-31.....	367,934	38	.45	.23	.83	.06	.59		.31	.62	.02	.01		127	.17	63,550	53	1.42	172	6.8
Feb. 1-10.....	391,339	11	.32	.21	.87		.23		.35	.82	--	.00		93	.13	49,497	62	1.69	164	6.2
Feb. 11-17.....	212,569	12	.39	.24	1.09		.25		.46	.99	--	.00		112	.15	32,378	63	1.94	194	6.2
Feb. 18.....	38,678	10	.25	.21	.74		.16		.31	.71	--	.00		80	.11	4,208	61	1.54	138	6.4
Feb. 19-28.....	576,578	8.7	.21	.13	.52		.20		.23	.42	--	.00		59	.08	46,425	60	1.26	99	6.0
Mar. 1-5.....	215,207	11	.30	.21	.61		.23		.29	.59	--	.01		76	.10	22,244	55	1.21	127	5.8
Mar. 6-18.....	412,304	14	.41	.30	.87		.33		.40	.85	--	.01		106	.14	59,438	55	1.47	184	6.4
Mar. 19-20,27-31	294,764	9.7	.29	.19	.57		.25		.25	.54	--	.01		70	.10	28,061	54	1.16	122	6.5
Mar. 21-26.....	339,412	8.3	.20	.14	.37	.04	.20		.16	.37	--	.01		52	.07	24,003	50	.91	85	5.8
Apr. 1-3.....	131,504	5.6	.24	.22	.87		.33		.29	.68	--	.01		82	.11	14,665	65	1.81	141	6.4
Apr. 4-9.....	286,572	9.2	.21	.19	.61		.30		.23	.48	--	.01		68	.09	26,502	60	1.36	116	5.8
Apr. 10-13.....	187,874	7.5	.25	.26	.74		.34		.29	.62	--	.00		79	.11	20,185	59	1.47	139	7.1
Apr. 14-19.....	241,944	11	.27	.22	.87		.36		.29	.68	--	.01		69	.12	29,285	64	1.75	148	5.8
Apr. 20-30.....	194,509	13	.39	.32	1.22		.46		.40	1.04	--	.01		123	.17	32,537	63	2.04	211	5.8
May 1-10.....	90,486	16	.46	.30	1.17		.51		.35	1.07	.01	.00		126	.17	15,506	61	1.90	215	6.5
May 11-20.....	66,446	17	.50	.37	1.39		.56		.35	1.35	.01	.00		146	.20	13,194	62	2.11	256	6.4
May 21-31.....	51,164	16	.50	.34	1.48		.62		.33	1.33	.01	.01		147	.20	10,229	64	2.29	252	6.6
June 1-15.....	56,529	16	.55	.36	1.78		.62		.37	1.72	--	.00		a177	.24	13,608	66	2.64	297	6.4
June 16-19.....	19,954	7.7	.19	.12	.70		.20		.14	.68	--	.00		66	.09	1,791	69	1.76	115	6.3
June 20-30.....	176,618	9.1	.26	.17	.91		.25		.25	.85	--	.00		86	.12	20,657	68	1.97	150	5.7
July 1-10.....	196,443	10	.37	.22	.96		.30		.33	.90	--	.02		100	.14	26,716	62	1.75	175	6.0
July 11-20.....	207,471	9.8	.32	.16	.74		.30		.23	.68	--	.01		80	.11	22,573	60	1.50	131	6.1
July 21-31.....	135,425	11	.32	.19	.83		.34		.21	.79	--	.01		88	.12	16,208	62	1.63	146	6.3
Aug. 1-10.....	98,519	13	.36	.16	.87		.39		.17	.82	--	.01		a98	.13	13,131	62	1.70	158	6.4
Aug. 11-20.....	54,684	15	.39	.20	1.13		.49		.19	1.02	--	.01		112	.15	8,330	66	2.09	192	6.3
Aug. 21-31.....	51,142	15	.39	.19	1.09		.52		.18	.96	--	.01		110	.15	7,651	65	2.02	188	6.7
Sept. 1-11.....	38,465	19	.40	.19	1.26		.62		.17	1.04	--	.01		123	.17	6,435	68	2.33	201	6.2
Sept.12-14,19-24	322,929	11	.17	.09	.57		.25		.12	.45	--	.01		58	.08	25,473	68	1.55	95	6.0
Sept. 15-18.....	189,223	8.1	.15	.04	.28	.05	.20		.08	.25	--	.01		40	.05	10,294	54	.90	59	5.5
Sept. 25-30.....	63,669	19	.50	.18	.91		.67		.20	.73	--	.00		108	.15	9,352	57	1.57	158	5.9
Total or weighted average	8,984,000	16	0.31	0.20	0.78	--	0.34		0.25	0.68	--	0.01		90	0.12	1,078,000	60	1.48	144	--

a Residue at 180°C.

NECHES RIVER BASIN

8-410. NECHES RIVER AT EVADALE, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 96, 200 feet upstream from Gulf, Colorado and Santa Fe Railway Co. bridge at Evadale, Jasper County, 600 feet downstream from Mill Creek, and 15 miles upstream from Village Creek.
DRAINAGE AREA (revised).--7,952 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1961.
Water temperatures: October 1947 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 264 micromhos Nov. 13; minimum daily, 68 micromhos Jan. 15.
Percent sodium: Maximum 65 Oct. 19-30; minimum, 45 Jan 21-31.
EXTREMES, 1947-61.--Specific conductance: Maximum daily, 422 micromhos Jan 25, 1957, minimum daily, 44 micromhos Sept. 22, 1958.
Percent sodium: Maximum, 76 Jan 21-31, 1957; minimum, 14 June 4-18, 1950.
REMARKS.--Sodium (Na) and potassium (K) values are calculated and reported and sodium (Na). Records of specific conductance of daily samples available in district office at Austin, Tex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1960.	38,995	15	0.44	0.31	1.22		0.57		0.37	1.02	0.01	0.01		128	0.17	6,786	62	1.99	223	6.8
Oct. 11-18.....	46,350	14	.39	.28	1.17		.52		.35	.96	.01	.01		120	.16	7,564	64	2.03	204	6.6
Oct. 19-30.....	50,721	9.6	.35	.25	1.09		.39		.31	.96	.01	.01		106	.14	7,312	65	1.99	193	6.3
Oct. 31-Nov.1-10	80,160	11	.36	.25	.70		.33		.29	.65	.01	.01		85	.12	9,266	53	1.26	145	6.4
Nov. 11-18.....	41,240	13	.40	.30	.96		.38		.37	.90	.01	.01		108	.15	6,057	58	1.61	189	6.2
Nov. 19-30.....	156,044	12	.35	.26	.65		.30		.33	.62	.01	.01		85	.12	18,039	52	1.18	141	6.0
Dec. 1-14.....	246,196	13	.32	.20	.70		.28		.37	.56	.02	.00		84	.11	28,125	57	1.36	135	6.3
Dec. 15-24.....	456,000	12	.22	.14	.52		.16		.31	.39	.01	.00		65	.09	40,310	59	1.22	100	5.8
Dec. 25-31.....	446,241	10	.25	.15	.61		.15		.31	.56	.01	.00		70	.10	42,482	61	1.37	122	5.7
Jan. 1-10, 1961.	466,512	9.8	.20	.13	.48		.15		.27	.39	.01	.00		58	.08	36,798	59	1.18	96	5.9
Jan. 11-20.....	707,107	8.7	.17	.12	.29	0.04	.15		.23	.24	.01	.00		46	.06	44,237	46	.75	75	5.9
Jan. 21-31.....	736,145	10	.22	.16	.37	.06	.16		.31	.34	.01	.00		59	.08	59,068	45	.83	96	5.9
Feb. 1-10.....	346,512	12	.32	.20	.63		.20		.42	.71	.01	.01		92	.13	43,356	61	1.62	154	6.2
Feb. 11-16.....	171,134	12	.36	.22	.74		.26		.44	.59	.01	.00		89	.12	20,714	56	1.37	148	6.6
Feb. 17-28.....	495,788	9.6	.26	.14	.57		.23		.33	.39	.01	.00		67	.09	45,176	59	1.27	110	6.1

Mar. 1-9, 1961..	351,491	11	.30	.21	.61		.30		.37	.45	.01	.01		77	.10	36,808	55	1.21	125	6.2
Mar. 10-16,18-22	356,549	12	.41	.27	.74		.36		.40	.62	.01	.01		93	.13	45,096	52	1.27	155	6.1
Mar. 17.....	26,579	12	.42	.30	1.22		.82		.42	.68	.01	.01		122	.17	4,410	63	2.04	220	7.0
Mar. 23-31.....	392,192	7.5	.29	.20	.52		.30		.29	.39	.01	.01		65	.09	34,670	52	1.06	114	6.0
Apr. 1-10.....	343,537	9	.30	.26	.83		.39		.35	.59	.01	.01		90	.12	42,049	60	1.57	143	5.9
Apr. 11-20.....	350,678	11	.26	.23	.74		.36		.31	.51	.01	.01		81	.11	38,631	60	1.49	130	5.9
Apr. 21-30.....	141,917	12	.36	.29	.91		.46		.37	.68	.01	.01		100	.14	19,301	59	1.61	163	6.0
May 1-10.....	105,402	16	.44	.34	1.04		.56		.40	.79	.01	.02		118	.16	16,915	57	1.68	187	6.4
May 11-20.....	79,795	15	.41	.33	1.00		.52		.37	.76	.01	.02		112	.15	12,154	58	1.65	185	6.8
May 21-31.....	47,476	15	.44	.34	1.09		.56		.40	.85	.01	.02		120	.16	7,748	58	1.75	195	6.5
June 1-15.....	42,456	16	.50	.33	1.09		.59		.37	.93	.01	.01		125	.17	7,218	57	1.69	207	6.7
June 16-23.....	42,700	13	.46	.28	.96		.49		.33	.85	.01	.01		110	.15	6,388	56	1.57	182	6.6
June 24-30.....	55,343	14	.45	.29	1.04		.52		.33	.90	.01	.01		116	.16	8,731	59	1.72	191	6.5
July 1-15.....	232,810	13	.40	.24	.83		.31		.42	.73	.01	.01		99	.13	31,346	56	1.46	160	5.8
July 16-31.....	129,227	13	.41	.22	.74		.36		.31	.68	.01	.01		92	.13	16,169	54	1.32	150	5.9
Aug. 1-15.....	52,988	17	.45	.26	.83		.52		.29	.68	.02	.02		104	.14	7,495	54	1.38	163	6.8
Aug. 16-31.....	49,698	18	.45	.28	.91		.61		.29	.73	.02	.01		110	.15	7,435	56	1.51	180	6.1
Sept. 1-13.....	28,441	19	.47	.28	1.00		.66		.27	.79	.02	.01		117	.16	4,526	57	1.63	189	6.3
Sept. 14-15.....	22,076	15	.32	.21	.83		.39		.23	.71	.02	.01		92	.13	2,762	61	1.61	148	6.5
Sept. 16-19.....	101,950	13	.27	.17	.74		.33		.21	.62	.02	.01		81	.11	11,231	62	1.56	133	6.1
Sept. 20-30.....	97,222	15	.30	.18	.61		.34		.25	.45	.02	.01		76	.10	10,049	56	1.24	112	6.2
Total or weighted average	7,536,000	11	0.29	0.20	0.65		0.28		0.33	0.51	0.01	0.01		77	0.10	753,600	57	1.31	126	--

TRINITY RIVER BASIN

8-665. TRINITY RIVER AT ROMAYOR, TEX.

LOCATION.--At gaging station at bridge on State Highway 105, 1.9 miles south of Romayor, Liberty County, 1.9 miles downstream from Gulf, Colorado and Santa Fe Railway Co. bridge, and 3.7 miles downstream from Big Creek.
DRAINAGE AREA.--17,192 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to November 1949, February 1950 to September 1951, April 1953 to September 1961.
Water temperatures: February 1950 to September 1951, April 1953 to January 1959, March to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,410 micromhos Sept. 22; minimum daily, 134 micromhos Jan. 15.
Percent sodium: Maximum, 76 Sept. 21-22, minimum, 28 Jan. 17-23.
EXTREMES, 1945-50, 1953-61.--Specific conductance: Maximum daily, 3,800 micromhos Oct. 30, 1956; minimum daily, 103 micromhos Nov. 9, 1946.
Percent sodium: Maximum, 86 Nov. 7, 1953; minimum, 23 June 11-20, 1946.
REMARKS.--Sodium (Na) and potassium (K) are calculated and reported as sodium. Records of specific conductance of daily samples available in district office at Austin, Tex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-2, 1960..	2,876	10	2.59	0.58	5.61		2.98		1.19	4.57		0.03		508	0.69	1,987	64	4.46	912	8.0
Oct. 3-16.....	19,216	15	1.50	.40	3.57		1.67		.96	2.74		.09		330	.45	8,624	65	3.66	595	7.3
Oct. 17-28.....	62,075	11	1.60	.38	3.44		1.61		.83	2.91		.08		322	.44	27,184	64	3.46	599	7.3
Oct. 29-31.....	74,559	12	1.05	.21	.96		1.11		.23	.85		.02		133	.18	13,486	43	1.21	238	7.1
Nov. 1-3.....	58,986	8.8	.65	.21	.57		.69		.25	.48		.02		89	.12	7,140	40	.86	158	6.7
Nov. 4-12.....	40,005	16	1.50	.35	2.35		1.54		.58	2.06		.03		253	.34	13,765	56	2.45	458	7.2
Nov. 13-20.....	54,030	11	1.10	.21	1.44		1.00		.48	1.24		.03		167	.23	12,271	52	1.77	300	6.8
Nov. 21-23.....	120,972	12	.80	.18	.91		.79		.33	.76		.01		119	.16	19,578	48	1.31	206	6.7
Nov. 24-26.....	165,243	9.4	.60	.17	.57		.64		.25	.42		.01		83	.11	18,653	42	.91	143	6.7
Nov. 27-30.....	60,893	16	1.15	.33	2.00		1.18		.60	1.69		.03		215	.29	17,805	58	2.33	391	6.9
Dec. 1-4.....	22,929	16	1.50	.35	1.96		1.41		.73	1.64		.03		232	.32	7,235	51	2.03	410	6.9
Dec. 5-9.....	90,050	13	1.05	.22	1.04		.82		.58	.90		.03		148	.20	18,125	45	1.31	253	6.8
Dec. 10-21.....	863,762	8.8	1.00	.20	.61		1.02		.31	.45		.02		108	.15	126,869	34	.79	192	6.9
Dec. 22-31.....	431,008	12	1.60	.27	1.09		1.44		.62	.87		.03		178	.24	104,338	37	1.13	309	7.0
Jan. 1-7, 1961..	179,524	13	1.50	.26	1.22		1.31		.65	.99		.03		181	.25	44,192	41	1.30	319	7.0

Jan. 8-16, 1961.	726,902	8.6	.80	.13	.52		.75		.31	.37		.01		90	.12	88,973	36	.77	158	6.5
Jan. 17-23.....	577,587	11	1.55	.21	.70		1.52		.52	.39		.01		146	.20	114,686	28	.74	254	7.0
Jan. 24-31.....	357,342	12	1.80	.30	1.31		1.62		.79	.99		.02		205	.28	99,627	38	1.28	359	7.0
Feb. 1-9.....	172,764	14	2.30	.41	1.61		1.93		1.06	1.30		.05		a272	.37	63,909	37	1.38	456	7.5
Feb. 10-19.....	435,174	12	1.65	.25	1.13		1.48		.71	.79		.05		183	.25	108,306	37	1.16	315	7.1
Feb. 20-25.....	426,645	9.6	.90	.12	.57		.82		.31	.42		.02		98	.13	56,863	36	.79	166	6.9
Feb. 26-28.....	173,574	12	1.70	.26	.96		1.61		.56	.73		.03		174	.24	41,074	33	.97	301	7.1
Mar. 1-5.....	137,256	15	2.00	.35	1.57		1.98		.85	1.02		.05		235	.32	43,867	40	1.45	374	6.8
Mar. 6-17.....	136,812	16	2.59	.51	2.18		2.18		1.23	1.83		.05		a331	.45	61,587	41	1.75	555	6.9
Mar. 18-31.....	408,198	12	1.95	.36	1.44		1.59		.94	1.18		.05		226	.31	125,464	38	1.34	404	6.8
Apr. 1-13.....	331,339	17	2.20	.38	1.74		2.26		.85	1.16		.04		258	.35	116,260	40	1.53	413	6.9
Apr. 14-23.....	87,848	17	2.64	.49	2.26		2.33		1.10	1.92		.05		a342	.47	40,860	42	1.81	560	7.1
Apr. 24-30.....	36,557	19	2.99	.51	2.52		2.75		1.17	2.06		.04		a380	.52	18,893	42	1.91	619	7.2
May 1-15.....	66,436	15	3.04	.60	3.22		2.75		1.33	2.76		.02		a428	.58	38,671	47	2.38	710	7.7
May 16-31.....	54,109	11	2.89	.60	3.52		2.70		1.29	2.99		.03		a426	.58	31,349	50	2.67	730	7.5
June 1-13.....	41,385	21	2.99	.52	4.61		2.69		1.31	4.06		.05		a501	.68	28,198	57	3.48	847	7.6
June 14-21.....	63,757	20	2.05	.36	3.05		1.97		.92	2.54		.03		a346	.47	30,001	56	2.78	571	7.7
June 22-30.....	301,686	16	1.75	.22	1.35		1.64		.56	1.07		.04		a219	.30	89,854	41	1.36	342	7.1
July 1-14.....	278,797	15	1.90	.28	1.31		1.82		.62	.99		.05		a223	.30	84,553	37	1.25	347	7.2
July 15-26.....	80,188	14	2.00	.35	1.87		1.80		.79	1.58		.05		a267	.36	29,118	44	1.73	431	6.9
July 27-31.....	20,212	7.5	2.59	.46	3.22		2.38		1.10	2.76		.02		a384	.52	10,555	51	2.60	645	7.3
Aug. 1-5.....	14,836	15	2.84	.49	5.57		2.77		1.23	4.85		.05		a541	.74	10,916	63	4.32	929	8.0
Aug. 6-12.....	16,980	13	2.00	.35	2.61		2.13		.77	2.03		.02		a306	.42	7,067	53	2.41	513	7.7
Aug. 13-31.....	35,048	12	2.79	.51	4.52		2.92		1.15	3.72		.01		a476	.65	22,689	58	3.52	809	7.8
Sept. 1-11.....	17,651	15	3.09	.59	7.31		3.08		1.23	6.63		.05		a665	.90	15,963	66	5.38	1,150	7.6
Sept. 12, 23-30.	48,359	19	2.15	.45	3.05		2.18		1.12	2.26		.08		a363	.49	23,874	54	2.67	588	7.4
Sept. 13-17.....	216,595	11	.80	.10	1.00		.85		.31	.71		.02		118	.16	34,759	53	1.49	201	7.0
Sept. 18-20.....	35,209	13	1.15	.25	2.52		1.05		.56	2.26		.04		237	.32	11,348	64	3.02	426	6.9
Sept. 21-22.....	14,202	18	2.10	.53	8.09		1.82		1.00	7.79		.10		a661	.90	12,767	76	7.07	1,160	7.6
Total or weighted average	7,559,000	12	1.50	0.26	1.26		1.43		0.60	0.96		0.03		185	0.25	1,890,000	42	1.34	315	--

a Residue at 180°C.

BRAZOS RIVER BASIN

8-1140. BRAZOS RIVER AT RICHMOND, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 59 in Richmond, Fort Bend County, and 925 feet downstream from Texas and New Orleans Railroad Co. bridge.
DRAINAGE AREA.--44,020 square miles, approximately, of which 9,240 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1961.
Water temperatures: November 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,430 micromhos Aug. 20; minimum daily, 242 micromhos Nov. 25-26.
Percent sodium: Maximum, 54 June 26-30, Aug. 1-17; minimum, 25 Mar. 1-7.
EXTREMES, 1945-61.--Specific conductance: Maximum daily, 2,540 micromhos Sept. 4, 1951; minimum daily, 186 micromhos Aug. 31, 1947.
Percent sodium: Maximum, 76 Dec. 3-4, 1945; minimum, 18 Aug. 27-31, 1947.
REMARKS.--Sodium (Na) and potassium (K) are calculated and reported as sodium. Records of specific conductance of daily samples available in district office at Austin, Tex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-14, 1960.	39,737	13	3.59	1.40	5.39		2.98		2.21	5.19	--	0.02		628	0.85	33,938	52	3.41	1,060	7.6
Oct. 15-19.....	48,397	12	2.50	.82	2.74		2.31		1.12	2.60	--	.03		368	.50	24,222	45	2.13	630	7.7
Oct. 20-27.....	221,990	13	1.80	.44	1.00		1.82		.60	.79	--	.03		198	.27	59,777	31	.95	324	7.5
Oct. 28-31.....	158,360	12	2.79	.73	3.05		2.00		1.37	3.19	--	.02		410	.56	88,302	46	2.29	687	7.6
Nov. 1-2, 5-8...	295,736	12	2.20	.58	2.13		1.67		.96	2.29	--	.02		a 290	.39	116,638	43	1.81	521	7.2
Nov. 3-4.....	118,810	12	1.70	.42	1.13		1.57		.58	1.10	--	.02		a 192	.26	31,024	35	1.10	304	7.3
Nov. 9-19.....	162,175	11	3.09	.99	3.96		2.16		1.71	4.15	--	.02		a 471	.64	103,883	49	2.77	847	7.3
Nov. 20-23.....	121,864	12	2.20	.53	1.91		1.97		.79	1.86	--	.02		a 271	.37	44,914	41	1.64	449	7.3
Nov. 24-30.....	359,742	12	1.50	.33	.87		1.52		.46	.68	--	.02		a 159	.22	77,791	32	.91	268	7.4
Dec. 1-10, 15...	363,709	13	2.25	.49	1.65		2.10		.77	1.52	--	.02		278	.38	137,511	38	1.41	460	7.1
Dec. 11-14,16-18 20-21.....	849,362	12	1.80	.41	.91		1.70		.56	.82	--	.04		a 183	.25	211,389	29	.87	330	7.2
Dec. 19, 22-31..	389,891	13	2.25	.60	1.39		2.18		.75	1.27	--	.04		260	.35	137,865	33	1.17	437	7.2
Jan. 1-9, 1961..	348,813	13	2.50	.67	1.52		2.33		.92	1.38	--	.05		297	.40	140,893	32	1.21	488	7.2
Jan. 10-17.....	1,097,732	11	2.10	.50	1.09		2.03		.69	.90	--	.05		a 213	.29	317,991	30	.95	376	7.3
Jan. 18-31.....	790,294	12	2.64	.73	2.04		2.33		1.08	1.95	--	.05		342	.47	367,582	38	1.57	569	7.4

a Calculated from determined constituents.

Feb. 1-4, 1961..	106,314	12	3.39	.90	2.09		3.11		1.31	1.86	--	.08		382	.52	55,232	33	1.42	637	7.7
Feb. 5-8, 14-17.	445,884	11	2.74	.73	1.74		2.52		1.08	1.55	--	.07		324	.44	196,474	33	1.32	536	7.4
Feb. 9-13.....	476,231	10	2.10	.53	1.04		2.02		.75	.85	--	.05		223	.30	144,431	28	.91	371	7.2
Feb. 18-28.....	903,273	11	2.20	.55	1.26		1.98		.63	1.16	--	.03		252	.34	309,570	31	1.08	418	7.2
Mar. 1-7.....	246,724	13	2.69	.73	1.13		2.75		.77	.96	--	.09		286	.39	95,966	25	.86	455	7.7
Mar. 8-17.....	267,769	13	3.39	.90	1.87		3.16		1.17	1.75	--	.10		388	.53	141,296	30	1.28	622	7.7
Mar. 18-24.....	217,012	11	2.89	.77	1.61		2.70		1.10	1.38	--	.09		332	.45	97,985	31	1.19	538	7.6
Mar. 25-31.....	135,927	12	3.39	.90	2.44		2.92		1.42	2.31	--	.06		426	.58	78,751	36	1.66	692	7.8
Apr. 1-10.....	158,519	13	3.49	1.07	2.31		3.23		1.33	2.20	.02	.08		426	.58	91,840	34	1.53	694	7.8
Apr. 11-20.....	114,684	12	3.59	1.07	2.26		3.47		1.33	2.03	.02	.06		417	.57	65,040	33	1.48	681	7.8
Apr. 21-30.....	65,554	8.4	3.49	1.32	3.18		3.26		1.73	2.93	.02	.04		498	.68	44,398	40	2.05	807	7.5
May 1-10.....	83,484	13	3.59	1.07	2.96		2.98		1.85	2.76	--	.03		467	.64	53,023	39	1.94	763	7.4
May 11-20.....	46,988	11	3.39	1.23	3.65		2.95		1.87	3.44	--	.03		490	.67	31,313	44	2.40	858	7.2
May 21-31.....	43,505	13	3.24	1.32	3.13		3.38		1.60	2.65	.02	.02		447	.61	26,448	41	2.07	777	7.1
June 1-18.....	102,823	18	3.24	1.32	3.65		3.02		1.81	3.33	--	.05		496	.67	69,360	44	2.42	828	7.6
June 19-25.....	593,693	17	1.85	.46	1.22		1.80		.67	1.02	--	.05		225	.31	181,670	35	1.13	359	7.5
June 26-30.....	229,884	16	3.44	.99	5.22		2.03		2.27	5.30	--	.03		601	.82	187,898	54	3.51	1,020	7.5
July 1-9.....	264,912	21	2.89	.90	3.57		2.15		1.62	3.55	.02	.03		476	.65	171,494	48	2.59	775	7.3
July 10-13, 15..	195,174	28	2.40	.68	2.61		2.00		1.25	2.40	.02	.03		376	.51	99,804	46	2.10	599	7.1
July 14, 16.....	95,603	21	1.90	.50	1.39		1.88		.69	1.18	.02	.03		a 231	.31	30,035	37	1.27	382	7.7
July 17-24.....	272,926	16	2.45	.64	2.52		1.90		1.27	2.37	.02	.03		356	.48	132,140	45	2.03	585	7.0
July 25-31.....	156,476	17	3.79	1.07	5.52		2.33		2.54	5.47	.02	.03		658	.89	140,027	53	3.54	1,080	7.3
Aug. 1-17.....	252,420	20	4.19	1.23	6.31		2.64		2.79	6.26	.02	.01		755	1.03	259,185	54	3.83	1,200	7.8
Aug. 18-31.....	78,113	14	4.59	1.48	6.96		3.06		3.06	6.88	.02	.02		837	1.14	88,918	53	3.99	1,340	7.7
Sept. 1-11.....	41,716	21	4.29	1.73	6.61		3.15		3.00	6.46	--	.04		805	1.09	45,671	52	3.81	1,280	7.4
Sept. 12, 28-30.	39,630	18	2.69	.82	3.18		2.36		1.21	3.10	--	.00		426	.58	22,960	47	2.39	701	7.2
Sept. 13, 21-27.	163,755	20	2.00	.45	1.83		1.80		.87	1.58	--	.01		278	.38	61,913	43	1.65	445	7.2
Sept. 14-20.....	508,304	16	1.70	.39	1.04		1.69		.58	.87	--	.01		208	.28	143,789	33	1.02	323	7.4
Total or weighted average	11,670,000	13.0	2.45	0.66	1.91		2.16		1.02	1.80	--	0.04		312	0.42	4,901,00	38	1.51	519	--

a Calculated from determined constituents.

COLORADO RIVER BASIN

8-1580. COLORADO RIVER AT AUSTIN, TEX.

LOCATION.--At raw water intake at Austin City waterplant, just downstream from Lamar Boulevard bridge in Austin, Travis County, 0.5 mile downstream from Barton Creek, and 4.5 miles upstream from gaging station at Montopolis bridge on U.S. Highway 183.
DRAINAGE AREA.--38,400 square miles, approximately, upstream from gaging station, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1961.
Water temperatures: October 1947 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 603 micromhos Dec. 2, minimum daily, 387 micromhos Feb. 2.
Percent sodium: Maximum, 29 Oct. 1-31, minimum, 15 Dec. 1 to Jan. 31.
EXTREMES, 1947-61.--Specific conductance: Maximum daily, 603 micromhos Dec. 2, 1960; minimum daily, 243 micromhos Dec. 2, 1953.
Percent sodium; Maximum, 46 Nov. 1-30, 1951; minimum, 15 Nov. 1-30, 1953, Jan. 1-31, 1954, Dec. 1-31, 1960, Jan. 1-31, 1961.
REMARKS.--Sodium (Na) and potassium (K) are calculated and reported as sodium. Records of specific conductance of daily samples available in district office at Austin, Tex. No appreciable inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	98,934	9.2	2.15	1.32	1.44		2.97		0.58	1.33	--	0.01		279	0.38	37,539	29	1.09	472	7.6
Nov. 1-30.....	35,583	11	2.69	1.46	1.00		3.61		.48	1.02	0.01	.05		279	.38	13,502	19	.69	481	7.7
Dec. 1-31.....	39,660	13	2.79	1.48	.74		3.79		.46	.68	.02	.08		269	.37	14,509	15	.51	479	7.6
Jan. 1-31, 1961.	53,802	11	3.19	1.56	.83		4.26		.50	.71	.01	.09		297	.40	21,732	15	.54	517	7.6
Feb. 1-28.....	247,751	11	2.40	1.40	1.26		3.26		.56	1.16	.02	.04		277	.38	93,333	25	.92	487	7.7
Mar. 1-31.....	226,459	11	2.30	1.40	1.17		3.03		.56	1.24	.02	.03		282	.38	86,851	24	.86	474	7.7
Apr. 1-30.....	205,349	10	2.20	1.40	1.26		3.05		.56	1.21	.02	.02		274	.37	76,521	26	.94	473	7.6
May 1-31.....	150,030	9.2	2.25	1.48	1.09		3.11		.52	1.16	.02	.02		a258	.35	52,642	23	.80	473	7.2
June 1-30.....	142,155	12	2.30	1.40	1.09		3.13		.52	1.07	.02	.03		265	.36	51,233	23	.80	460	7.7
July 1-31.....	246,934	9.1	2.30	1.56	1.09		3.26		.52	1.13	.02	.02		268	.36	90,003	22	.78	468	7.5
Aug. 1-31.....	223,507	11	2.25	1.56	1.13		3.06		.58	1.27	.02	.02		293	.40	89,063	23	.82	475	7.4
Sept. 1-30.....	141,560	9.9	2.10	1.40	1.22		2.95		.54	1.18	.02	.02		280	.38	53,906	26	.92	465	7.8
Total or weighted average	1,812,000	10	2.30	1.48	1.17		3.16		0.54	1.16	0.02	0.03		276	0.38	688,600	24	0.85	474	--

a Calculated from determined constituents.

8-1620. COLORADO RIVER AT WHARTON, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 59 in Wharton, Wharton County, 1,000 feet downstream from Texas and New Orleans Railroad Co. bridge, and 12 miles upstream from Jones Creek.
DRAINAGE AREA.--41,380 square miles, approximately, of which 11,900 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: April 1944 to September 1961.
Water temperatures: October 1945 to September 1948, March 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 626 micromhos Jan. 31; minimum daily, 163 micromhos Sept. 14.
Percent sodium: Maximum, 27 Oct. 1-18, Mar. 1-31, May 1-13; minimum, 12 Nov. 1-3.
EXTREMES, 1944-61.--Specific conductance: Maximum daily, 765 micromhos Feb. 5, 1957; minimum daily, 146 micromhos Sept. 27, 1957.
Percent sodium: Maximum, 43 Nov. 1-30, 1951; minimum, 7 Jan. 19-24, 1945.
REMARKS.--Where no potassium (K) is reported, sodium and potassium are calculated and reported as sodium (Na). Records of specific conductance of daily samples available in district office at Austin, Tex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-18, 1960.	53,490	12	2.20	1.40	1.31		3.00		0.65	1.21	0.01	0.02		286	0.39	20,802	27	0.97	482	7.6
Oct. 19-24, 31..	191,881	9.6	1.50	.38	.44		1.56		.44	.28	.02	.02		a134	.18	34,968	19	.45	234	7.2
Oct. 25-30.....	54,506	13	2.25	.73	.78		2.49		.60	.65	.02	.02		232	.32	17,198	21	.64	377	7.4
Nov. 1-3.....	164,350	14	1.50	.26	.26	0.10	1.54		.35	.17	--	.02		a128	.17	28,610	12	.28	216	7.3
Nov. 4-23, 26-30	170,331	15	2.59	.90	.70		2.84		.67	.65	--	.04		250	.34	57,912	17	.53	408	7.4
Nov. 24-25.....	33,263	15	1.40	.30	.35	.10	1.48		.31	.34	--	.01		a130	.18	5,881	16	.38	216	7.3
Dec. 1-11.....	63,404	18	3.34	1.15	1.04		3.69		.85	.90	.02	.06		329	.45	28,369	19	.70	526	7.8
Dec. 12-15.....	41,827	16	2.10	.56	.65		2.02		.67	.54	.02	.06		a195	.27	11,093	20	.57	324	7.7
Dec. 16-31.....	67,025	15	3.39	1.15	.87		3.77		.77	.79	.02	.07		308	.42	28,076	16	.58	512	7.7
Jan. 1-15, 1961.	187,498	13	2.10	.54	.70		2.15		.65	.48	.02	.04		211	.29	53,804	21	.61	332	7.6
Jan. 16-31.....	64,423	14	3.49	1.15	1.39		4.15		.83	.96	.02	.06		337	.46	29,526	23	.91	563	7.7
Feb. 1-6, 12-16.	72,764	13	2.84	1.23	1.13		3.33		.83	.96	--	.06		296	.40	29,292	22	.79	496	7.7
Feb. 7-11.....	82,116	11	2.00	.61	.74		1.93		.79	.59	--	.05		209	.28	23,341	22	.65	337	7.4
Feb. 17-18.....	99,372	15	1.40	.46	.57		1.69		.27	.45	--	.03		a143	.19	19,326	23	.59	241	7.5
Feb. 19-28.....	204,099	12	2.40	.90	.87		2.80		.56	.79	--	.04		246	.33	68,283	21	.68	415	7.3
Mar. 1-31.....	267,225	11	2.69	1.15	1.39		3.36		.67	1.16	--	.05		a288	.39	104,667	27	1.00	503	7.4
Apr. 1-30.....	220,820	13	2.40	1.23	1.26		3.05		.62	1.18	--	.04		286	.39	85,890	26	.94	478	7.2

COLORADO RIVER BASIN--Continued

8-1620. COLORADO RIVER AT WHARTON, TEX.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 1-15, 1961..	78,843	12	2.20	1.40	1.31		3.05		0.62	1.18	--	0.04		282	0.38	30,238	27	0.97	474	7.5
May 16-31.....	63,376	11	2.10	1.32	1.26		2.87		.60	1.18	--	.02		262	.36	22,582	27	.97	462	7.1
June 1-17, 24-30	136,526	13	2.30	1.15	1.04		2.92		.56	.96	.02	.04		254	.35	47,162	23	.80	430	7.6
June 18-23.....	356,073	13	1.65	.48	.52		1.84		.37	.39	.02	.04		160	.22	77,481	20	.51	260	7.1
July 1-11, 15-31	298,846	16	2.54	1.23	1.00		3.15		.60	.96	.02	.05		a265	.36	107,704	21	.73	452	7.4
July 12-14.....	174,347	14	1.45	.35	.52		1.57		.35	.34	.02	.03		a137	.19	32,484	23	.55	229	6.8
Aug. 1-31.....	196,576	14	2.25	1.48	1.26		3.10		.62	1.24	.02	.03		302	.41	80,738	25	.92	477	7.8
Sept. 1-11.....	69,927	14	2.35	1.40	1.35		3.13		.62	1.30	.02	.03		288	.39	27,389	26	.99	488	7.6
Sept. 12-18.....	415,279	14	1.65	.37	.44		1.79		.35	.28	.02	.03		a145	.20	81,893	18	.43	245	6.9
Sept. 19-30.....	73,785	15	2.79	1.15	.96		3.36		.58	.90	.02	.03		282	.38	28,298	20	.68	472	7.5
Total or weighted average	3,902,000	13	2.15	0.82	0.83		2.52		0.54	0.70	--	0.04		223	0.30	1,183,000	22	0.67	372	--

a Calculated from determined constituents.

8-1765. GUADALUPE RIVER AT VICTORIA, TEX.

LOCATION.--At gaging station at bridge on U.S. Highway 59 in Victoria, Victoria County, 1,300 feet upstream from Texas and New Orleans Railroad Co. bridge and 10 miles upstream from Coleto Creek.
DRAINAGE AREA.--5,161 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1948 to September 1961.
Water temperatures: November 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 889 micromhos Dec. 1; minimum daily, 160 micrombos Oct. 31.
Percent sodium: Maximum, 28 Aug. 11-20, 21-31, Sept. 11-13; minimum, 14 Nov. 6-10.
EXTREMES, 1945-46, 1948-61.--Specific conductance: Maximum daily, 1,950 micromhos Jan. 11-17, 1946; minimum daily, 160 micromhos Oct. 31, 1960.
Percent sodium: Maximum, 67 July 23-24, 1950; minimum, 13 May 7-10, 1958.
REMARKS.--Where no potassium (K) is reported sodium and potassium are calculated and reported as sodium (Na). Records of specific conductance of daily samples available in district office at Austin, Tex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-16, 1960.	26,150	18	3.19	1.40	1.31		4.16		0.60	1.07	0.02	0.05		328	0.45	11,665	22	0.86	551	7.6
Oct. 17-18.....	18,129	14	2.30	.90	.91		2.88		.37	.79	.02	.05		a228	.31	5,621	22	.72	386	7.4
Oct. 19-29.....	450,545	12	1.60	.36	.52		1.80		.25	.39	.01	.02		a142	.19	87,009	21	.53	235	7.3
Oct. 30-31.....	72,000	---	1.20	.18	.36		1.34		.14	.25	--	.01		100	.14	9,792	21	.43	160	7.4
Nov. 1-5.....	235,835	13	1.95	.44	.52		2.13		.31	.42	--	.03		a165	.22	52,921	18	.48	280	7.2
Nov. 6-10.....	44,172	18	3.69	1.23	.83		4.21		.50	.96	--	.06		332	.45	19,944	14	.53	540	7.4
Nov. 11-22.....	79,617	18	4.24	1.40	1.26		4.92		.65	1.24	--	.08		394	.54	42,662	18	.75	643	7.4
Nov. 23-30.....	102,173	14	2.79	.90	.91		3.08		.58	.90	--	.05		282	.38	39,185	20	.67	446	7.3
Dec. 1-12.....	68,906	21	4.14	1.40	1.74		4.79		.79	1.58	.02	.08		416	.57	38,984	24	1.05	694	7.6
Dec. 13-20,30-31	83,643	15	3.39	1.15	1.26		3.97		.67	1.04	.02	.08		329	.45	37,425	22	.84	547	7.6
Dec. 21-29.....	49,662	16	4.14	1.32	1.31		4.92		.65	1.07	.02	.09		374	.51	25,260	19	.79	628	7.7
Jan. 1-10, 1961.	107,048	15	2.84	.99	1.00		3.21		.62	.96	--	.05		277	.38	40,327	21	.72	474	7.3
Jan. 11-16.....	53,827	15	2.94	.99	1.00		3.23		.69	.96	--	.06		294	.40	21,522	20	.71	485	7.3
Jan. 17-31.....	74,767	15	4.04	1.56	1.22		4.70		.73	1.27	--	.10		398	.54	40,470	18	.73	647	7.5
Feb. 1-6.....	30,978	13	3.59	1.56	1.39		4.33		.77	1.33	--	.11		357	.49	15,040	21	.87	624	7.8

a Calculated from determined constituents.

GUADALUPE RIVER BASIN--Continued

8-1765. GUADALUPE RIVER AT VICTORIA, TEX.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 7-12, 1961.	83,806	12	2.59	0.82	1.13		2.80		0.69	0.96	--	0.08		264	0.36	30,090	25	0.87	450	7.4
Feb. 13-20.....	68,406	11	3.34	1.23	1.09		3.92		.65	.99	--	.10		316	.43	29,398	19	.72	536	7.7
Feb. 21-28.....	74,499	14	3.19	1.15	.87		3.74		.54	.85	--	.09		292	.40	29,585	17	.59	498	7.7
Mar. 1-10.....	58,175	17	3.59	1.56	1.09		4.34		.67	1.10	0.02	.12		368	.50	29,116	17	.68	599	7.6
Mar. 11-20.....	47,841	18	3.54	1.73	1.04		4.26		.75	1.18	.02	.12		381	.52	24,789	17	.64	619	7.4
Mar. 21-31.....	45,185	17	3.44	1.73	1.26		4.25		.73	1.30	.02	.12		384	.52	23,598	20	.78	618	7.5
Apr. 1-10.....	36,972	18	3.34	1.65	1.22		4.23		.69	1.18	.02	.07		361	.49	18,152	20	.77	602	7.4
Apr. 11-20.....	31,220	16	3.59	1.65	1.44		4.39		.79	1.41	.02	.06		396	.54	16,814	22	.89	640	7.5
Apr. 21-30.....	28,126	15	3.09	1.56	1.61		4.26		.73	1.21	.02	.05		351	.48	13,426	26	1.05	600	7.4
May 1-10.....	26,817	17	3.29	1.40	1.48		4.23		.75	1.13	.02	.05		362	.49	13,202	24	.97	594	7.3
May 11-20.....	22,175	18	3.29	1.56	1.48		4.26		.75	1.24	.02	.04		365	.50	11,008	23	.95	601	7.4
May 21-31.....	21,796	16	3.14	1.56	1.31		4.10		.69	1.18	.02	.03		333	.45	9,871	22	.85	575	7.3
June 1-10.....	17,395	19	2.74	1.56	1.39		3.74		.65	1.24	--	.06		320	.44	7,570	24	.95	550	7.5
June 11-19.....	35,738	19	2.84	1.23	1.35		3.51		.60	1.24	--	.07		318	.43	15,456	25	.94	516	7.4
June 20-25.....	324,298	14	1.65	.35	.38	0.10	1.84		.27	.34	--	.03		a 146	.20	64,393	15	.38	247	7.0
June 26-30.....	30,486	22	3.54	1.15	1.26		4.05		.65	1.18	--	.06		358	.49	14,843	21	.82	559	7.0
July 1-10.....	39,015	21	3.99	1.40	1.74		4.79		.77	1.50	.02	.05		407	.55	21,596	24	1.06	668	7.6
July 11-13.....	32,709	18	3.14	1.15	1.35		3.80		.58	1.18	.02	.06		a 314	.43	13,968	24	.92	539	7.3
July 14-17.....	42,065	15	1.85	.53	.78		2.13		.37	.62	.02	.04		a 183	.25	10,469	25	.72	316	7.1
July 18-31.....	48,345	18	3.49	1.15	1.57		4.08		.77	1.27	.02	.05		361	.49	23,736	25	1.03	596	7.4
Aug. 1-10.....	26,301	22	2.69	1.48	1.48		3.54		.75	1.30	--	.07		340	.46	12,162	26	1.02	542	7.6
Aug. 11-20.....	22,889	21	2.89	1.48	1.70		3.84		.69	1.47	--	.06		356	.48	11,082	28	1.15	581	7.6
Aug. 21-31.....	23,040	19	2.59	1.40	1.52		3.51		.67	1.27	--	.06		328	.45	10,278	28	1.08	531	7.5
Sept. 1-10.....	18,843	22	2.74	1.56	1.57		3.80		.71	1.27	.02	.06		332	.45	8,508	27	1.07	546	7.7
Sept. 11-13.....	13,847	18	2.10	.90	1.17		2.87		.37	.87	.02	.05		a 236	.32	4,444	28	.96	396	7.8
Sept. 14.....	8,291	20	4.08		1.44		3.79		.56	1.07	.02	.06		--	--	--	26	1.01	510	8.2
Sept. 15-20.....	51,911	19	1.80	.54	.83		2.18		.42	.51	.02	.04		204	.28	14,402	26	.76	305	7.7
Sept. 21-30.....	20,231	20	3.19	1.32	1.61		4.06		.71	1.27	.02	.06		349	.47	9,603	26	1.07	570	7.7
Total or weighted average	2,798,000	15	2.64	0.90	0.96		3.08		0.50	0.82	--	0.05		258	0.35	979,300	21	0.72	428	--

a Calculated from determined constituents.

8-2110. NUECES RIVER NEAR MATHIS, TEX.

LOCATION.--At intake tower at Wesley E. Seale Dam, 0.6 mile upstream from gaging station at bridge on State Highway 359, and 4 miles southwest of Mathis, San Patricio County.
DRAINAGE AREA.--16,660 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1961.
Water temperatures: October 1947 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 592 micromhos June 12; minimum daily, 325 micromhos Nov. 27.
Percent sodium: Maximum, 43 July 1-31; minimum, 34 Dec. 1-10, 11-20.
EXTREMES, 1947-61.--Specific conductance: Maximum daily, 1,040 micromhos July 1, 1948; minimum daily, 233 micromhos July 30, 1949.
Percent sodium: Maximum, 63 May 1-20, 1953; minimum, 18 Dec. 1-31, 1959.
REMARKS.--Sodium (Na) and potassium (K) values are calculated and reported at sodium. Records of specific conductance of daily samples available in district office at Austin, Tex.

Chemical analyses, water year October 1980 to September 1981

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	155,810	15	2.10	0.52	1.87		2.75		0.58	1.18	--	0.01		270	0.37	57,213	42	1.84	454	7.5
Nov. 1-11, 13-30	92,378	12	1.80	.35	1.35		2.28		.48	.73	--	.02		220	.30	27,640	39	1.30	341	7.8
Nov. 12.....	1,878		2.18		--		2.23		--	1.81	--	--		--	--	--	--	--	478	7.8
Dec. 1-10.....	20,410	21	1.90	.37	1.17		2.29		.48	.85	--	.02		a 207	.28	5,746	34	1.10	345	7.8
Dec. 11-20.....	27,907	17	1.90	.34	1.13		2.21		.52	.82	--	.03		a 200	.27	7,591	34	1.07	350	7.1
Dec. 21-31.....	13,158	17	1.90	.33	1.26		2.25		.54	.68	--	.03		a 207	.28	3,704	38	1.20	353	7.3
Jan. 1-31, 1981.	51,485	18	2.00	.31	1.39		2.34		.56	.78	0.01	.02		231	.31	18,188	38	1.30	367	7.9
Feb. 1-28.....	64,590	15	2.10	.37	1.70		2.33		.89	1.13	--	.03		258	.35	22,488	41	1.53	418	7.5
Mar. 1-31.....	11,191	15	2.30	.39	1.83		2.38		.71	1.41	.02	.00		281	.38	4,277	40	1.58	483	7.4
Apr. 1-30.....	17,258	14	2.40	.44	1.91		2.82		.79	1.30	.02	.01		300	.41	7,041	40	1.81	496	7.3
May 1-31.....	7,501	15	2.59	.51	2.26		2.79		.81	1.75	.02	.01		322	.44	3,285	42	1.82	534	7.7
June 1-30.....	81,481	12	2.89	.54	2.39		2.85		.83	1.92	--	.02		332	.45	38,781	42	1.88	581	7.6
July 1-31.....	28,100	14	2.45	.48	2.22		2.67		.79	1.88	--	.02		318	.43	12,078	43	1.84	513	7.2
Aug. 1-31.....	28,100	19	2.59	.51	2.18		3.06		.71	1.47	--	.01		318	.43	12,153	41	1.75	507	8.2
Sept. 1-30.....	11,901	21	2.69	.53	2.18		3.21		.87	1.47	.02	.01		328	.45	5,309	40	1.71	517	8.0
Total or weighted average	613,000	15	2.15	0.44	1.78		2.57		0.82	1.18	--	0.02		288	0.38	220,700	41	1.56	438	--

a Calculated from determinded constituents.

RIO GRANDE BASIN

8-2492. RIO GRANDE ABOVE CULEBRA CREEK, NEAR LOBATOS, COLO.

LOCATION.--Half a mile southeast of La Sauces, 7 miles upstream from Culebra Creek, and 15 miles upetream from gaging station near Lobatos Conejos County.
DRAINAGE AREA.--7,700 square miles, approximately, upstream from gaging station (includes 2,940 square miles in closed basin in northern part of San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 920 micromhos July 26; minimum daily, 134 micromhos Nov. 12.
Percent sodium: Maximum, 49 May 3-4; minimum, 28 Jan. 1-10, Apr. 19-20.
EXTREMES, 1946-61.--Specific conductance: Maximum daily, 1,110 micromhos Sept. 21, 1959; minimum daily, 122 micromhos June 1, 1949.
Percent sodium: Maximum, 72 May 11-14, 1957; minimum, 16 Dec. 1, 3-10, 1946.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Culebra Creek which enters the Rio Grande between the sampling point and the gaging station is usually dry at its mouth. Inflow from this and other sources between sampling point and gaging station occurs only after heavy local rainfall.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-11, 1960.	700	--	2.59	0.73	2.26	--	2.82	0.00	--	--	--	--	--	370	0.50	352	40	1.75	552	7.5
Oct. 12-18.....	597	--	2.84	.90	2.48	--	2.85	.00	--	--	--	--	--	418	.57	339	40	1.81	615	7.8
Oct. 19-31.....	2,733	--	2.40	.66	1.96	--	2.62	.00	--	--	--	--	--	338	.46	1,256	39	1.58	503	7.4
Nov. 1-7.....	1,019	--	2.69	.82	2.18	--	2.67	.00	--	--	--	--	--	380	.52	527	38	1.64	561	7.8
Nov. 8-9.....	274	--	.85	.21	.52	--	.98	.00	--	--	--	--	--	114	.16	42	33	.72	167	7.1
Nov. 10-12, 14..	4,015	18	.80	.08	.41	0.06	.85	.00	0.40	0.05	0.01	0.01	0.03	100	.14	546	30	.62	139	7.2
Nov. 13,15.....	2,348	--	1.00	.60	.83	--	1.44	.00	--	--	--	--	--	170	.23	543	34	.92	250	7.4
Nov. 16, 18-22, 24-26, 28, 30.	2,749	--	2.20	.60	1.52	--	2.31	.00	--	--	--	--	--	294	.40	1,099	35	1.29	432	7.5
Nov. 17.....	329	--	2.54	.74	2.04	--	2.64	.00	--	--	--	--	--	358	.49	160	38	1.60	528	7.5
Nov. 23,27,29...	708	--	1.80	.58	1.22	--	2.36	.00	--	--	--	--	--	245	.33	236	34	1.12	355	7.6
Dec. 1-7.....	1,749	--	1.90	.58	1.26	--	2.39	.00	--	--	--	--	--	263	.36	626	34	1.13	377	7.6
Dec. 8-25.....	5,605	--	1.70	.46	.96	--	2.29	.00	--	--	--	--	--	228	.31	1,738	31	.92	311	7.9
Dec. 26-31.....	2,047	--	1.50	.54	.83	--	2.07	.00	--	--	--	--	--	200	.27	557	29	.82	275	7.8
Jan. 1-10, 1961.	2,876	38	1.60	.34	.78	.12	2.05	.00	.65	.14	.02	.01	.07	204	.28	798	28	.80	271	7.9
Jan. 11-24.....	4,110	--	1.40	.28	.70	--	1.69	.00	--	--	--	--	--	174	.24	973	29	.76	238	7.4

Jan. 25, 1961...	317	--	3.44	1.65	3.18	--	5.26	.00	--	--	--	--	--	558	.76	241	38	1.99	785	8.0
Jan. 26-Feb. 4..	3,491	--	1.35	.29	.70	--	1.61	.00	--	--	--	--	--	180	.24	855	30	.77	242	7.3
Feb. 5.....	387	--	2.05	.63	1.39	--	2.36	.20	--	--	--	--	--	280	.38	147	34	1.20	406	8.5
Feb. 6-15.....	4,086	--	1.30	.34	.74	--	1.74	.00	--	--	--	--	--	180	.24	1,000	31	.82	243	7.7
Feb. 16-17.....	1,031	--	1.50	.44	1.13	--	2.47	.00	--	--	--	--	--	208	.28	292	37	1.15	303	7.8
Feb. 18-28.....	5,236	--	1.55	.31	.87	--	1.90	.00	--	--	--	--	--	195	.27	1,389	32	.90	277	7.7
Mar. 1-11.....	5,018	--	1.55	.49	.87	--	1.82	.00	--	--	--	--	--	212	.29	1,447	30	.86	294	7.7
Mar. 12-17.....	2,511	--	1.90	.54	1.13	--	2.00	.00	--	--	--	--	--	255	.35	871	32	1.02	364	7.4
Mar. 18-29.....	3,999	--	2.10	.56	1.35	--	2.21	.00	--	--	--	--	--	284	.39	1,544	34	1.17	407	7.3
Mar. 30-31.....	619	--	2.59	.73	1.74	--	2.39	.00	--	--	--	--	--	355	.48	299	34	1.35	509	7.6
Apr. 1-3.....	1,000	--	2.20	.54	1.44	--	2.20	.00	--	--	--	--	--	296	.40	402	34	1.23	426	7.9
Apr. 4-5.....	666	--	2.69	.90	1.91	--	2.46	.00	--	--	--	--	--	386	.52	350	35	1.43	545	7.3
Apr. 6-8.....	1,648	--	1.90	.56	1.26	--	2.07	.00	--	--	--	--	--	265	.36	594	34	1.14	379	7.5
Apr. 9-16.....	3,427	--	2.79	.82	1.83	--	2.33	.00	--	--	--	--	--	384	.52	1,790	34	1.36	549	7.6
Apr. 17-18.....	651	--	3.09	.99	2.04	--	2.26	.13	--	--	--	--	--	442	.60	391	33	1.43	613	8.
Apr. 19-20.....	1,579	--	1.40	.42	.70	--	1.33	.00	--	--	--	--	--	194	.26	417	28	.73	266	7.5
Apr. 21-24.....	5,871	--	.65	.25	.44	--	1.00	.00	--	--	--	--	--	143	.19	1,142	33	.65	175	7.1
Apr. 25-29.....	4,860	--	1.20	.40	.74	--	1.49	.00	--	--	--	--	--	179	.24	1,183	32	.83	242	7.4
Apr. 30, May 2, 7, 12, 16.....	5,901	--	.85	.23	.48	--	1.13	.00	--	--	--	--	--	133	.18	1,067	31	.65	164	7.4
May 1, 5-6.....	5,671	--	1.30	.34	.78	--	1.48	.00	--	--	--	--	--	185	.25	1,427	32	.87	255	7.4
May 3-4.....	4,443	--	1.50	.52	1.91	--	2.84	.07	--	--	--	--	--	287	.39	1,734	49	1.91	392	8.3
May 8-10.....	2,577	--	1.70	.54	1.00	--	1.70	.00	--	--	--	--	--	233	.32	816	31	.95	334	7.1
May 11, 13-14...	2,809	--	1.15	.33	.70	--	1.36	.00	--	--	--	--	--	162	.22	619	32	.81	226	7.4
May 15, 17-23, 25-30.....	14,079	29	1.15	3.87	.78	.11	1.84	.00	.46	.10	.02	01	.07	174	.24	3,332	13	.49	236	7.5
May 24.....	1,541	--	1.10	.30	.78	--	1.70	.00	--	--	--	--	--	223	.30	467	36	.94	210	6.6
May 31-June 1...	3,320	--	1.60	.32	1.22	--	1.80	.00	--	--	--	--	--	236	.32	1,066	39	1.24	319	8.2
June 2-6.....	5,762	--	1.95	.57	1.26	--	1.87	.00	--	--	--	--	--	267	.36	2,092	33	1.13	384	7.7
June 7-11.....	2,489	--	2.89	.90	2.31	--	2.39	.00	--	--	--	--	--	440	.60	1,490	38	1.67	595	7.2
June 12.....	419	--	2.10	.62	1.44	--	2.07	.00	--	--	--	--	--	320	.44	182	35	1.23	420	7.3
June 13-17.....	1,388	--	2.99	1.07	2.65	--	2.49	.13	--	--	--	--	--	456	.62	861	40	1.86	640	8.3

RIO GRANDE BASIN--Continued

8-2492. RIO GRANDE ABOVE CULEBRA CREEK NEAR LOBATOS, COLO.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 18-21, 1961	1,039	--	2.59	0.81	2.09	--	3.15	0.00	--	--	--	--	--	378	0.51	534	38	1.60	537	7.1
June 22-29.....	2,063	--	2.99	1.07	2.91	--	3.18	.00	--	--	--	--	--	471	.64	1,321	42	2.04	662	7.4
June 30-July 17.	2,242	31	3.59	1.23	3.13	0.21	3.11	.00	4.16	0.73	0.04	0.01	0.16	540	.73	1,647	38	2.02	768	7.1
July 18-21.....	428	--	3.89	1.32	3.65	--	3.31	.07	--	--	--	--	--	600	.82	350	41	2.26	850	8.3
July 22-23.....	278	--	2.50	.90	2.18	--	3.34	.00	--	--	--	--	--	376	.51	142	39	1.67	548	7.7
July 24-25.....	184	--	3.14	.99	2.83	--	3.47	.00	--	--	--	--	--	467	.64	117	41	1.97	666	8.0
July 26.....	77	--	4.19	1.56	3.83	--	3.41	.00	--	--	--	--	--	628	.85	66	40	2.26	920	6.9
July 27-28.....	325	--	3.44	1.23	3.00	--	3.34	.00	--	--	--	--	--	529	.72	234	39	1.96	745	7.6
July 29.....	107	--	2.40	.68	1.74	--	2.79	.37	--	--	--	--	--	330	.45	48	36	1.40	463	8.6
July 30.....	83	--	3.34	1.07	2.83	--	3.28	.00	--	--	--	--	--	482	.66	55	39	1.90	701	7.6
July 31-Aug. 1..	145	--	2.64	.82	2.31	--	3.05	.07	--	--	--	--	--	388	.53	76	40	1.75	560	8.3
Aug. 2-3, 5, 7..	387	--	3.24	1.15	2.91	--	3.15	.00	--	--	--	--	--	485	.66	255	40	1.97	692	7.9
Aug. 4, 6, 8....	333	--	2.20	.80	1.70	--	3.18	.00	--	--	--	--	--	337	.46	153	36	1.39	464	8.2
Aug. 9-11.....	264	--	2.89	1.07	2.61	--	3.05	.00	--	--	--	--	--	454	.62	163	40	1.85	641	7.6
Aug. 12-13.....	165	--	2.20	.82	2.09	--	2.98	.00	--	--	--	--	--	362	.49	81	41	1.70	505	7.7
Aug. 14-15.....	270	--	2.05	.71	1.57	--	2.46	.27	--	--	--	--	--	319	.43	117	36	1.33	433	8.5
Aug. 16.....	133	--	2.89	1.23	2.61	--	3.41	.00	--	--	--	--	--	467	.64	84	39	1.82	654	7.7
Aug. 17-19.....	399	--	1.70	.64	1.13	--	2.33	.00	--	--	--	--	--	262	.36	142	33	1.05	358	7.5
Aug. 20-25.....	628	--	2.05	.75	1.61	--	2.59	.00	--	--	--	--	--	320	.44	273	37	1.36	440	7.3
Aug. 26-31.....	443	--	2.79	.90	2.31	--	2.90	.00	--	--	--	--	--	392	.53	236	38	1.70	584	8.0
Sept. 1-2.....	127	--	2.35	.90	2.39	--	2.39	.20	--	--	--	--	--	397	.54	69	42	1.88	571	8.5
Sept. 3-15.....	2,290	--	2.00	.68	1.52	--	2.62	.00	--	--	--	--	--	303	.41	944	36	1.32	428	8.1
Sept. 16-20.....	738	--	2.54	.82	1.91	--	2.77	.00	--	--	--	--	--	374	.51	375	36	1.48	531	8.0
Sept. 21-28.....	1,509	--	1.90	.64	1.35	--	2.33	.00	--	--	--	--	--	276	.38	566	35	1.20	396	8.0
Sept. 29-30.....	303	--	2.50	.82	1.87	--	2.57	.27	--	--	--	--	--	366	.50	151	36	1.45	512	8.6
Total or weighted average	143,615	--	1.70	0.82	1.17	--	1.97	--	--	--	--	--	--	243	0.33	47,497	32	1.04	338	7.4

8-3130. RIO GRANDE AT OTOWI BRIDGE, NEAR SAN ILDEFONSO, N. MEX.

LOCATION.--At gaging station on pier of former railway bridge, 400 feet downstream from bridge on State Highway 4, 1.8 miles southwest of San Ildefonso Pueblo, 2.5 miles downstream from Pojoaque River, and 7 miles west of Pojoaque, Santa Fe County.
DRAINAGE AREA.--14,300 square miles, approximately (includes 2,940 square miles in closed basin in San Luis Valley Colo.).
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1961.
Water temperatures: October 1948 to September 1961.
Sediment records: October 1947 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 749 micromhos Sept. 19; minimum daily, 222 micromhos Apr. 24, May 24, June 1.
Percent sodium: Maximum, 42 Oct. 18-20; minimum, 15 May 1-5.
EXTREMES, 1946-61.--Specific conductance: Maximum daily, 1,230 micromhos Aug. 26, 1951; minimum daily, 165 micromhos June 13, 1952.
Percent sodium: Maximum, 43 Sept. 13-30, 1958; minimum, 12 Apr. 26-30; Aug. 1-7, 1958.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 1960.	7,646	28	2.30	0.54	1.26		2.79	0.00	1.10	0.27		0.01		256	0.35	2,662	31	1.06	399	7.9
Oct. 16-17.....	1,769	26	2.40	.40	1.57		2.95	.00	1.25	.31		.01		276	.38	664	36	1.32	431	8.1
Oct. 18-20.....	3,671	24	2.69	.55	2.35		3.25	.00	2.12	.31		.02		350	.48	1,748	42	1.84	537	7.8
Oct. 21-22.....	1,849	27	2.59	.57	1.70		3.11	.00	1.52	.31		.01		303	.41	762	35	1.35	471	7.6
Oct. 23-24.....	2,114	27	2.84	.68	1.65		2.98	.00	1.92	.37		.01		325	.44	935	32	1.24	497	7.5
Oct. 25-31.....	6,442	27	2.54	.54	1.31		2.75	.00	1.48	.28		.01		279	.38	2,444	30	1.05	430	7.7
Nov. 1-10.....	8,648	27	2.50	.78	1.44		2.90	.00	1.50	.31		.01		290	.39	3,411	30	1.12	451	7.5
Nov. 11-13.....	7,658	23	3.09	.99	1.35		2.80	.00	2.42	.21		.02		337	.46	3,510	25	.94	511	7.6
Nov. 14-18.....	9,114	24	1.70	.58	.87		1.92	.00	1.08	.16		.01		202	.27	2,504	28	.81	304	7.5
Nov. 19-21.....	2,963	25	2.00	.76	1.13		2.36	.00	1.29	.22		.01		242	.33	975	29	.96	369	7.6
Nov. 22 30.....	7,837	27	2.40	.72	1.35		2.70	.00	1.50	.28		.00		278	.38	2,963	30	1.08	425	7.7
Dec. 1-31.....	30,682	28	2.20	.80	1.17		2.72	.00	1.29	.27		.01		263	.36	10,974	28	.96	409	7.8
Jan. 1-15, 1961.	13,002	60	2.30	.54	1.17		2.70	.00	1.10	.23		.01		282	.38	4,986	29	.99	389	7.8
Jan. 16-31.....	15,328	58	2.05	.55	1.04		2.52	.00	.96	.20		.01		260	.35	5,420	29	.92	357	7.9
Feb. 1-15.....	16,810	56	2.00	.60	1.04		2.46	.00	1.02	.20		.00		258	.35	5,898	29	.92	357	7.7
Feb. 16-18.....	4,225	53	2.20	.64	1.22		2.44	.00	1.44	.23		.01		283	.38	1,626	30	1.02	398	7.5
Feb. 19-28.....	13,944	55	2.10	.58	1.13		2.36	.00	1.29	.21		.01		271	.37	5,139	30	.98	374	7.7
Mar. 1-11.....	15,076	29	2.20	.66	1.22		2.47	.00	1.39	.25		.01		259	.35	5,310	30	1.02	401	7.4

RIO GRANDE BASIN--Continued

8-3130. RIO GRANDE AT OTOWI BRIDGE NEAR SAN ILDEFONSO, N. MEX.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 12-18, 1961	12,357	24	2.99	0.82	1.44		3.00	0.00	2.04	0.22		0.02		324	0.44	5,445	27	1.04	501	7.5
Mar. 19-31	16,451	28	2.40	.68	1.31		2.64	.00	15.62	.26		.01		278	.38	6,220	30	1.05	428	7.7
Apr. 1-19	32,787	26	2.50	.50	1.13		2.57	.00	1.37	.27		.02		262	.36	11,683	27	.92	407	7.6
Apr. 20-23	19,660	21	2.50	.36	.57		2.44	.00	.87	.13		.03		210	.29	5,615	17	.47	337	7.5
Apr. 24-29	25,313	19	1.80	.26	.44		1.84	.00	.60	.12		.02		158	.21	5,439	17	.43	250	7.3
Apr. 30	5,891	18	2.30	.42	.57		2.21	.00	1.00	.12		.02		202	.27	1,618	17	.49	324	7.6
May 1-5	38,737	21	2.54	.34	.52		2.46	.00	.83	.08		.02		207	.28	10,905	15	.43	322	7.7
May 6-15	62,083	18	2.20	.20	.48		2.13	.00	.71	.07		.02		177	.24	14,945	17	.44	278	.
May 16-June 2	97,254	19	1.80	.20	.43		1.82	.00	.56	.08		.01		153	.21	20,237	18	.43	237	7.8
June 3-13	37,898	21	1.80	.40	.70		1.82	.00	.96	.14		.01		184	.25	9,484	24	.66	284	7.9
June 14-16	6,664	19	2.10	.38	.91		2.07	.00	1.21	.20		.00		214	.29	1,940	27	.82	334	7.8
June 17	2,182	20	4.49	.59	1.22		2.75	.00	3.33	.17		.04		397	.54	1,178	19	.76	596	7.9
June 18-25	13,456	21	2.30	.42	1.00		2.23	.00	1.33	.21		.01		234	.32	4,282	27	.86	363	7.8
June 26-July 6	10,364	26	2.59	.67	1.44		2.66	.00	1.81	.34		.01		299	.41	4,214	31	1.12	454	7.9
July 7-8, 10-12, 14-16	11,234	22	2.54	.48	1.04		2.66	.00	1.23	.23		.02		251	.34	3,835	26	.85	389	7.8
July 9, 13	3,745	23	3.89	.47	.96		3.34	.00	1.77	.23		.02		323	.44	1,645	18	.65	499	7.6
July 17-20	3,285	24	2.59	.55	1.13		2.74	.00	1.37	.25		.01		266	.36	1,188	26	.90	415	7.7
July 21-27	9,372	21	2.05	.31	.74		2.07	.00	.94	.19		.01		197	.27	2,511	24	.68	305	7.6
July 28-30	2,267	26	2.54	.50	1.31		2.77	.00	1.35	.28		.01		272	.37	839	30	1.06	420	7.8
July 31	589	26	3.24	.60	1.52		2.79	.00	2.21	.39		.00		338	.46	271	28	1.10	514	7.9
Aug. 1-3	1,648	27	2.79	.49	1.52		2.85	.00	1.67	.34		.00		302	.41	677	32	1.19	466	8.0
Aug. 4-6	3,660	26	3.49	.63	1.35		3.25	.00	2.46	.24		.00		358	.49	1,782	25	.94	521	7.8
Aug. 7-15	15,995	22	2.40	.52	.78		2.56	.00	1.06	.14		.00		227	.31	4,938	21	.65	365	7.8
Aug. 16	1,232	20	1.35	.67	.96		1.57	.27	1.10	.16		.00		191	.26	320	32	.95	302	8.7
Aug. 17-20	6,934	24	3.09	.63	1.26		3.18	.00	1.71	.17		.00		306	.42	2,886	25	.92	479	7.9
Aug. 21-24	13,591	24	2.50	.50	.96		2.92	.00	.90	.17		.00		239	.33	4,418	24	.78	379	7.9
Aug. 25-27	5,605	26	3.69	.67	1.00		3.46	.00	1.73	.17		.00		324	.44	2,470	19	.68	504	7.7
Aug. 28-29	3,122	15	2.20	.42	.87		1.90	.27	1.17	.17		.00		211	.29	896	25	.76	335	8.7
Aug. 30-Sept. 11	15,239	25	2.50	.52	1.04		2.77	.00	1.10	.21		.01		249	.34	5,161	26	.85	391	7.9
Sept. 12-14	4,237	25	2.89	.59	1.22		2.74	.00	1.75	.21		.03		293	.40	1,688	26	.92	455	7.8

Sept. 15, 1961..	1,254	25	2.35	.51	1.09		2.59	.00	1.17	.22		.01		246	.33	419	28	.91	382	8.0
Sept. 16-18.....	4,064	21	3.29	.67	1.22		2.93	.00	2.04	.20		.03		318	.43	1,758	24	.87	496	7.7
Sept. 19.....	2,420	24	5.64	1.07	1.48		3.29	.00	4.79	.18		.01		520	.71	1,711	18	.81	749	7.6
Sept. 20-21.....	4,225	20	3.14	.62	1.22		2.69	.00	2.10	.18		.00		307	.42	1,764	24	.89	482	8.0
Sept. 22-30.....	12,050	23	2.45	.49	.91		2.51	.00	1.19	.18		.01		238	.32	3,900	24	.75	374	7.9
Total or weighted average	675,600	25	2.30	0.46	0.87		2.37	--	1.45	0.17		0.01		229	0.31	209,626	39	1.06	387	7.6

RIO GRANDE BASIN--Continued

8-3583. RIO GRANDE CONVEYANCE CHANNEL AT SAN MARCIAL, N. MEX.

LOCATION.--At gaging station, 1,800 feet west of San Marcial gage on railway bridge, about 1 mile south of former site of village of San Marcial, Socorro County, and about 18.5 miles southwest of San Antonio.
RECORDS AVAILABLE.--Chemical analyses: March 1954 to September 1961.
Water temperatures: March 1954 to September 1961.
Sediment records: March 1954 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,510 micromhos Aug. 17; minimum daily, 410 micromhos June 4-5.
Percent sodium: Maximum, 64 Oct. 3-4, Oct. 7-11; minimum, 31 May 14-15.
EXTREMES, 1954-61.--Specific conductance: Maximum daily, 2,860 micromhos Oct. 25, 1956; minimum daily, 410 micromhos June 4-5, 1961.
Percent sodium: Maximum, 66 Oct. 1-20, Nov. 1-21, 1956, Oct. 1-9, 1959; minimum, 29 May 14-15, 1961.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of discharge for water year October 1960 to September 1961 furnished by Santa Fe district office of Surface Water Branch. Records of composite discharge for Rio Grande conveyance channel at San Marcial and Rio Grande floodway at San Marcial given in Surface Water Records as Rio Grande at San Marcial. Quality of Water Records for Rio Grande floodway given on page 91.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-2, 1960..	19	--	3.49	1.07	5.44	--	3.67	0.00	--	--	--	--	--	642	0.87	16	54	3.56	987	7.6
Oct. 3-4.....	40	--	4.19	1.65	10.22	--	4.26	.13	--	--	--	--	--	1,040	1.41	56	64	5.98	1,600	8.3
Oct. 5-6.....	37	--	3.79	.90	5.39	--	3.93	.00	--	--	--	--	--	648	.88	33	53	3.52	1,000	7.6
Oct. 7-11.....	94	--	4.49	1.48	10.61	--	4.47	.00	--	--	--	--	--	1,060	1.44	136	64	6.14	1,640	7.9
Oct. 12-13.....	73	--	3.74	.99	3.57	--	3.18	.40	--	--	--	--	--	540	.73	54	43	2.32	797	8.7
Oct. 14-15.....	83	--	4.04	1.23	6.48	--	3.90	.00	--	--	--	--	--	770	1.05	87	55	3.99	1,180	7.7
Oct. 16-17.....	103	--	3.69	.90	3.52	--	3.44	.00	--	--	--	--	--	527	.72	74	43	2.32	789	8.0
Oct. 18-21.....	6,093	19	6.94	1.97	6.57	0.19	4.54	.00	9.49	1.35	0.03	0.00	0.22	1,000	1.36	8,287	42	3.11	1,380	7.5
Oct. 22-31.....	5,772	--	3.89	.99	3.57	--	3.62	.00	--	--	--	--	--	542	.74	4,255	42	2.28	813	7.9
Nov. 1-14.....	10,913	--	3.79	.99	2.96	--	3.64	.00	--	--	--	--	--	498	.68	7,391	38	1.91	736	7.9
Nov. 15-28.....	19,438	--	3.39	.90	2.31	--	3.29	.00	--	--	--	--	--	424	.58	11,209	35	1.57	634	7.7
Nov. 29-Dec. 5..	1,819	--	3.79	1.07	4.31	--	3.49	.00	--	--	--	--	--	588	.80	1,454	47	2.76	898	7.7
Dec. 6-31.....	9,695	--	3.69	.99	3.52	--	3.38	.00	--	--	--	--	--	527	.72	6,949	43	2.30	792	7.7
Jan. 1-5, 1961..	2,063	--	3.79	.99	3.57	--	3.44	.00	--	--	--	--	--	537	.73	1,507	43	2.31	809	7.9
Jan. 6-19.....	5,748	--	3.79	1.07	3.83	--	3.52	.00	--	--	--	--	--	561	.76	4,386	44	2.46	841	8.0
Jan. 20-21.....	881	--	3.79	.82	3.05	--	2.85	.53	--	--	--	--	--	490	.67	587	40	2.00	738	8.6
Jan. 22-31.....	4,502	31	3.79	1.07	3.96	.14	3.15	.33	3.75	1.69	.03	.01	.20	564	.77	3,454	44	2.54	846	8.4
Feb. 1-11.....	5,280	--	3.79	1.07	4.31	--	3.52	.00	--	--	--	--	--	578	.79	4,151	47	2.76	897	8.1

Feb. 12-20, 1961	4,284	--	3.84	1.07	4.05	--	3.54	.00	--	--	--	--	--	571	.78	3,327	45	2.58	870	8.0
Feb. 21-28.....	3,903	--	3.99	.90	4.09	--	3.57	.00	--	--	--	--	--	570	.78	3,026	46	2.61	877	8.1
Mar. 1-3.....	1,880	--	3.94	1.07	3.92	--	3.52	.00	--	--	--	--	--	557	.76	1,424	44	2.47	861	8.0
Mar. 4-22.....	21,029	--	3.49	.82	3.09	--	3.28	.00	--	--	--	--	--	480	.65	13,728	42	2.10	725	7.8
Mar. 23-30.....	7,109	--	3.59	1.07	3.52	--	3.34	.00	--	--	--	--	--	529	.72	5,114	43	2.31	791	7.9
Mar. 31.....	1,375	--	2.99	.77	2.65	--	3.02	.00	--	--	--	--	--	410	.56	766	41	1.93	637	8.2
Apr. 1-7.....	7,123	--	3.69	.99	3.57	--	3.49	.00	--	--	--	--	--	512	.70	4,960	43	2.33	808	7.7
Apr. 8-19.....	18,851	29	3.34	.80	2.78	.14	3.21	.00	2.71	1.13	.03	.04	.17	446	.61	11,434	39	1.93	683	7.8
Apr. 20-21.....	1,793	--	3.69	.99	3.48	--	3.49	.00	--	--	--	--	--	519	.71	1,266	43	2.28	797	7.5
Apr. 22-30.....	20,154	--	2.69	.59	1.83	--	2.62	.00	--	--	--	--	--	330	.45	9,045	36	1.43	504	7.9
May 1-2.....	5,177	--	2.50	.54	1.87	--	2.39	.17	--	--	--	--	--	338	46	2,380	38	1.52	482	8.5
May 3-13.....	22,953	27	2.89	.55	1.83	.11	2.74	.00	1.85	.68	.03	.03	.16	326	.44	10,176	34	1.39	513	7.8
May 14-15.....	4,145	--	3.69	.51	1.91	--	3.49	.00	--	--	--	--	--	366	.50	2,063	31	1.32	588	7.4
May 16-17.....	3,967	--	2.69	.51	2.00	--	2.33	.20	--	--	--	--	--	319	.43	1,721	38	1.58	514	8.5
May 18-23.....	8,616	--	3.14	.68	2.44	--	3.05	.00	--	--	--	--	--	386	.52	4,523	39	1.76	619	7.8
May 24-June 3...	15,033	--	2.99	.61	2.39	--	2.85	.00	--	--	--	--	--	372	.51	7,605	40	1.78	587	8.2
June 4-5.....	2,626	--	2.54	.34	1.35	--	2.44	.00	--	--	--	--	--	250	.34	893	32	1.12	410	8.0
June 6-10.....	9,045	--	2.74	.58	1.83	--	2.70	.00	--	--	--	--	--	326	.44	4,010	35	1.42	504	7.9
June 11.....	1,325	--	3.09	.47	2.35	--	2.82	.00	--	--	--	--	--	382	.52	688	40	1.76	582	8.2
June 12-13.....	2,186	--	3.29	.75	2.83	--	3.15	.00	--	--	--	--	--	413	.56	1,228	41	1.99	670	8.2
June 14-16.....	2,380	--	3.79	.90	3.92	--	3.51	.00	--	--	--	--	--	525	.71	1,699	45	2.55	835	8.0
June 17-19.....	2,577	--	3.54	.70	3.05	--	3.34	.00	--	--	--	--	--	472	.64	1,654	42	2.09	723	7.7
June 20-22.....	2,577	--	3.84	.90	3.57	--	3.51	.07	--	--	--	--	--	541	.74	1,896	43	2.32	808	8.3
June 23-26.....	1,920	--	4.09	.99	4.65	--	3.70	.00	--	--	--	--	--	626	.85	1,635	48	2.92	954	8.1
June 27-July 2..	1,809	--	4.29	1.07	5.39	--	3.93	.00	--	--	--	--	--	704	.96	1,732	50	3.29	1,080	7.7
July 3.....	206	--	3.99	.90	3.83	--	3.67	.00	--	--	--	--	--	580	.79	163	44	2.45	847	8.2
July 4-10.....	1,916	--	4.39	1.23	5.22	--	3.93	.00	--	--	--	--	--	712	.97	1,855	48	3 11	1,070	7.6
July 11.....	674	--	4.04	.99	4.35	--	3.13	.00	--	--	--	--	--	620	.84	569	46	2.74	921	8.1
July 12.....	748	--	5.84	1.48	6.09	--	4.28	.00	--	--	--	--	--	896	1.22	911	45	3.18	1,260	7.8
July 13-19.....	3,568	--	4.39	1.07	3.83	--	3.54	.00	--	--	--	--	--	623	.85	3,023	41	2.32	901	7.7

RIO GRANDE BASIN--Continued

8-3583. RIO GRANDE CONVEYANCE CHANNEL AT SAN MARCIAL, N. MEX.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 20, 1961...	218	--	4.39	1.07	5.35	--	3.95	0.00	--	--	--	--	--	710	0.97	211	49	3.24	1,060	8.0
July 21-31.....	805	32	4.39	1.40	8.92	0.24	4.23	.00	5.52	5.19	0.03	0.00	0.28	946	1.29	1,036	60	5.24	1,460	8.2
Aug. 1-15.....	1,032	--	4.39	1.48	9.35	--	4.03	.20	--	--	--	--	--	1,020	1.39	1,432	61	5.46	1,520	8.4
Aug. 16, 18.....	706	--	5.49	1.48	5.57	--	4.46	.00	--	--	--	--	--	822	1.12	789	44	2.98	1,160	7.8
Aug. 17, 19-21..	5,284	--	12.08	3.29	10.18	--	5.11	.00	--	--	--	--	--	1,780	2.42	12,791	40	3.67	2,170	7.8
Aug. 22.....	1,115	--	7.58	1.73	6.53	--	4.00	.00	--	--	--	--	--	1,090	1.48	1,652	41	3.02	1,410	8.2
Aug. 23.....	1,587	--	4.74	.99	4.52	--	3.21	.13	--	--	--	--	--	740	1.01	1,597	44	2.67	970	8.3
Aug. 24.....	1,190	--	8.38	2.22	11.22	--	4.26	.00	--	--	--	--	--	1,440	1.96	2,331	51	4.87	1,990	8.1
Aug. 25-31.....	6,789	--	4.39	.90	2.78	--	4.13	.00	--	--	--	--	--	540	.73	4,986	34	1.71	771	7.7
Sept. 1-9.....	3,142	--	4.19	1.15	4.65	--	3.54	.20	--	--	--	--	--	661	.90	2,824	47	2.85	957	8.4
Sept. 10-13.....	4,411	--	8.13	2.06	6.61	--	5.44	.00	--	--	--	--	--	1,110	1 51	6,559	39	2.93	1,470	8.0
Sept. 14-20.....	4,915	--	4.54	1.07	4.92	--	3.47	.00	--	--	--	--	--	688	.94	4,599	47	2.93	1,000	8.2
Sept. 21.....	1,634	--	7.44	1.65	8.61	--	4.85	.00	--	--	--	--	--	1,160	1.58	2,578	49	4.04	1,550	8.0
Sept. 22.....	1,337	--	4.34	1.07	5.22	--	3.41	.20	--	--	--	--	--	716	.97	1,296	49	3.17	986	8.3
Sept. 23-30.....	682	--	4.19	.90	3.39	--	3.72	.00	--	--	--	--	--	563	.77	525	40	2.13	810	7.7
Total or weighted average	288,149	--	3.84	0.90	3.30	--	3.33	--	--	--	--	--	--	521	0.71	203,806	41	2.14	770	7.8

8-3584. RIO GRANDE FLOODWAY AT SAN MARCIAL, N. MEX.

LOCATION.--At gaging station at Atchison, Topeka, and Santa Fe Railway Co. bridge, 1.1 miles downstream from former site of San Marcial, Socorro County, and 18.5 miles southwest of San Antonio.
DRAINAGE AREA.--27,700 square miles, approximately (includes 2,940 square miles in closed basin in San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: May 1905 to April 1907, July 1946 to September 1961.
Water temperatures: January 1949 to September 1961.
Sediment records: July 1946 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,050 micromhos Aug. 21; minimum daily, 374 micromhos May 30.
Percent sodium: Maximum, 47 Feb. 15-17; minimum, 22 Sept. 22-30.
EXTREMES, 1946-61.--Specific conductance: Maximum daily, 2,730 micromhos Apr. 8, 1953; minimum daily, 311 micromhos June 14, 1952.
Percent sodium: Maximum, 65 May 1-10, 1951; minimum, 22 Nov. 21-22, 28-30, 1947; June 21-30, 1949; Sept. 22-30, 1961.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Records of composite discharge for Rio Grande conveyane channel at San Marcial and Rio Grande floodway at San Marcial given under Rio Grande at San Marcial in Surface Water records. Chemical analyses for Rio Grande conveyance channel given on page 88.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 3-4, 18-23, 1960 a	2,920	--	7.63	2.22	7.00	--	4.97		--	--	--	--	--	1,100	1.50	4,368	42	3.15	1,500	7.6
Nov. 30-Dec. 31.	8,251	29	3.44	.80	2.39	0.12	3.36		2.48	0.82	0.03	0.03	0.14	426	.58	4,780	35	1.64	639	7.8
Jan. 1-22, 1961.	9,164	--	3.44	.76	2.39	--	3.39		--	--	--	--	--	432	.59	5,384	36	1.65	637	8.0
Jan. 23.....	399	--	4.09	.82	2.48	--	4.05		--	--	--	--	--	470	.64	255	34	1.58	704	7.3
Jan. 24-Feb. 5..	6,885	--	3.49	.75	2.44	--	3.46		--	--	--	--	--	432	.59	4,045	36	1.67	650	7.7
Feb. 6-14.....	4,945	30	3.34	.82	3.09	.14	3.41		2.73	1.30	.04	.04	.16	478	.65	3,215	42	2.14	722	7.7
Feb. 15-17.....	1,666	--	3.44	.90	3.87	--	3.34		--	--	--	--	--	534	.73	1,210	47	2.63	814	7.6
Feb. 18-21.....	3,039	--	3.59	.99	3.18	--	3.47		--	--	--	--	--	508	.69	2,099	41	2.10	755	7.6
Feb. 22-28.....	5,165	--	3.29	.77	2.48	--	3.29		--	--	--	--	--	425	.58	2,985	38	1.74	640	7.8
Mar. 1-5 a.....	1,745	--	3.49	.82	2.39	--	3.54		--	--	--	--	--	442	.60	1,049	36	1.63	658	7.7
Apr. 24-26.....	3,219	--	3.49	.77	1.61	--	3.70		--	--	--	--	--	375	.51	1,642	27	1.10	565	7.5
Apr. 27-30, May 2-5 a.....	11,615	--	2.74	.66	1.39	--	2.90		--	--	--	--	--	321	.44	5,071	29	1.07	477	7.7
May 6-31.....	70,342	26	2.50	.54	1.17	.11	2.57		1.33	.34	.02	.03	.08	280	.38	26,786	27	.95	419	7.7
June 1-7 a.....	8,940	36	2.50	.58	1.35	.11	2.72		1.33	.42	.03	.02	.09	304	.40	3,580	30	1.09	436	8.1
Aug. 15, 20-22 a	2,420	--	10.28	2.92	8.22	--	5.75		--	--	--	--	--	1,400	1.90	4,600	38	3.20	1,830	7.7
Aug. 23-27 a....	2,520	--	6.19	1.69	3.96	--	4.47		--	--	--	--	--	761	1.03	2,600	33	2.00	1,080	7.7
Sept. 12-16 a...	1,080	--	7.98	2.42	5.83	--	5.24		--	--	--	--	--	1,030	1.40	1,510	36	2.56	1,430	7.6
Sept. 21.....	79	--	10.68	2.92	9.05	--	6.10		--	--	--	--	--	1,490	2.03	160	40	3.47	1,910	7.9
Sept. 22-30.....	137	--	6.09	1.83	2.18	--	5.24		--	--	--	--	--	620	.84	115	22	1.10	906	7.6
Total or weighted average	144,531	--	3.24	0.77	2.04	--	3.06		--	--	--	--	--	397	0.54	75,454	33	1.35	579	7.7

a No flow Oct. 1-2, 5-17, Oct. 24 to Nov. 29, Mar. 6. to Apr. 23, May 1, June 8 to Aug. 14, 16-19, Aug 28 to Sept. 11, 17-20.

RIO GRANDE BASIN--Continued

8-3610. RIO GRANDE BELOW ELEPHANT BUTTE DAM, N. MEX.

LOCATION.--At gaging station, 1.0 mile downstream from dam, 1.5 miles upstream from Cuchillo Negro River, and in Pedro Armendaris Grant.
DRAINAGE AREA.--28,900 square miles, approximately (includes 2,940 square miles in closed basin in San Luis Valley, Colo.).
RECORDS AVAILABLE.--Chemical analyses: 1933 to 1961.
REMARKS.--Chemical analyses by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif.

Chemical analyses, water year October 1980 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1960	25	848	--	2.68	1.09	3.55	--	2.75	0.00	3.44	1.25	--	0.01	0.16	472	0.64		48	2.6	731	7.8
November....	20	832	--	2.81	1.12	3.31	--	2.58	.12	3.56	1.10	--	.01	.11	487	.84		46	2.4	729	8.2
December....	20	376	--	2.85	1.14	3.22	--	2.80	.00	3.44	1.08	--	.01	.06	465	.63		45	2.3	718	8.3
January 1961	25	946	18	2.90	1.15	3.29	0.12	2.87	.00	3.47	1.10	0.03	.01	.16	469	.64		44	2.3	725	8.0
February....	20	73,900	--	3.01	1.10	2.94	--	2.77	.00	3.22	1.03	--	.01	.12	455	.82		42	2.1	895	8.0
March.....	20	110,400	--	3.15	1.08	2.92	--	2.83	.00	3.30	1.15	--	.01	.16	460	.63		41	2.0	713	7.8
April.....	25	67,400	--	3.13	1.18	2.90	--	2.91	.00	3.34	1.00	--	.01	.12	479	.85		40	2.0	731	7.8
May.....	20	73,050	--	3.11	1.18	3.10	--	2.82	.00	3.42	1.22	--	.01	.14	490	.87		42	2.1	732	8.1
June.....	22	71,300	--	3.15	1.29	3.04	--	3.02	.00	3.25	1.22	--	.01	.09	471	.64		41	2.0	728	8.1
July.....	20	90,840	20	2.90	1.05	2.78	.13	2.85	.00	2.90	1.05	.03	.01	.08	436	.59		40	2.0	673	8.0
August.....	25	85,530	--	2.71	.99	2.64	--	2.83	.00	2.71	1.10	--	.01	.12	413	.56		42	1.9	645	7.8
September...	20	3,130	--	2.72	1.12	3.72	--	2.85	.00	3.47	1.35	--	.02	.14	515	.70		49	2.7	769	8.0
Total or weighted average	--	578,552	--	3.02	1.11	2.90	--	2.83	--	3.16	1.11	--	0.01	0.12	456	0.62		41	2.0	701	--

8-3640. 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 29).
RECORDS AVAILABLE.--Chemical analyses: 1933 to 1961.
REMARKS.--Chemical analyses by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1960 to September 1961 given in International Boundary and Water Commission Water Bulletin Numbers 30 and 31. Records for previous years are given in earlier Bulletins.

Chemical analyses, water year October 1960 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1960	31	11,000	--	6.87	2.51	13.50	--	5.00	0.26	10.77	7.52	--	0.01	0.40	1,504	2.05	22,600	59	6.2	2,210	7.9
November....	30	7,400	--	6.93	2.55	14.03	--	4.49		11.26	7.70	--	.01	.36	1,566	2.13	15,800	60	6.4	2,280	8.4
December....	31	7,220	--	6.63	2.51	14.38	--	4.65		11.22	7.90	--	.01	.37	1,552	2.11	15,200	61	6.7	2,280	7.8
January 1961	31	5,810	28	6.66	2.65	14.76	0.24	4.95		11.19	8.15	0.05	.01	.37	1,547	2.10	12,200	61	6.8	2,290	8.2
February....	28	3,970	--	5.12	2.63	15.70	--	3.60		11.50	.66	--	.01	.43	1,520	2.07	8,220	67	8.0	2,390	8.1
March.....	31	37,800	--	4.14	1.53	5.46	--	3.35		4.92	3.15	--	.01	.15	727	.99	37,400	49	3.2	1,120	8.2
April.....	30	33,100	--	4.48	1.58	6.10	--	3.65		5.61	2.90	--	.01	.19	806	1.10	36,400	50	3.5	1,210	8.0
May.....	31	29,800	--	4.68	1.68	6.74	--	3.75		6.00	3.50	--	.01	.22	850	1.16	34,600	51	3.8	1,300	8.1
June.....	30	40,600	--	4.40	1.56	5.80	--	3.60		5.45	3.00	--	.01	.23	773	1.05	42,600	49	3.3	1,180	8.0
July.....	29	54,000	24	4.00	1.66	5.64	.21	3.35		5.17	2.95	.04	.01	.20	710	.97	52,400	49	3.3	1,130	8.0
August.....	31	48,200	--	4.20	1.36	7.10	--	3.45		6.14	3.20	--	.01	.15	770	1.05	50,600	56	4.2	1,170	8.0
September...	30	26,900	--	4.98	1.78	8.02	--	3.85		6.72	4.50	--	.01	.28	960	1.31	35,200	54	4.3	1,440	8.1
Total or weighted average	--	305,800	--	4.61	1.69	6.96	--	3.67		6.28	3.77	--	0.01	0.22	872	1.19	363,220	52	4.0	1,326	--

RIO GRANDE BASIN--Continued

8-3705. 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.--32,035 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: 1933 to 1961.
REMARKS.--Chemical analyses by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1960 to September 1961 given in International Boundary and Water Commission Water Bulletin Numbers 30 and 31. Records for previous years are given in earlier Bulletins.

Chemical analyses, water year October 1960 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1960	5	12,400	--	6.87	1.97	10.32	--	2.97		7.93	8.40	--	0.05	0.25	1,253	1.70	21,100	54	4.9	1,900	8.0
November....	5	4,820	--	14.34	5.86	33.83	--	5.45		19.00	30.00	--	.01	.55	3,487	4.74	22,600	63	11	5,110	8.2
December....	4	6,210	--	12.33	4.62	27.60	--	5.58		16.27	22.90	--	.04	.54	2,885	3.92	24,300	62	9.5	4,280	8.2
January 1961	4	3,710	27	12.85	4.98	29.70	0.20	5.35		16.59	25.75	0.05	.01	.49	2,998	4.08	15,100	62	10	4,500	8.0
February....	4	1,520	--	14.34	6.14	35.84	--	5.01		19.31	32.05	--	.01	.56	3,572	4.86	7,390	64	11	5,350	8.3
March.....	5	565	--	20.30	10.22	58.92	--	4.80		28.10	56.70	--	.01	.69	5,755	7.83	4,420	66	15	8,420	8.1
April.....	4	496	--	26.82	13.44	68.80	--	5.20		30.16	75.10	--	.02	.84	6,878	9.35	4,640	63	15	10,000	8.0
May.....	5	829	--	20.28	13.88	65.16	--	4.90		29.22	65.75	--	.01	.82	6,308	8.58	7,110	66	16	9,250	8.0
June.....	4	333	--	25.06	13.78	76.68	--	4.51		33.12	78.25	--		.92	7,370	10.0	3,330	66	17	10,600	7.7
July.....	2	101	30	27.02	15.73	87.70	.30	3.95		36.45	90.80	.05	.02	1.06	8,308	11.3	1,140	67	19	12,000	7.8
August.....	1	17	--	3.64	.76	2.83	--	2.90		1.94	2.45	--	.01	.14	499	.68	11	39	1.9	747	7.8
September...	3	819	--	22.66	11.56	68.33	--	4.25		30.09	69.00	--	.01	.84	6,484	8.82	7,220	67	17	9,450	7.9
Total or weighted average	--	31,800	--	11.68	4.68	26.36	--	4.40		14.97	23.59	--	0.03	0.45	2,744	3.73	118,561	59	8.7	4,069	--

8-3715. RIO GRANDE AT UPPER PRESIDIO, TEX.

LOCATION.--At gaging station, 7.8 river miles above the junction of the Rio Conchos, about 10 miles northwest of the towns of Presidio, Tex., and Ojinaga, Chihuahua, and 285.7 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--34,988 square miles (United States and Mexico; from International Boundary and Water Commission Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: 1935 to 1961.
REMARKS.--Chemical analyses by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1960 to September 1961 given in International Boundary and Water Commission Water Bulletin Numbers 30 and 31. Records for previous years are given in earlier Bulletins.

Chemical analyses, water year October 1960 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1960	4	5,990	--	5.14		4.28	--	2.70		--	2.98	--	--	--	625	0.85	5,090	45	2.7	968	--
November....	8	3,390	--	18.69		30.40	--	3.80		--	28.10	--	--	--	3,192	4.34	14,700	62	9.9	4,760	--
December....	9	4,180	--	17.27		30.38	--	4.13		--	26.00	--	--	--	3,094	4.21	17,600	64	10	4,590	--
January 1961	9	3,400	21	12.61	5.22	32.30	0.23	4.30		18.01	28.00	0.06	0.01	0.57	3,169	4.31	14,700	64	11	4,780	8.2
February....	7	1,140	--	19.20		35.14	--	3.46		--	31.78	--	--	--	3,509	4.77	5,440	65	11	5,210	--
May.....	3	2,930	--	4.32		2.63	--	2.15		--	1.15	--	--	--	462	.63	1,850	36	1.8	711	--
June.....	8	3,870	--	5.30		3.02	--	2.10		--	1.50	--	--	--	601	.82	3,170	36	1.9	844	--
July.....	4	744	16	4.02	.46	2.80	.14	2.00		4.62	.80	.03	.03	.08	482	.66	491	38	1.9	740	7.7
August.....	6	3,120	--	4.28		2.58	--	2.35		--	1.00	--	--	--	467	.64	2,000	38	1.8	642	--
September...	1	370	--	6.14		1.57	--	1.47		--	.35	--	--	--	546	.74	274	20	.9	764	--
Total or weighted average	--	29,100	--	10.33		14.95	--	3.04		--	12.57	--	--	--	1,650	2.24	8,050	50	5.5	2,450	--

RIO GRANDE BASIN--Continued

8-3775. 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.--84,795 square miles (United Statss and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chsmical analyses: 1944 to 1961.
REMARKS.--Chemical analyses by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1960 to September 1961 are given in International Boundary and Water Commission Water Bulletin Numbers 30 and 31.

Chemical analyses, water year October 1960 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1960	6	122,000	--	3.75	0.94	3.15	--	2.90		3.81	1.20	--	0.04	0.23	525	0.71	86,600	40	2.1	779	7.7
November....	5	80,200	--	4.92	1.51	5.68	--	3.00		6.45	2.78	--	.05	.28	829	1.13	90,600	47	3.2	1,190	8.1
December....	3	93,100	--	4.87	1.36	5.03	--	3.25		5.71	2.45	--	.05	.23	749	1.02	95,000	45	2.9	1,110	7.9
January.....	4	88,600	26	4.42	1.49	5.12	0.13	3.15		5.48	2.45	0.07	.01	.22	720	.98	84,900	46	3.0	1,090	8.0
February....	4	67,900	--	3.49	1.49	5.09	--	2.37		5.52	2.40	--	.01	.26	665	.90	61,100	51	3.2	1,030	8.0
March.....	5	57,200	--	3.87	1.56	4.51	--	2.95		5.42	1.75	--	.03	.22	667	.91	52,100	45	2.7	993	8.1
April.....	4	27,900	--	4.00	1.80	4.30	--	2.85		5.36	2.00	--	.03	.14	872	.91	25,400	43	2.5	1,000	8.0
May.....	6	70,600	--	4.92	1.28	4.05	--	3.00		5.98	1.40	--	.02	.19	676	.92	85,000	40	2.3	1,000	8.1
June.....	4	153,000	--	3.82	.75	2.17	--	2.85		3.14	.85	--	.02	.12	427	.58	88,700	32	1.4	871	7.8
July.....	8	129,000	22	4.52	.92	3.25	.14	2.75		4.98	1.10	.05	.02	.15	567	.77	99,300	37	2.0	849	7.9
August.....	5	117,000	--	4.78	1.10	3.68	--	3.01		5.71	1.00	--	.01	.15	655	.89	104,000	38	2.1	924	7.9
September...	3	83,200	--	4.98	1.26	5.18	--	3.35		6.24	1.95	--	.02	.25	766	1.04	86,500	45	2.9	1,120	7.8
Total or weightsd averags	--	1,087,700	--	4.36	1.19	4.02	--	2.95		5.11	1.64	--	0.02	0.20	636	0.86	939,200	41	2.4	944	--

8-4590. RIO GRANDE AT LAREDO, TEX.

LOCATION.--At gaging station, 0.9 mile downstream from the highway bridge between Laredo, Tex., and Nuevo Laredo, Tamaulipas, Mex., and 890.8 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--135,976 square miles (United States and Mexico; from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses July 1955 to September 1961.
REMARKS.--Chemical analyses are by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses for water year October 1960 to September 1961 are given in International Boundary and Water Commission Water Bulletin Numbers 30 and 31. Records for previous years are given in earlier Bulletins.

Chemical analyses, water year October 1960 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million											Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)			Parts per million	Tons per acre-foot	Total tons				
October 1960	31	377,200	--	3.78		1.94	--	2.37		--	1.35	--	--	--	372	0.51	192,000	34	1.4	586	--
November	30	196,600	--	4.96		3.26	--	2.81		--	2.28	--	--	--	534	.73	144,000	40	2.1	626	--
December	31	189,100	--	5.64		4.39	--	2.95		--	2.90	--	--	--	640	.87	165,000	44	2.6	999	--
January 1961	31	176,600	20	4.00	1.64	4.51	0.09	2.93		3.98	3.25	0.05	0.01	0.18	632	.86	152,000	44	2.7	1,010	7.9
February	28	147,700	--	4.74		4.46	--	1.81		--	3.32	--	--	--	575	.78	115,000	48	2.9	939	--
March	31	105,800	--	5.36		4.96	--	2.35		--	3.60	--	--	--	653	.89	94,200	48	3.0	1,060	--
April	30	76,620	--	5.74		5.41	--	2.35		--	4.58	--	--	--	717	.98	75,100	49	3.2	1,150	--
May	31	105,500	--	5.02		4.36	--	2.35		--	3.55	--	--	--	601	.82	86,500	46	2.8	976	--
June	30	648,800	--	3.34		1.30	--	2.30		--	.92	--	--	--	299	.41	266,000	28	1.0	474	--
July	31	325,000	21	3.40	1.02	2.54	.11	2.47		2.61	1.90	.03	.09	.09	441	.60	195,000	36	1.7	720	7.8
August	31	230,600	--	4.88		2.98	--	2.65		--	1.95	--	--	--	535	.73	168,000	38	1.9	804	--
September	30	158,400	--	4.82		3.12	--	2.67		--	2.05	--	--	--	510	.69	109,000	39	2.0	811	--
Total or weighted average	--	2,737,920	--	3.76		2.89	--	2.48		--	2.07	--	--	--	472	0.64	1,761,800	37	1.9	748	--

RIO GRANDE BASIN--Continued

8-4613. RIO GRANDE AT FALCON DAM - U.S. TAILRACE

LOCATION.--U.S. Tailrace at Falcon Dam.
DRAINAGE AREA.--164,482 square miles (from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: July 1955 to September 1961.
REMARKS.--Chemical analyses are by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity of individual water samples, and these same chemical analyses, for water year October 1960 to September 1961 are available in International Boundary and Water Commission Bulletin Numbers 30 and 31. Records for previous years are given in earlier Bulletins.

Chemical analyses, water year October 1960 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1960	7	90,900	--	3.23	1.57	3.98	--	2.07		4.04	2.75	--	0.01	0.23	572	0.78	70,900	45	2.6	902	7.9
November	10	41,700	--	3.35	1.33	3.77	--	2.15		3.92	2.55	--	.01	.22	575	.78	32,500	45	2.5	870	8.0
December	11	37,100	--	3.43	1.37	3.86	--	2.21		3.80	2.65	--	.01	.20	551	.75	27,800	45	2.5	876	8.0
January 1961	11	220,475	16	3.49	1.48	3.83	0.11	2.30		4.02	2.58	0.04	.01	.19	550	.75	54,500	43	2.4	896	7.9
February	7	202,200	--	3.43	1.55	3.84	--	2.36		3.79	2.75	--	.01	.23	565	.77	68,100	44	2.4	896	8.0
March	13	172,436	--	3.55	1.40	3.77	--	2.35		3.92	2.50	--	.01	.09	562	.76	254,000	43	2.4	897	8.0
April	7	177,691	--	3.59	1.39	3.81	--	2.37		4.04	2.50	--	.01	.18	573	.78	194,000	43	2.4	903	7.9
May	10	322,475	--	3.52	1.52	3.92	--	2.33		3.97	2.72	--	.01	.20	568	.77	361,000	44	2.5	911	7.9
June	10	331,050	--	3.36	1.46	3.92	--	2.21		3.95	2.76	--	.01	.20	558	.76	161,000	45	2.5	902	8.0
July	27	117,896	11	3.20	1.30	3.54	.17	2.10		3.48	2.55	.04	.01	.17	509	.69	94,500	43	2.4	839	7.8
August	13	137,050	--	3.12	1.44	3.48	--	2.13		3.46	2.50	--	.01	.12	524	.71	134,000	43	2.3	829	7.9
September	14	137,188	--	3.00	1.24	3.50	--	2.10		3.10	2.50	--	.01	.21	509	.69	136,000	45	2.4	815	7.8
Total or weighted average	--	1,988,161	--	3.39	1.44	3.80	--	2.25		3.83	2.63	--	0.01	0.19	553	0.75	1,588,300	44	2.4	886	--

8-3845. PECOS RIVER BELOW ALAMOGORDO DAM, N. MEX.

LOCATION.--At gaging station, 1,200 feet downstream from Alamogordo Dam, 1.5 miles downstream from Alamogordo Creek, and 4.5 miles northeast of Guadalupe, De Baca County.
DRAINAGE AREA.--4,390 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: June 1937 to September 1961.
Water temperatures: June 1959 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,910 micromhos Aug. 18; minimum daily, 1,320 micromhos Sept. 25.
Percent sodium: Maximum, 13 Oct. 13-16; minimum, 11 May 1 to Sept. 30.
EXTREMES, 1937-61.--Specific conductance: Maximum daily 3,200 micromhos Jan. 14, 1948; minimum 513 micromhos July 22, 1937.
Percent sodium: Maximum, 19 July 1, 3-10, 1947; minimum, 1 Feb. 21-28, 1950.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1980 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-12, 1960.	2,275	16	14.37	2.47	2.22		1.95		15.53	1.66		0.01		1,250	1.70	3,868	12	0.76	1,580	7.4
Oct. 13-18.....	739	13	12.38	1.81	2.04		1.85		12.70	1.58		.01		1,050	1.43	1,056	13	.77	1,390	7.2
Oct. 17-31.....	7,438	16	14.47	2.55	2.26		1.97		15.78	1.72		.01		1,270	1.73	12,847	12	.76	1,600	7.6
Nov. 1-30.....	4,677	16	14.47	2.55	2.28		2.03		15.68	1.69		.01		1,260	1.71	8,015	12	.78	1,600	7.5
Dec. 1-31.....	5,017	15	14.97	2.96	2.35		2.07		16.20	1.83		.01		1,310	1.78	8,939	12	.78	1,640	7.4
Jan. 1-31, 1961.	4,867	15	15.47	2.80	2.44		2.08		16.91	1.86		.00		1,360	1.85	8,632	12	.81	1,700	7.6
Feb. 1-28.....	5,776	18	16.22	2.55	2.57		2.00		17.53	1.92		.01		1,400	1.90	10,997	12	.84	1,740	7.8
Mar. 1-31.....	5,964	16	18.22	3.37	2.61		2.10		18.36	2.03		.00		1,460	1.99	11,843	12	.83	1,790	7.5
Apr. 1-30.....	9,283	14	17.22	2.96	2.65		2.13		19.09	2.14		.00		1,510	2.05	19,063	12	.84	1,840	7.4
May 1-31.....	13,158	14	17.22	2.96	2.61		2.10		18.90	2.14		.00		1,500	2.04	26,843	11	.82	1,840	7.4
June 1-30.....	23,683	17	18.47	3.13	2.52		1.98		18.16	2.06		.00		1,450	1.97	46,702	11	.81	1,810	7.7
July 1-31.....	52,572	18	17.22	2.80	2.57		1.88		18.40	2.12		.01		1,470	2.00	105,102	11	.81	1,830	7.7
Aug. 1-18.....	18,994	17	17.22	3.21	2.61		2.00		18.90	2.20		.01		1,510	2.05	39,005	11	.82	1,880	7.6
Aug. 19.....	127	21	11.88	2.55	1.78		3.11		11.99	1.35		.00		1,050	1.43	181	11	.66	1,390	7.2
Aug. 20-Sept. 2.	2,271	16	14.87	2.96	2.22		1.90		16.32	1.81		.01		1,310	1.78	4,047	11	.74	1,650	7.3
Sept. 3-30.....	4,921	15	11.58	2.22	1.70		1.90		12.41	1.35		.01		1,010	1.37	6,759	11	.65	1,350	7.6
Total or weighted average	161,600	16	15.20	2.88	2.52		1.98		17.88	2.03		0.00		1,430	1.44	313,802	12	0.78	1,780	7.6

RIO GRANDE BASIN--Continued

8-3965. PECOS RIVER NEAR ARTESIA, N. MEX.

LOCATION.--At gaging station at bridge on State Highway 83, 4.3 miles east of Artesia, Eddy County, 7.0 miles north of mouth of Rio Penasco, and 17 miles north of McMillan Dam.
DRAINAGE AREA.--15,300 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1961.
Water temperatures: April 1949 to September 1961.
Sediment records: January 1949 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 11,500 micromhos July 13; minimum daily, 2,090 micromhos June 16.
Percent sodium: Maximum, 62 Sept. 8-9; minimum, 15 July 16 to Aug. 12.
EXTREMES, 1937-61.--Specific conductance: Maximum daily, 22,600 micromhos June 23, 1959; minimum daily, 727 micromhos July 8, 1958.
Percent sodium: Maximum, 71 May 16, 1950; minimum, 12 Mar. 25-31, 1951.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-16, 1960.	2,062	26	27.45	13.57	35.19		2.20	0.00	37.69	37.24		0.02		4,760	6.47	13,477	46	7.77	6,620	7.3
Oct. 17.....	893	16	19.71	3.87	10.79		2.49	.00	22.28	10.04		.05		2,210	3.01	2,683	31	3.14	2,960	7.7
Oct. 18-23.....	18,589	14	16.47	3.95	7.09		2.38	.00	16.95	6.26		.07		1,760	2.39	44,495	26	2.22	2,340	7.6
Oct. 24-25.....	1,626	17	19.56	4.65	9.05		2.25	.00	22.28	8.97		.06		2,130	2.90	4,711	27	2.59	2,630	7.8
Oct. 26-26.....	1,601	19	21.56	7.24	14.53		2.51	.00	26.03	15.16		.07		2,740	3.73	5,965	34	3.83	3,680	7.8
Oct. 29-31.....	1,303	19	23.70	9.54	21.27		2.51	.00	29.77	22.00		.08		3,390	4.61	6,006	39	5.22	4,630	7.7
Nov. 1-30.....	10,651	21	24.70	11.27	26.62		2.95	.00	31.65	28.07		.10		3,860	5.28	56,204	43	6.28	5,410	7.7
Dec. 1-5.....	1,726	19	27.20	10.36	30.93		3.18	.00	33.52	32.72		.09		4,270	5.81	10,021	45	7.14	5,940	7.7
Dec. 6-18.....	5,054	18	23.20	11.02	28.06		2.96	.00	30.19	29.34		.09		3,850	5.24	26,462	45	6.76	5,420	7.6
Dec. 19-23.....	2,043	19	25.45	12.34	32.10		3.41	.00	32.69	34.42		.09		4,310	5.86	11,975	46	7.39	6,070	7.5
Dec. 24-31.....	3,364	16	23.95	10.45	26.10		3.15	.00	30.40	27.36		.09		3,750	5.10	17,156	43	6.29	5,240	7.7
Jan. 1-3, 1961..	1,297	19	24.20	12.59	26.93		3.34	.00	31.65	30.16		.07		4,020	5.47	7,092	44	6.74	5,610	7.9
Jan. 4-13.....	4,760	18	21.71	9.13	20.79		2.95	.00	27.07	20.88		.06		3,170	4.31	20,608	40	5.30	4,410	7.8
Jan. 14-20.....	2,471	19	24.70	11.27	26.10		3.34	.00	31.23	29.90		.08		3,960	5.39	13,310	44	6.63	5,550	7.8
Jan. 21-31.....	3,927	17	25.35	13.49	33.41		3.31	.00	32.90	35.83		.07		4,410	6.00	23,554	46	7.58	6,210	7.7
Feb. 1-8.....	2,777	23	24.20	12.59	31.67		3.05	.00	32.48	34.13		.09		4,260	5.79	16,068	46	7.38	5,960	7.5

Feb. 9-28, 1961.	6,902	23	23.70	11.27	24.97	3.16	.00	31.02	26.80	.07	3,750	5.10	35,203	42	5.97	5,160	8.1
Mar. 1-15.....	4,136	19	25.20	12.17	28.10	2.46	.00	33.52	29.62	.05	4,060	5.52	22,835	43	6.50	5,590	7.7
Mar. 16-31.....	3,332	16	26.45	13.57	34.89	2.62	.00	36.02	36.96	.05	4,640	6.31	21,028	47	7.80	6,470	7.5
Apr. 1-20.....	3,372	18	28.19	15.79	41.76	2.75	.00	39.56	43.44	.11	5,260	7.15	24,121	49	8.90	7,320	7.4
Apr. 21-25.....	686	17	32.19	17.60	51.33	2.46	.00	45.60	54.73	.10	6,270	6.53	5,852	51	10.29	6,660	7.2
Apr. 26.....	303	19	31.94	15.88	40.63	2.59	.00	44.55	41.75	.11	5,490	7.47	2,266	46	8.31	7,330	7.3
Apr. 27-30.....	1,087	18	26.20	11.02	24.14	2.33	.00	34.96	23.98	.06	3,640	5.22	5,676	39	5.60	5,120	7.4
May 1-22.....	6,327	20	25.45	9.79	21.05	2.21	.00	33.10	21.30	.03	3,550	4.83	30,546	37	5.02	4,730	7.3
May 23-24.....	260	19	27.69	12.09	32.36	2.11	.00	37.06	33.85	.03	4,510	6.13	1,594	45	7.26	6,180	7.2
May 25-31.....	744	21	29.94	15.30	44.37	2.26	.00	41.43	46.26	.04	5,530	7.52	5,597	50	9.33	7,640	7.2
June 1.....	127	27	33.43	13.74	51.77	2.47	.00	42.89	54.16	.00	6,110	6.31	1,055	52	10.66	8,490	7.1
June 2-3.....	323	23	29.34	12.26	35.15	2.07	.00	38.93	35.26	.01	4,750	6.46	2,089	46	7.71	6,450	7.4
June 4-10.....	986	23	27.35	10.69	26.10	1.84	.00	36.02	27.03	.02	4,050	5.51	5,430	41	5.96	5,370	7.6
June 11.....	73	22	29.34	13.08	38.89	1.75	.00	39.77	40.06	.01	5,050	6.87	504	46	8.44	6,630	6.9
June 12.....	1,196	40	25.65	8.56	18.14	2.66	.00	33.31	16.22	.01	3,330	4.53	5,417	35	4.37	4,250	7.7
June 13-15.....	6,914	25	21.06	4.94	7.44	2.46	.00	24.57	6.43	.04	2,160	2.94	20,312	22	2.06	2,700	7.8
June 16-18.....	6,557	19	18.71	3.45	5.09	2.43	.00	20.61	4.46	.04	1,780	2.42	15,874	19	1.53	2,220	7.7
June 19-22.....	1,690	18	21.71	5.10	8.79	2.25	.00	24.78	8.35	.03	2,270	3.09	5,217	25	2.40	2,890	7.5
June 23-25.....	417	19	23.20	6.99	15.31	1.72	.00	26.32	15.46	.01	2,880	3.92	1,631	34	3.94	3,810	7.3
June 26-29.....	361	20	27.54	10.04	27.54	1.80	.00	35.39	28.21	.02	4,060	5.55	2,003	42	6.35	5,540	7.7
June 30-July 3..	161	22	31.94	12.09	39.93	2.07	.00	40.81	40.62	.01	5,190	7.06	1,277	48	8.51	7,080	7.5
July 4-12.....	214	21	34.66	14.31	57.42	1.90	.00	45.39	59.24	.02	6,550	6.91	1,908	54	11.60	9,120	7.6
July 13.....	22	17	35.78	16.43	77.87	1.84	.10	48.72	82.94	.02	8,090	11.00	240	59	14.96	11,500	6.3
July 14.....	920	31	28.04	9.13	21.05	2.07	.00	37.06	19.32	.08	3,720	5.06	4,656	36	4.88	4,800	8.2
July 15.....	2,301	18	24.70	5.10	6.40	2.62	.00	28.52	7.05	.04	2,470	3.36	7,729	22	2.17	3,020	7.9
July 16-Aug. 12.	44,930	19	20.36	3.62	4.39	1.97	.00	22.69	3.67	.02	1,850	2.52	113,043	15	1.27	2,260	7.8
Aug. 13-17.....	1,567	19	21.71	5.26	9.87	1.93	.00	24.98	9.70	.01	2,350	3.20	5,071	27	2.69	3,060	7.5
Aug. 16-22.....	1,468	16	15.22	3.87	10.01	2.08	.00	17.82	9.14	.04	1,840	2.50	3,723	34	3.24	2,590	7.6
Aug. 23-25.....	359	19	20.36	7.07	18.49	2.07	.00	25.61	18.11	.02	2,870	3.90	1,401	40	4.99	3,990	7.6
Aug. 26-28.....	167	21	25.35	9.87	27.71	1.69	.00	33.10	26.07	.01	3,920	5.33	888	44	6.60	5,440	7.4

RIO GRANDE BASIN--Continued

6-3965. PECOS RIVER NEAR ARTESIA, N. MEX.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 29-Sept. 2, 1961	135	23	29.54	11.02	35.41		2.10	0.00	37.68	35.54		0.01		4,700	6.39	862	47	7.86	6,450	7.4
Sept. 3-7	129	19	31.84	13.98	51.33		1.97	.00	42.06	53.32		.01		5,980	6.13	1,049	53	10.72	6,410	7.6
Sept. 8-9	105	15	27.89	14.48	69.17		1.84	.00	36.23	73.91		.02		6,760	9.19	966	62	15.03	10,100	7.2
Sept. 10-14	327	16	32.04	13.98	50.03		1.92	.00	41.85	51.91		.01		5,890	8.01	2,622	52	10.43	6,240	7.3
Sept. 15-16	347	16	27.94	12.09	34.80		2.02	.00	36.64	35.26		.01		4,590	6.24	2,167	47	7.78	6,360	7.2
Sept. 17-20	506	15	21.86	8.14	20.88		1.54	.00	29.15	19.61		.01		3,170	4.31	2,162	41	5.39	4,340	7.2
Sept. 21-22	95	13	20.86	9.36	28.41		1.61	.00	28.32	28.49		.05		3,620	4.92	469	48	7.31	5,230	7.2
Sept. 23	58	12	27.05	13.16	60.47		1.38	.00	35.60	63.75		.02		6,120	8.32	479	60	13.49	9,010	7.3
Sept. 24-28	256	16	26.85	13.74	46.55		1.70	.00	37.06	47.39		.01		5,300	7.21	1,844	53	10.33	7,560	7.4
Sept. 29-30	71	16	31.19	15.38	57.86		2.21	.00	42.06	59.81		.02		6,370	8.66	619	55	11.99	9,020	7.6
Total or weighted average	164,175	19	22.16	7.49	16.40		2.46	--	27.07	16.62		0.05		2,900	3.94	644,707	36	8.41	5,490	7.6

8-4101. PECOS RIVER BELOW RED BLUFF DAM, NEAR ORLA, TEX.

LOCATION.--Just below dam, 3 miles upstream from Salt (Screwbean) Draw, 5 miles northwest of Orla, Reeves County, and 14 miles upstream from gaging station near Orla.
DRAINAGE AREA.--20,720 square miles, approximately (contributing area).
RECORDS AVAILABLE.--Chemical analyses: July 1937 to September 1961.
Water temperatures: March 1953 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 11,100 micromhos Sept. 24; minimum daily, 7,400 micromhos Jan. 17, Feb. 25.
Percent sodium: Maximum, 65 Oct. 1-15, 21-31; minimum, 57 Nov. 17-30.
EXTREMES, 1937-61.--Specific conductance: Maximum daily, 24,200 micromhos Sept. 28, 30, 1953; minimum, 1,610 micromhos June 2, 1948.
Percent sodium: Maximum, 78 Oct. 4-8, 1954; minimum, 9 Aug. 17-19, 1944.
REMARKS.--Sodium (Na) and potassium (K) values are calculated and reported as sodium. Records of specific conductance of daily samples available in district office at Austin, Tex. Records of discharge are given for gaging station near Orla. Mean discharge values reported below have been adjusted to exclude inflow from Salt (Screwbean) Draw which enters Pecos River between sampling point and gaging station.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 21-31, 1960...	820	18	25.70	15.71	77.00		2.13		38.52	77.58		--		7,160	9.74	7,985	65	16.92	10,400	7.3
Oct. 16-20.....	19	15	23.45	12.17	54.81		1.75		33.52	55.01		0.02		5,510	7.49	141	61	12.99	7,960	7.3
Nov. 1-16.....	127	18	24.45	14.72	61.77		2.16		33.94	64.88		--		6,100	8.30	1,053	61	13.96	9,040	7.1
Nov. 17-30.....	106	13	23.45	12.91	47.85		1.75		31.23	51.34		.05		5,120	6.96	735	57	11.22	7,630	7.2
Dec. 1-31.....	363	14	23.70	11.68	52.20		1.92		33.73	51.91		.03		5,350	7.28	2,640	60	12.41	7,740	6.9
Jan. 1-31, 1961.	369	14	24.20	12.26	50.03		2.07		33.31	51.06		.03		5,270	7.17	2,644	58	11.72	7,670	7.6
Feb. 1-28.....	289	20	25.70	13.41	55.25		2.36		36.64	55.29		.07		5,760	7.83	2,262	59	12.49	8,100	7.1
Mar. 1-31.....	7,932	12	23.95	12.91	51.33		2.03		33.73	52.47		.06		5,370	7.30	57,928	58	11.96	7,840	7.3
Apr. 1-30.....	9,342	11	24.20	12.75	56.12		2.08		35.19	55.86		.02		5,670	7.71	72,039	60	13.05	8,140	7.5
May 1-31.....	12,359	9.4	25.20	13.08	53.51		2.10		35.39	56.14		.02		5,660	7.70	95,135	58	12.23	8,200	7.4
June 1-30.....	10,294	12	25.95	13.82	58.29		2.13		37.06	58.68		--		5,960	8.11	83,441	59	13.07	8,540	7.1
July 1-31.....	15,864	15	27.45	14.72	61.34		1.93		39.56	62.06		--		6,310	8.58	136,137	59	13.36	9,030	7.3
Aug. 1-31.....	20,906	16	27.94	15.22	66.99		1.93		41.02	67.14		--		6,710	9.13	190,778	61	14.42	9,520	7.4
Sept. 1-30.....	11,782	16	29.19	16.12	77.43		2.03		41.64	78.99		--		7,440	10.12	119,213	63	16.27	10,400	7.6
Total or weighted average	90,630	14	26.60	14.31	61.77		2.02		38.31	62.89		--		6,270	8.53	773,100	60	13.64	8,950	--

RIO GRANDE BASIN--Continued

8-4474. PECOS RIVER NEAR SHUMLA, TEX.

LOCATION.--At gaging station, 13.0 river miles upstream the Pecos High Bridge, and 18.5 river miles above the confluence with the Rio Grande, which confluence is 638.2 river miles below the American Dam at El Paso, Tex.
DRAINAGE AREA.--35,308 square miles (from International Boundary and Water Commission Water Bulletin Number 29).
RECORDS AVAILABLE.--Chemical analyses: January 1955 to September 1961.
REMARKS.--Chemical analyses are by the U.S. Department of Agriculture, Agricultural Research Service, U.S. Salinity Laboratory, Riverside, Calif. Records of discharge, electrical conductivity for individual water samples, and these same chemical analyses for water year October 1960 to September 1961 are available in International Boundary and Water Commission Bulletin Numbers 30 and 31. Records of previous years are given in earlier Bulletins for a station near the mouth and for a station 4.7 miles upstream at the Pecos High Bridge.

Chemical analyses, water year October 1960 to September 1961

Month	Number of samples	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
				Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
October 1960	4	12,300	--	5.58	4.08	13.09	--	2.35		6.03	14.45	--	0.04	0.24	1,442	1.96	24,100	58	5.9	2,350	7.7
November....	3	10,800	--	6.87	5.25	16.60	--	2.55		7.64	18.50	--	.05	.23	1,803	2.45	26,500	58	6.7	2,900	8.2
December....	4	11,200	--	7.55	5.36	18.17	--	2.71		8.42	20.00	--	.05	.19	1,969	2.68	30,000	58	7.2	3,150	8.1
January 1961	4	12,200	14	8.01	6.14	20.27	0.11	2.67		9.52	22.25	0.05	.01	.19	2,143	2.91	35,500	59	7.6	3,430	8.0
February....	4	10,300	--	7.49	6.79	23.12	--	1.41		10.80	25.55	--	.01	.25	2,359	3.21	33,100	62	8.6	3,840	7.7
March.....	5	9,780	--	8.84	7.31	24.98	--	2.30		11.53	27.80	--	.01	.24	2,587	3.52	34,400	61	8.8	4,140	8.0
April.....	3	9,510	--	10.52	10.00	33.95	--	2.21		15.40	37.36	--	.01	.33	3,454	4.70	44,700	62	11	5,320	7.9
May.....	5	7,960	--	7.92	6.68	24.17	--	1.85		10.68	26.50	--	.01	.29	2,450	3.33	26,500	62	8.9	3,960	8.1
June.....	4	44,600	--	5.29	3.60	11.97	--	2.65		5.58	12.57	--	.06	.18	1,301	1.77	78,900	57	5.7	2,140	7.9
July.....	4	16,500	16	5.64	4.38	14.85	.10	2.40		6.82	15.76	.04	.05	.15	1,568	2.13	35,100	59	6.6	2,540	7.7
August.....	5	16,400	--	5.80	4.72	15.35	--	2.25		6.98	16.86	--	.02	.22	1,666	2.27	37,200	59	6.7	2,670	7.8
September...	3	10,700	--	5.22	3.96	12.88	--	2.45		5.81	13.94	--	.04	.25	1,393	1.89	20,200	58	6.0	2,310	8.1
Total or weighted average	--	172,250	--	6.57	5.13	17.17	--	2.40		7.90	18.70	--	0.04	0.22	1,820	2.47	426,200	59	7.0	2,934	--

9-711. COLORADO RIVER NEAR GLENWOOD SPRINGS, COLO.

LOCATION.--At Shoshone powerplant, 6 miles upstream from gaging station at Glenwood Springs, Garfield County, and 6.5 miles upstream from Roaring Fork.
DRAINAGE AREA.--4,560 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: October 1941 to September 1961.
Water temperatures: May 1949 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 870 micromhos July 1; minimum daily, 252 micromhos June 2.
Percent sodium: Maximum, 45 Feb. 1-28; minimum, 22 May 22-31.
EXTREMES, 1941-61.--Specific conductance: Maximum daily, 2,260 micromhos Aug. 10, 1947; minimum daily, 153 mocromhos May 24, 1948.
Percent sodium: Maximum, 53 Dec. 11-20, 1954; minimum, 11 May 21-31, 1956.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Records of discharge are given for Colorado River at Glenwood Springs, Colo.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	61,365	8.3	3.24	1.23	3.22	0.05	2.23	0.00	2.52	2.88		0.01	0.05	459	0.62	38,306	42	2.15	771	7.6
Nov. 1-30.....	55,696	9.0	3.29	1.23	3.18	.06	2.33	.00	2.54	2.76		.01	.03	458	.62	34,692	41	2.11	762	7.6
Dec. 1-31.....	60,504	11	2.89	.99	2.76	.06	2.18	.00	2.00	2.62		.00	.04	406	.55	33,572	41	2.00	686	7.8
Jan. 1-31, 1961.	64,808	9.8	2.74	.80	2.74	.06	2.03	.00	1.64	2.65		.00	.03	382	.52	33,669	43	2.06	653	7.8
Feb. 1-28.....	56,315	9.3	2.69	.82	2.96	.05	1.97	.00	1.71	2.79		.00	.03	393	.53	30,099	45	2.23	674	7.5
Mar. 1-31.....	54,478	11	2.99	.99	2.96	.07	2.15	.00	2.21	2.79		.00	.03	434	.59	32,155	42	2.10	730	7.6
Apr. 1-30.....	66,228	11	2.89	.90	2.57	.06	2.15	.00	1.96	2.40		.00	.04	396	.54	35,668	40	1.86	667	8.1
May 1-11.....	37,855	10	2.45	.76	1.78	.04	1.90	.00	1.37	1.75		.00	.03	310	.42	15,959	35	1.41	522	7.7
May 12-21.....	56,509	11	2.10	.60	1.04	.04	1.80	.00	1.02	.90		.00	.04	229	.31	17,599	28	.90	376	7.6
May 22-31.....	112,701	9	1.75	.42	.61	.03	1.61	.00	.67	.51		.00	.04	169	.23	25,903	22	.59	280	7.5
June 1-14.....	131,595	8.6	1.70	.46	.74	.03	1.52	.00	.67	.65		.00	.17	178	.24	31,857	25	.71	299	7.6
June 15-23.....	47,645	7.7	1.95	.68	1.26	.03	1.61	.00	1.19	1.10		.00	.17	234	.32	15,163	32	1.10	402	7.6
June 24-30.....	24,006	8.8	2.54	.90	2.09	.05	2.03	.00	1.67	1.86		.00	.19	333	.45	10,872	37	1.59	561	7.7
July 1-31.....	82,455	9.4	3.39	1.07	2.57	.06	2.49	.00	2.35	2.31		.00	.03	432	.59	48,444	36	1.72	717	7.7
Aug. 1-31.....	79,749	10	3.34	.90	3.00	.06	2.36	.00	2.33	2.62		.01	.06	433	.59	46,963	41	2.06	734	7.7
Sept. 1-26.....	87,824	9.3	3.14	.90	2.31	.05	2.23	.00	2.23	1.95		.01	.05	379	.52	45,268	36	1.62	636	7.6
Sept. 27-30.....	20,961	10	2.69	.99	1.57	.05	2.10	.00	1.83	1.30		.01	.04	312	.42	8,894	30	1.15	523	7.6
Total or weighted average	1,466,000	9.5	2.64	0.82	2.10	0.05	2.01	0.00	1.68	1.89		0.00	0.06	3340	0.46	505,080	38	1.54	570	7.6

COLORADO RIVER MAIN STEM--Continued

9-1805. COLORADO RIVER NEAR CISCO, UTAH

LOCATION.--At gaging station, 1 mile downstream from Dolores River, 11 miles south of Cisco, Grand County, 36 miles downstream from Colorado-Utah State line, 97 miles upstream from Green River, and 235 miles upstream from San Juan River.
DRAINAGE AREA.--24,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1961.
Water temperatures: May 1949 to September 1959.
Sediment records: May 1930 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,630 micromhos Aug. 19; minimum daily, 437 micromhos May 29.
Percent sodium: Maximum, 48 Feb. 1-28; minimum, 24 May 22-31.
EXTREMES, 1941-52, 1953-61.--Specific conductance: Maximum daily, 4,820 micromhos Dec. 13, 1957; minimum daily, 291 micromhos May 31, 1958.
Percent sodium: Maximum, 57 Mar. 2, 4, 1955; minimum, 18 June 1-10, 1957.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	152,797	10	8.58	5.51	8.40	0.16	3.31	0.00	14.78	4.37		0.24	0.13	1,430	1.94	297,159	37	3.16	1,970	8.0
Nov. 1-30.....	176,846	12	7.29	4.69	7.40	.14	3.05	.00	12.16	4.29		.18	.14	1,230	1.67	295,828	38	3.02	1,770	8.2
Dec. 1-31.....	164,602	9.7	6.29	3.78	7.35	.15	3.02	.00	9.68	4.80		.21	.10	1,090	1.48	244,006	42	3.28	1,650	8.1
Jan. 1-31, 1961.	156,486	12	6.09	3.37	7.48	.15	3.02	.00	8.54	5.22		.19	.00	1,050	1.43	223,462	44	3.44	1,620	8.0
Feb. 1-28.....	139,620	10	5.84	3.54	8.66	.18	2.69	.00	9.10	6.07		.18	.08	1,120	1.52	212,670	48	4.00	1,740	8.2
Mar. 1-31.....	161,958	9.6	5.59	3.54	7.74	.16	2.66	.00	8.74	5.64		.26	.07	1,060	1.44	233,479	45	3.62	1,630	8.0
Apr. 1-20.....	115,676	9.8	5.74	3.54	7.18	.15	2.69	.00	8.95	4.51		.21	.08	1,020	1.39	160,466	43	3.33	1,570	8.1
Apr. 21-30.....	90,744	9	4.99	1.56	3.05	.10	2.98	.00	4.98	1.75		.15	.03	601	.82	74,170	31	1.68	923	7.3
May 1-12.....	163,732	9.2	4.24	2.06	3.00	.08	2.31	.00	5.29	1.81		.15	.05	588	.80	130,933	32	1.69	895	8.1
May 13-21.....	171,051	11	3.54	1.73	2.31	.07	2.23	.00	3.96	1.41		.06	.05	470	.64	109,336	30	1.42	726	7.8
May 22-31.....	341,950	9.2	2.74	1.15	1.26	.05	2.02	.00	2.39	.79		.06	.04	316	.43	146,957	24	.90	505	7.9
June 1-17.....	490,949	9.6	2.89	.99	1.52	.05	1.97	.00	2.66	.73		.05	.07	333	.45	222,341	28	1.09	548	7.7
June 18-24.....	117,225	9.1	3.39	1.48	2.31	.07	2.00	.00	3.85	1.41		.06	.06	450	.61	71,742	32	1.48	715	8.1
June 25-30.....	56,327	6.8	4.44	2.14	3.52	.08	2.23	.00	5.77	2.23		.08	.08	634	.86	48,567	35	1.94	1,000	8.1
July 1-14.....	74,003	7.6	6.94	3.78	5.96	.13	2.80	.00	10.12	3.67		.11	.09	1,040	1.41	104,670	35	2.57	1,550	7.7
July 15-31.....	56,446	8.9	8.63	5.35	8.00	.16	3.03	.00	14.80	4.37		.13	.12	1,400	1.90	107,472	36	3.03	1,970	7.6
Aug. 1-16, 20-31	133,111	12	9.73	5.10	8.09	.16	3.34	.00	15.72	3.67		.21	.15	1,460	1.99	264,305	35	2.97	2,010	7.8
Aug. 19.....	4,701	10	11.28	6.00	12.09	.31	3.18	.00	18.80	7.90		.31	.09	1,900	2.58	12,147	41	4.11	2,630	7.8
Sept. 1-7, 9....	70,358	13	10.08	4.69	7.22	.15	3.47	.00	15.26	3.67		.18	.14	1,420	1.93	135,875	33	2.66	1,930	7.9
Sept. 8, 10-30..	245,280	11	7.14	3.29	5.35	.10	3.16	.00	10.14	2.40		.18	.12	999	1.36	333,247	34	2.34	1,430	7.7
Total or weighted average	3,084,000	10	5.34	2.80	4.83	0.11	2.61	--	7.56	2.85		0.14	0.08	818	1.11	3,425,270	37	2.40	1,220	7.8

9-3800. 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, 16 miles downstream from site of Glen Canyon Dam, 28 miles downstream from Utah-Arizona State line, 61.5 miles upstream from Little Colorado River, and 79 miles downstream from San Juan River.
DRAINAGE AREA.--107,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January to July 1926, October 1926 to June 1927, October 1928 to September 1930, November 1942 to October 1945, October 1947 to September 1961.
Water temperatures: July 1949 to September 1961.
Sediment records: October 1928 to December 1933, November 1942 to September 1944, October 1947 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,430 micromhos Oct. 15; minimum daily, 453 micromhos June 8.
Percent sodium: Maximum, 44 Mar. 1-27; minimum, 25 Sept. 14-18.
EXTREMES, 1928-33, 1942-45, 1947-61.--Specific conductance: Maximum daily, 2,430 micromhos Oct. 15, 1960; minimum daily, 318 micromhos June 9, 1948.
Percent sodium (1942-44, 1947-61): Maximum, 46 Mar. 2, 4, 7, 10, 1944; minimum, 17 June 1-11, 1958.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-6, 1960..	41,808	11	7.53	4.03	7.57	0.17	3.13		11.93	3.84	0.03	0.19	0.18	1,310	1.78	74,484	39	3.15	1,740	8.0
Oct. 7-11.....	37,646	--	7.78	3.78	7.40	--	3.36		--	--	--	--	--	1,270	1.73	65,023	39	3.07	1,730	7.6
Oct. 12.....	9,362	--	6.69	3.04	5.48	--	3.57		--	--	--	--	--	972	1.32	12,376	36	2.48	1,400	7.8
Oct. 13-14.....	20,767	--	7.98	3.95	7.13	--	3.67		--	--	--	--	--	1,240	1.69	35,021	37	2.92	1,690	7.8
Oct. 15.....	13,904	--	14.77	4.44	10.27	--	3.87		--	--	--	--	--	1,920	2.61	36,306	35	3.31	2,430	7.6
Oct. 16-17.....	29,078	--	6.39	2.55	6.09	--	3.34		--	--	--	--	--	948	1.29	37,489	41	2.88	1,400	7.9
Oct. 18-31.....	188,104	--	7.98	3.29	7.09	--	3.61		--	--	--	--	--	1,200	1.63	306,986	39	2.99	1,650	7.6
Nov. 1-30.....	345,421	--	6.79	3.37	6.44	--	3.46		--	--	--	--	--	1,080	1.47	507,355	39	2.86	1,530	7.7
Dec. 1-31.....	274,665	--	6.19	3.21	6.26	--	3.39		--	--	--	--	--	1,020	1.39	381,015	40	2.89	1,460	7.7
Jan. 1-28, 1961.	235,478	20	6.49	3.37	7.48	.16	3.64		9.39	4.23	.02	.23	.13	1,100	1.50	352,275	43	3.37	1,610	7.6
Jan. 29-Feb. 28.	360,871	--	5.74	2.88	6.31	--	3.34		--	--	--	--	--	988	1.34	484,855	42	3.04	1,420	7.5
Mar. 1-27.....	298,937	--	5.64	2.96	6.79	--	3.31		--	--	--	--	--	1,010	1.37	410,620	44	3.27	1,450	7.7
Mar. 28-Apr. 7..	177,578	--	5.19	2.47	5.48	--	3.38		--	--	--	--	--	859	1.17	207,454	42	2.80	1,250	7.6
Apr. 8-11.....	81,957	--	4.49	2.06	4.44	--	2.98		--	--	--	--	--	723	.98	80,587	40	2.45	1,050	8.0
Apr. 12-15.....	84,337	--	5.09	2.39	4.83	--	3.28		--	--	--	--	--	803	1.09	92,103	39	2.50	1,160	7.8
Apr. 16-30.....	286,185	13	4.39	2.06	4.09	.13	3.05		5.60	1.97	.02	.11	.09	698	.95	271,670	38	2.28	1,010	7.6
May 1-4.....	80,608	--	3.79	1.81	3.09	--	2.80		--	--	--	--	--	571	.78	62,597	36	1.85	850	7.7
May 5-19.....	460,562	--	3.49	1.48	2.48	--	2.56		--	--	--	--	--	492	.67	308,171	33	1.57	731	7.6

COLORADO RIVER MAIN STEM--Continued

9-3800. COLORADO RIVER AT LEES FERRY, ARIZ.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 20-26, 1961	297,540	--	3.04	1.32	2.00	--	2.38		--	--	--	--	--	415	0.56	167,932	31	1.36	621	7.8
May 27-31	314,380	--	2.59	1.07	1.48	--	2.20		--	--	--	--	--	346	.47	147,935	29	1.09	517	7.7
June 1-24	1,404,774	16	3.04	.99	1.26	0.08	2.62		2.08	0.51	0.02	0.05	0.06	326	.44	622,820	23	.89	516	7.8
June 25-July 2	228,496	--	2.99	1.32	1.83	--	2.33		--	--	--	--	--	394	.54	122,437	30	1.24	606	7.6
July 3-6	77,927	--	3.64	1.48	2.48	--	2.64		--	--	--	--	--	484	.66	51,294	33	1.55	743	7.6
July 7-15	124,887	--	4.59	2.06	3.31	--	2.92		--	--	--	--	--	654	.89	111,080	33	1.81	970	7.5
July 16-29	108,242	--	5.34	3.21	4.74	--	2.93		--	--	--	--	--	833	1.13	122,625	36	2.29	1,230	7.5
July 30-Aug. 6	65,248	--	7.29	3.70	6.18	--	3.18		--	--	--	--	--	1,110	1.51	98,499	36	2.64	1,560	7.5
Aug. 7-16	118,255	--	9.88	3.95	6.83	--	3.47		--	--	--	--	--	1,350	1.84	217,115	33	2.60	1,850	7.4
Aug. 17-27	114,655	--	7.58	2.71	6.26	--	3.44		--	--	--	--	--	1,090	1.48	169,964	38	2.76	1,520	7.5
Aug. 28-31	51,174	--	9.28	3.45	6.26	--	3.26		--	--	--	--	--	1,270	1.73	88,387	33	2.48	1,710	7.4
Sept. 1-4	48,889	--	8.98	2.88	4.92	--	4.16		--	--	--	--	--	1,140	1.55	75,797	29	2.02	1,500	7.5
Sept. 5-8	40,621	--	10.38	3.54	6.44	--	3.15		--	--	--	--	--	1,400	1.90	77,343	32	2.44	1,790	8.0
Sept. 9-11	124,364	--	8.43	2.55	4.09	--	5.15		--	--	--	--	--	978	1.33	165,414	27	1.74	1,330	7.7
Sept. 12	48,198	--	14.87	3.45	6.53	--	4.49		--	--	--	--	--	1,720	2.34	112,746	26	2.16	2,110	7.9
Sept. 13	37,091	--	9.18	2.55	4.18	--	4.79		--	--	--	--	--	1,080	1.47	54,479	26	1.72	1,430	7.9
Sept. 14-18	108,694	--	12.97	3.45	5.39	--	3.47		--	--	--	--	--	1,510	2.05	223,214	25	1.88	1,830	7.8
Sept. 19-23	132,893	--	8.43	2.39	4.52	--	4.00		--	--	--	--	--	1,030	1.40	186,156	29	1.95	1,390	7.5
Sept. 24-26	61,289	--	10.43	2.80	5.31	--	3.67		--	--	--	--	--	1,260	1.71	105,025	29	2.06	1,620	7.6
Sept. 27-30	108,694	--	7.49	2.55	4.87	--	3.18		--	--	--	--	--	1,000	1.36	147,824	33	2.18	1,350	7.8
Total or weighted average	**6,644,000**	**--**	**5.27**	**2.18**	**4.05**	**--**	**3.05**		**--**	**--**	**--**	**--**	**--**	**752**	**1.02**	**6,787,580**	**35**	**2.00**	**1,070**	**7.6**

COLORADO RIVER MAIN STEM--Continued

9-4025. COLORADO RIVER NEAR GRAND CANYON, ARIZ.

LOCATION.--At gaging station at Kaibab Bridge, 0.2 mile upstream from Bright Angel Creek, 11 miles by trail northeast of Grand Canyon, Coconino County, 26 miles downstream from Little Colorado River, and 267 miles upstream from Hoover Dam.
DRAINAGE AREA.--137,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1925 to November 1942, September 1943 to September 1961.
Water temperatures: October 1936 to October 1942, September 1943 to September 1961.
Sediment records: October 1925 to November 1942, September 1943 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,390 micromhos Oct. 17; minimum daily, 492 micromhos June 20.
Percent sodium: Maximum, 49 Dec. 4-5; minimum, 26 Sept. 13.
EXTREMES, 1937-42, 1943-61.--Specific conductance: Maximum daily, 2,900 micromhos Sept. 6, 1940; minimum daily, 341 micromhos June 15, 1942.
Percent sodium (1941-42, 1943-61): 50 Jan. 12-14, 1957; minimum, 16 June 11-20, 1952.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-13, 1960.	113,738	18	7.39	4.03	9.14	0.20	3.23		11.62	5.47	0.03	0.19	0.19	4,370	5.94	675,969	44	3.82	1,900	8.1
Oct. 14-15.....	23,226	--	7.58	3.45	8.40	--	3.38		--	--	--	--	--	1,270	1.73	40,117	43	3.57	1,790	7.7
Oct. 16-18.....	48,573	--	11.28	3.70	10.27	--	3.02		--	--	--	--	--	1,700	2.31	112,301	41	3.75	2,200	8.0
Oct. 19-31.....	196,612	--	7.44	3.04	8.31	--	3.74		--	--	--	--	--	1,230	1.67	328,892	44	3.63	1,700	7.7
Nov. 1-11.....	136,778	--	7.14	3.54	8.09	--	3.61		--	--	--	--	--	1,230	1.67	228,803	43	3.50	1,710	7.8
Nov. 12-30.....	242,999	--	6.69	3.37	7.70	--	3.67		--	--	--	--	--	1,130	1.54	373,441	43	3.43	1,630	7.7
Dec. 1.....	10,512	--	5.99	3.29	7.61	--	3.51		--	--	--	--	--	1,080	1.47	15,441	45	3.53	1,570	8.0
Dec. 2-3.....	7,359	--	6.29	3.29	8.13	--	3.74		--	--	--	--	--	1,130	1.54	11,309	46	3.72	1,640	7.8
Dec. 4-5.....	9,342	--	6.29	3.54	9.44	--	4.06		--	--	--	--	--	1,220	1.66	15,500	49	4.26	1,800	7.9
Dec. 6-25.....	213,104	--	5.89	3.37	7.66	--	3.65		--	--	--	--	--	1,070	1.46	310,109	45	3.56	1,570	7.7
Dec. 26-31.....	59,742	--	6.39	3.54	8.61	--	3.79		--	--	--	--	--	1,170	1.59	95,062	46	3.87	1,710	7.8
Jan. 1-25, 1961.	228,893	17	6.59	3.54	8.79	.18	4.03		9.45	5.61	.03	.19	.20	1,200	1.63	373,553	46	3.91	1,780	7.6
Jan. 26-Feb. 28.	415,216	--	5.54	3.13	7.57	--	3.44		--	--	--	--	--	1,020	1.39	575,987	47	3.64	1,550	7.5
Mar. 1-30.....	361,488	--	5.44	3.70	8.35	--	3.61		--	--	--	--	--	1,040	1.41	511,288	48	3.91	1,600	7.8
Mar. 31-Apr. 8..	153,539	--	5.14	2.71	6.09	--	3.61		--	--	--	--	--	856	1.16	178,743	44	3.07	1,330	7.6
Apr. 9-14.....	135,312	--	4.79	2.39	5.00	--	3.54		--	--	--	--	--	738	1.00	135,810	41	2.64	1,180	7.4
Apr. 15-17.....	61,646	--	5.24	2.63	5.87	--	3.64		--	--	--	--	--	846	1.15	70,928	43	2.96	1,310	7.5
Apr. 18-May 2...	296,063	--	4.49	2.47	4.79	--	3.28		--	--	--	--	--	708	.96	285,073	41	2.57	1,110	7.4

COLORADO RIVER MAIN STEM--Continued

9-4025. COLORADO RIVER NEAR GRAND CANYON, ARIZ.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 3-11, 1961..	255,808	--	3.89	1.89	3.31	--	3.11		--	--	--	--	--	569	0.77	197,955	36	1.94	881	7.5
May 12-21.....	316,959	--	3.69	1.65	3.00	--	2.95		--	--	--	--	--	512	.70	220,705	36	1.84	811	7.6
May 22-29.....	398,440	--	3.24	1.40	2.26	--	2.79		--	--	--	--	--	439	.60	237,884	33	1.48	675	7.4
May 30-June 26..	1,699,993	14	2.89	.99	1.61	0.10	2.39		2.17	0.90	0.02	0.05	0.07	337	.46	779,141	29	1.16	540	7.5
June 27-30.....	126,307	--	2.99	1.23	2.31	--	2.36		--	--	--	--	--	400	.54	68,711	35	1.59	646	7.4
July 1-6.....	138,883	--	3.64	1.32	2.87	--	2.72		--	--	--	--	--	501	.68	94,629	37	1.82	763	7.7
July 7-18.....	173,205	--	4.99	1.97	4.52	--	3.28		--	--	--	--	--	734	1.00	172,900	39	2.42	1,100	7.6
July 19-Aug. 2..	119,990	19	5.79	2.71	6.74	.17	3.31		7.25	4.74	.02	.10	.16	996	1.35	162,534	44	3.27	1,450	7.7
Aug. 3-15.....	169,589	--	8.73	3.45	7.87	--	3.67		--	--	--	--	--	1,340	1.82	309,059	39	3.19	1,810	7.7
Aug. 16-19.....	34,893	--	9.88	3.54	9.22	--	3.80		--	--	--	--	--	1,520	2.07	72,131	41	3.56	2,030	7.6
Aug. 20-31.....	154,663	--	5.59	5.43	7.66	--	4.10		--	--	--	--	--	1,220	1.66	256,617	41	3.26	1,700	7.5
Sept. 1-2.....	34,274	--	10.58	3.04	7.26	--	3.80		--	--	--	--	--	1,390	1.89	64,792	35	2.78	1,840	7.8
Sept. 3-12.....	220,165	--	8.58	2.63	5.87	--	4.06		--	--	--	--	--	1,130	1.54	338,350	34	2.48	1,550	7.6
Sept. 13.....	44,430	--	15.47	3.87	6.70	--	3.28		--	--	--	--	--	1,790	2.43	108,160	26	2.15	2,140	8.0
Sept. 14-30.....	449,137	--	11.38	3.13	5.83	--	3.85		--	--	--	--	--	1,390	1.89	849,049	29	2.16	1,750	7.7
Total or weighted average	7,050,000	--	5.40	2.40	5.00	--	3.20		--	--	--	--	--	863	1.17	8,270,043	29	2.53	1,180	7.5

COLORADO RIVER MAIN STEM--Continued

9-4215. COLORADO RIVER BELOW HOOVER DAM, ARIZ.-NEV.

LOCATION.--At Hoover Dam, on State line between Mohave County, Ariz., and Clark County, Nev., just downstream from gaging station.
DRAINAGE AREA.--167,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1939 to September 1961.
Water temperatures: October 1941 to September 1961.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 31, 1960...	556,300	10	4.52	2.00	3.96	0.09	2.64		5.83	2.26	0.02	0.04	0.12	676	0.92	511,800	37	2.2	1,010	7.7
Nov. 30.....	489,000	--	4.56	2.00	4.05	--	2.59		--	--	--	--	--	678	.92	449,900	38	2.2	1,010	8.1
Dec. 31.....	571,600	--	4.56	2.00	3.96	--	2.59		--	--	--	--	--	675	.92	525,900	38	2.2	1,010	8.1
Jan. 31, 1961...	590,600	9.2	4.52	2.08	4.00	.12	2.66		5.93	2.26	.02	.04	.12	681	.93	549,300	37	2.2	1,020	8.3
Feb. 28.....	577,300	9.8	4.44	2.32	4.00	.18	2.67		5.91	2.31	--	.05	.10	694	.94	542,700	37	2.2	1,040	8.2
Mar. 31.....	936,100	--	4.76	2.20	3.96	--	2.64		--	--	--	--	--	699	.95	889,300	36	2.1	1,030	8.2
Apr. 30.....	904,300	12	4.70	2.06	4.18	.11	2.66		6.00	2.48	.02	.05	.10	711	.97	877,200	38	2.3	1,060	7.9
May 31.....	943,300	--	4.62	2.30	3.96	--	2.57		--	--	--	--	--	697	.95	896,100	36	2.1	1,030	7.8
June 30.....	841,600	--	4.66	2.62	3.96	--	2.54		--	--	--	--	--	693	.94	791,100	35	2.1	1,040	7.8
July 31.....	821,500	11	4.64	2.24	4.18	.11	2.66		5.98	2.43	.02	.08	.14	694	.94	772,200	37	2.3	1,060	8.1
Aug. 31.....	739,000	12	4.38	2.18	3.78	--	2.62		5.85	2.37	--	.06	--	705	.96	709,400	37	2.1	1,040	7.3
Sept. 30.....	690,200	11	4.40	2.18	3.96	--	2.62		5.91	2.40	--	.06	--	705	.96	662,600	38	2.2	1,050	7.3
Total or weighted average a	8,661,000	10	4.59	2.22	4.00	0.12	2.62		6.00	2.45	0.02	0.06	0.12	894	0.94	8,141,000	37	2.2	1,040	--

a Includes estimated data for missing periods. Represents 100 percent of runoff for water year.

DIVERSIONS AND RETURN FLOWS AT AND BELOW IMPERIAL DAM

9-5255. 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, 3.5 miles downstream from siphon-drop powerplant, and 0.2 mile downstream from upper highway bridge over Colorado River at Yuma, Yuma County.
RECORDS AVAILABLE.--Chemical analyses: September 1926 to September 1928, October 1942 to September 1961.
Water temperatures: May 1960 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,380 micromhos Dec. 27; minimum daily, 1,150 micromhos July 5.
Percent sodium: Maximum, 45 Nov. 1 to Jan. 29; minimum, 42 Mar. 1 to Apr. 30.
EXTREMES, 1943-61.--Specific conductance: Maximum daily, 1,520 micromhos Jan. 16, 1957; minimum daily, 795 micromhos Jan. 5, 1953.
Percent sodium: Maximum, 46 Nov. 21-30, 1953; minimum, 32 several periods in 1945, 1946, 1948, 1949, and 1957.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	29,410	--	4.94	2.10	5.31	--	2.74		--	--	--	--	--	812	1.10	32,350	43	2.8	1,230	7.9
Nov. 1-30.....	22,150	15	5.04	2.20	5.92	0.13	2.80		6.79	3.67	0.02	0.02	0.17	837	1.14	25,250	45	3.1	1,270	8.0
Dec. 1-31.....	16,520	--	5.24	2.06	5.87	--	2.88		--	--	--	--	--	847	1.15	19,000	45	3.1	1,270	8.1
Jan. 1-29, 1961.	18,980	17	4.99	2.25	5.92	.13	2.80		6.83	3.67	.03	.03	.18	870	1.18	22,400	45	3.1	1,280	8.0
Jan. 30-Feb. 28.	28,410	--	4.99	2.17	5.35	--	2.79		--	--	--	--	--	843	1.15	32,670	43	2.8	1,210	7.9
Mar. 1-31.....	30,330	--	4.99	2.13	5.13	--	2.80		--	--	--	--	--	806	1.10	33,360	42	2.7	1,180	7.9
Apr. 1-30.....	33,330	15	4.99	2.17	5.22	.12	2.82		6.39	3.13	.02	.04	.18	797	1.08	36,000	42	2.8	1,190	7.9
May 1-31.....	38,210	--	4.89	2.27	5.61	--	2.75		--	--	--	--	--	839	1.14	43,560	44	3.0	1,230	8.0
June 1-30.....	35,820	--	4.79	2.37	5.52	--	2.70		--	--	--	--	--	794	1.08	38,690	44	2.9	1,220	8.0
July 1-31.....	36,960	18	4.69	2.35	5.44	.13	2.64		6.64	3.33	.02	.03	.17	799	1.09	40,290	43	2.9	1,200	7.9
Aug. 1-31.....	31,290	--	4.84	2.12	5.48	--	2.62		--	--	--	--	--	827	1.12	35,040	44	2.9	1,210	8.2
Sept. 1-30.....	37,560	--	4.79	2.21	5.52	--	2.66		--	--	--	--	--	838	1.14	42,820	44	3.0	1,230	8.1
Total or weighted average	348,970	--	4.90	2.22	5.73	--	2.74		--	--	--	--	--	823	1.12	401,430	45	3.0	1,120	7.9

GUNNISON RIVER BASIN

9-1525. GUNNISON RIVER NEAR GRAND JUNCTION, COLO.

LOCATION.--At bridge on State Highway 141, 180 feet downstream from gaging station, 0.4 mile downstream from Whitewater Creek, 0.5 mile south of Whitewater, and 8 miles southeast of Grand Junction, Mesa County.
DRAINAGE AREA.--7,870 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: October 1931 to September 1961.
Water temperatures: April 1949 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,340 micromhos Aug. 26; minimum daily, 426 micromhos May 28.
Percent sodium: Maximum, 32 Mar. 1-17; minimum, 19 May 24-31.
EXTREMES, 1941-61.--Specific conductance: Maximum daily, 2,730 micromhos Sept. 10, 1956; minimum daily, 280 micromhos May 23, 1948.
Percent sodium (1950-61): Maximum, 35 Sept. 21-30, 1956, Feb. 11-20, 1957; minimum, 10 June 2-5, 10, 1952.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	50,666	15	11.18	6.83	7.31	0.14	4.33	0.00	20.74	0.56		0.11	0.27	1,720	2.34	118,517	29	2.44	2,000	7.7
Nov. 1-30.....	58,314	16	7.98	4.94	5.13	.12	3.93	.00	13.99	.45		.10	.26	1,240	1.69	98,341	28	2.02	1,540	7.8
Dec. 1-31.....	51,096	16	7.29	4.77	4.96	.12	3.80	.00	13.12	.45		.12	.25	1,170	1.59	81,304	29	2.02	1,470	7.8
Jan. 1-31, 1961.	41,320	17	7.78	4.94	5.18	.10	4.00	.00	13.66	.51		.11	.16	1,210	1.65	67,996	29	2.05	1,520	8.0
Feb. 1-28.....	39,487	15	6.94	4.61	5.26	.10	3.56	.00	12.91	.62		.09	.18	1,140	1.55	61,221	31	2.19	1,450	8.0
Mar. 1-17.....	25,188	12	6.34	4.77	5.26	.10	3.34	.00	12.55	.54		.08	.17	1,110	1.51	38,024	32	2.23	1,410	8.0
Mar. 18-29.....	26,134	13	4.94	3.13	3.48	.09	2.84	.00	8.24	.39		.07	.14	768	1.04	27,297	30	1.73	1,040	7.9
Mar. 30-31.....	3,420	14	7.19	5.02	5.44	.11	3.44	.00	13.53	.51		.10	.09	1,190	1.62	5,534	31	2.20	1,500	7.8
Apr. 1-5, 9-21..	34,239	16	6.34	3.45	3.92	.10	3.15	.00	10.16	.45		.03	.10	915	1.24	42,607	28	1.77	1,190	7.7
Apr. 6-8.....	8,289	16	4.59	2.71	2.74	.07	2.87	.00	6.83	.34		.02	.08	648	.88	7,305	27	1.43	895	7.7
Apr. 22-26.....	16,740	15	4.69	1.65	2.00	.07	2.77	.00	5.52	.28		.01	.06	557	.76	12,681	24	1.12	778	7.5
Apr. 27-30.....	7,331	14	5.54	2.80	2.96	.07	2.84	.00	8.12	.39		.02	.12	748	1.02	7,458	26	1.45	1,010	7.7
May 1.....	4,621	12	5.39	2.14	2.35	.07	3.18	.00	6.41	.31		.01	.19	612	.83	3,847	24	1.21	902	7.3
May 2-8.....	44,902	13	3.79	1.32	1.31	.05	2.52	.00	3.77	.17		.01	.08	410	.56	25,037	20	.82	603	7.6
May 9-11.....	12,020	15	4.74	1.89	2.22	.06	2.47	.00	6.39	.28		.00	.06	598	.81	9,775	25	1.22	821	7.4

GUNNISON RIVER BASIN--Continued

9-1525. GUNNISON RIVER NEAR GRAND JUNCTION, COLO.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 12-23, 1961.	97,016	12	3.54	1.23	1.22	0.04	2.15	0.00	3.71	0.16		0.01	0.07	384	0.52	50,665	20	0.79	570	7.6
May 24-31.....	107,837	13	2.79	.90	.87	.04	1.92	.00	2.64	.10		.00	.06	299	.41	43,851	19	.64	447	7.6
June 1-17.....	159,862	12	3.39	1.23	1.31	.05	2.16	.00	3.79	.14		.00	.06	391	.53	85,008	22	.86	578	7.7
June 18-24.....	35,821	14	4.59	1.89	2.00	.06	2.57	.00	5.70	.20		.01	.07	557	.76	27,135	23	1.11	793	7.7
June 25-30.....	12,996	13	7.44	3.54	3.74	.08	3.10	.00	11.43	.37		.02	.14	980	1.33	17,321	25	1.60	1,280	7.7
July 1-12.....	15,995	9.3	10.23	4.77	5.57	.13	3.46	.00	16.95	.56		.04	.20	1,380	1.88	30,019	27	2.03	1,730	7.7
July 13-31.....	18,089	14	11.98	6.09	6.57	.15	3.75	.00	20.59	.68		.08	.23	1,670	2.27	41,084	27	2.19	2,030	7.8
Aug. 1-31.....	44,148	16	9.78	6.17	5.96	.14	3.93	.00	17.93	.51		.07	.20	1,520	2.07	91,263	27	2.11	1,820	7.4
Sept. 1-22.....	62,924	16	10.53	4.69	5.61	.10	4.06	.00	16.43	.45		.09	.19	1,390	1.89	118,951	27	2.03	1,710	7.8
Sept. 23-30.....	37,099	15	7.24	3.21	4.18	.07	3.36	.00	10.64	.51		.07	.13	935	1.27	47,175	28	1.83	1,240	7.8
Total or weighted average	1,016,000	14	6.04	3.13	3.35	0.08	2.99	--	9.34	0.34		0.05	0.13	839	1.14	1,159,416	27	1.51	1,090	7.7

9-2345. GREEN RIVER NEAR GREENDALE, UTAH

LOCATION.--At gaging station, 0.5 mile downstream from Flaming Gorge dam, 2 miles south of Dutch John, 4 miles northeast of Greendale, Daggett County, and 13 miles southeast of Linwood.
DRAINAGE AREA.--15,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1956 to September 1959.
Sediment: October 1956 to 8september 1959.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,340 micromhos Aug. 30; minimum daily, 325 micromhos June 2.
Percent sodium: Maximum, 46 Mar. 18-23; minimum, 25 May 28 to June 30.
EXTREMES, 1956-58, 1959-61.--Specific conductance: Maximum daily, 1,340 micromhos Aug. 30, 1961; minimum daily, 325 micromhos June 2, 1961.
Percent sodium (1959-61): Maximum, 47 Mar. 24-31, 1960; minimum, 25 Apr. 9-18, 1960, May 28 to June 30, 1961.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	48,883	7.2	3.09	1.97	2.61	0.05	3.06	0.00	4.35	0.51	0.02	0.01	0.10	479	0.65	31,844	34	1.64	720	8.2
Nov. 1-30.....	54,030	8.7	3.29	2.06	2.39	.05	3.21	.00	4.27	.42	.02	.00	.19	491	.67	36,079	31	1.46	718	8.0
Dec. 1-9.....	7,658	9.5	5.14	3.37	4.22	.08	4.65	.00	7.54	.79	.03	.00	.05	812	1.10	8,457	33	2.05	1,100	7.7
Dec. 10- Jan. 31, 1961.	46,149	9.2	3.99	2.14	2.44	.05	3.54	.00	4.77	.42	.01	.00	.19	535	.73	33,578	28	1.39	784	8.2
Feb. 1-28.....	27,158	8.1	3.74	2.22	2.83	.05	3.28	.00	5.08	.56	.01	.01	.07	567	.77	20,942	32	1.64	819	8.0
Mar. 1-17, 24-28	39,622	6.5	3.39	2.22	3.05	.06	2.98	.00	5.16	.68	.02	.02	.08	558	.76	30,068	35	1.82	806	8.0
Mar. 18-23.....	15,150	6.7	3.69	2.71	5.66	.12	2.75	.00	7.54	1.92	--	.07	.18	866	1.18	17,843	46	3.16	1,110	8.1
Mar. 29-31.....	8,848	14	3.54	1.89	3.26	.08	3.28	.07	4.62	.68	.04	.06	.11	570	.78	6,859	37	1.98	828	8.3
Apr. 1-30.....	75,808	14	3.39	2.06	2.61	.07	3.43	.00	4.23	.54	.02	.03	.09	508	.69	52,374	32	1.58	754	8.2
May 1-15, 17-20.	33,540	9.7	3.29	1.97	2.96	.06	3.11	.00	4.60	.62	.03	.02	.10	524	.71	23,902	36	1.82	767	7.9
May 16.....	2,261	15	4.39	2.55	4.13	.10	3.77	.00	6.23	1.02	--	.07	.19	744	1.01	2,288	37	2.22	1,020	7.9
May 21-27.....	17,300	8.6	2.79	1.48	2.31	.06	2.67	.00	3.60	.48	.03	.02	.09	425	.58	9,999	35	1.58	643	7.9
May 28-31.....	25,468	15	2.45	.99	1.17	.05	2.54	.00	1.83	.27	.03	.05	.06	289	.39	10,010	25	.90	438	8.0
June 1-30.....	192,020	9.8	2.00	.90	.96	.04	2.23	.00	1.50	.21	.02	.02	.05	236	.32	61,631	25	.79	376	7.8
July 1-31.....	55,892	6.2	2.30	1.32	1.83	.05	2.77	.00	2.52	.28	.01	.01	.08	326	.44	24,780	33	1.36	524	8.0
Aug. 1-29.....	40,092	5.9	2.59	1.56	2.39	.07	2.82	.00	3.35	.45	.02	.02	.25	399	.54	21,755	36	1.66	624	7.9
Aug. 30-31.....	2,824	12	4.54	2.88	5.74	.19	3.28	.00	8.12	1.97	.03	.06	.33	828	1.13	3,181	43	2.98	1,240	7.9
Sept. 1-5.....	7,140	11	4.19	2.30	3.61	.12	3.25	.00	5.95	.90	.03	.06	.15	628	.85	6,099	35	2.00	924	7.9
Sept. 6-30.....	47,504	9.6	3.29	1.73	2.61	.08	2.92	.00	4.41	.51	.03	.03	.13	476	.65	30,752	34	1.65	715	7.8
Total or weighted average	747,400	9.4	2.90	1.65	2.18	0.06	2.88	--	3.56	0.45	0.02	0.02	0.11	425	0.58	432,030	32	1.44	636	7.9

GREEN RIVER BASIN

9-3150. GREEN RIVER AT GREEN RIVER, UTAH

LOCATION.--At bridge on U.S. Highways 50 and 6 in town of Green River, Emery County, 1 mile upstream from gaging station.
DRAINAGE AREA.--40,600 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: August 1928 to September 1961.
Water temperatures: May 1949 to September 1959.
Sediment records: May 1930 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,530 micromhos Aug. 30; minimum daily, 319 micromhos June 19.
Percent sodium: Maximum, 43 Oct. 1-8, 13, 18-31; minimum, 26 June 1-30, Sept. 18-20.
EXTREMES, 1941-61.--Specific conductance: Maximum daily, 2,420 micromhos Sept. 29, 1943; minimum daily, 272 micromhos May 13, 1956.
Percent sodium (1950-61): Maximum, 48 Sept. 19, 1960; minimum, 19 Aug. 7, 1957.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-8, 13, 18-31, 1960...	66,286	10	3.54	2.22	4.39	0.08	3.25	0.13	5.43	1.52		0.03	0.18	638	0.87	57,515	43	2.59	961	8.4
Oct. 9-12, 14-17	29,958	9	5.89	2.88	6.05	.12	3.29	.00	9.91	1.41		.03	.23	959	1.30	39,073	41	2.89	1,320	7.9
Nov. 1-30.....	105,203	11	3.64	2.63	4.48	.06	3.47	.17	5.89	1.33		.01	.17	663	.90	94,860	41	2.53	988	8.4
Dec. 1-31.....	80,364	13	4.39	3.13	5.05	.06	4.16	.13	6.93	1.55		.02	.19	780	1.06	85,250	40	2.60	1,150	8.3
Jan. 1-31, 1961.	79,442	12	4.34	2.96	4.35	.07	4.36	.00	6.10	1.38		.02	.17	720	.98	77,790	37	2.28	1,070	8.2
Feb. 1-14, 17...	44,033	9.5	3.84	2.55	3.87	.06	3.72	.00	5.48	1.27		.02	.16	645	.88	38,626	38	2.17	961	8.0
Feb. 15-16,18-28	49,972	10	3.49	2.63	3.96	.07	3.49	.00	5.48	1.21		.02	.25	634	.86	43,087	39	2.26	947	7.8
Mar. 1-31.....	136,564	9.8	3.54	2.39	4.35	.09	3.49	.00	5.68	1.30		.01	.25	655	.89	121,651	42	2.53	970	7.7
Apr. 1-30.....	184,344	11	3.39	2.06	3.65	.09	3.39	.00	4.81	1.10		.03	.23	578	.79	144,909	40	2.21	865	7.8
May 1-17.....	136,259	14	2.59	1.40	1.87	.07	2.80	.00	2.60	.62		.02	.09	370	.50	68,565	32	1.32	574	7.9
May 18-31.....	205,293	13	2.10	.90	1.13	.04	2.25	.00	1.52	.39		.04	.06	254	.35	70,916	27	.92	402	8.0
June 1-30.....	542,083	13	2.00	.70	.96	.05	2.29	.00	1.12	.34		.02	.06	226	.31	166,615	26	.82	363	7.9
July 1-2.....	14,142	9.8	2.10	.90	1.22	.05	2.36	.00	1.50	.42		.02	.06	254	.35	4,885	29	.99	408	7.8
July 3-30.....	95,302	9.8	2.59	1.73	2.09	.06	2.87	.00	2.64	.79		.02	.07	375	.51	48,604	32	1.42	596	8.0
July 31.....	2,182	10	2.15	.80	1.26	.05	2.39	.00	1.46	.45		.01	.00	260	.35	771	30	1.04	423	7.6
Aug.1-3,5-16,18-26,28-29, 31..	68,120	12	3.34	2.71	3.48	.13	3.43	.00	5.08	1.18		.05	.12	610	.83	56,513	36	2.00	905	7.9
Aug. 4.....	3,412	13	4.24	3.95	5.44	.16	3.70	.00	9.06	1.16		.03	.11	898	1.22	4,166	39	2.69	1,220	7.5
Aug. 17.....	2,797	11	4.54	4.94	4.48	.18	3.28	.00	10.01	1.04		.02		922	1.25	3,507	32	2.06	1,240	7.7
Aug. 27-30.....	5,177	14	6.59	4.61	5.74	.16	3.80	.00	12.51	.96		.05	.15	1,120	1.52	7,885	34	2.43	1,480	7.4
Sept. 1-17,21-30	154,181	11	4.09	2.30	4.00	.13	3.28	.00	6.23	1.18		.04	.17	680	.92	142,587	38	2.24	994	7.6
Sept. 18-20.....	21,142	11	7.19	4.61	4.13	.16	3.08	.00	12.45	.85		.03	.12	1,080	1.47	31,053	26	1.70	1,400	7.4
Total or weighted average	2,026,000	12	3.04	1.73	2.74	0.07	2.99	--	3.83	0.84		0.02	0.13	475	0.65	1,310,403	35	1.67	714	7.9

9-3555. SAN JUAN RIVER NEAR ARCHULETA, N. MEX.

LOCATION.--At gaging station, 0.5 mile upstream from Gobernador Canyon, 1 mile north of Archuleta, San Juan County, and 6.8 miles downstream from Navajo Dam.
DRAINAGE AREA.--3,260 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: Decsmber 1954 to September 1961.
Water temperatures: December 1954 to Septsmbsr 1961.
Ssdiment records: December 1954 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 585 micromhos Dec. 22, 23, Jan. 6; minimum daily, 124 micromhos May 30.
Percent sodium: Maximum, 36 Dec. 1-15, Mar. 1-17; minimum, 17 Sept. 19.
EXTREMES, 1954-61.--Specific conductance: Maximum daily, 685 micromhos Jan. 5, 1960; minimum daily, 101 micromhos July 2, 1957.
Percent soidum: Maximum, 45 Feb. 13-17, 1957; minimum, 13 Apr. 17-23, 1958.
REMARKS.--Valuss reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	25,825	14	2.30	0.60	1.52	0.10	2.49	0.00	1.73	0.25	0.02	0.03	0.07	274	0.37	9,623	34	1.27	428	7.4
Nov. 1-30.....	16,185	--	2.64	.62	1.70	--	2.62	.00	--	--	--	--	--	310	.42	6,824	34	1.33	480	7.4
Dec. 1-15.....	7,587	--	2.69	.63	1.83	--	2.64	.00	--	--	--	--	--	324	.44	3,343	35	1.42	499	7.4
Dec. 16-27.....	4,903	--	2.99	.73	2.00	--	2.87	.00	--	--	--	--	--	360	.49	2,401	35	1.47	550	7.6
Dec. 28-31.....	1,793	--	2.74	.68	1.74	--	2.64	.00	--	--	--	--	--	321	.44	783	34	1.33	498	7.5
Jan. 1-23, 1961.	8,257	--	2.89	.71	1.78	--	2.75	.00	--	--	--	--	--	338	.46	3,796	33	1.33	524	7.6
Jan. 24-Feb. 18.	14,218	--	2.54	.56	1.65	--	2.39	.00	--	--	--	--	--	300	.41	5,801	35	1.33	471	7.6
Feb. 19-28.....	5,871	13	2.59	.79	1.87	.10	2.52	.00	2.50	.31	.02	.03	.05	330	.45	2,635	35	1.44	516	7.4
Mar. 1-17.....	15,915	--	2.59	.81	1.91	--	2.61	.00	--	--	--	--	--	342	.47	7,403	36	1.47	524	7.5
Mar. 18-20.....	4,844	--	2.40	.80	1.31	--	2.31	.00	--	--	--	--	--	293	.40	1,930	29	1.03	450	7.4
Mar. 21-23.....	5,415	--	2.79	.82	1.70	--	2.49	.00	--	--	--	--	--	339	.46	2,496	32	1.26	526	7.5
Mar. 24-31.....	16,994	--	2.50	.82	1.31	--	2.38	.00	--	--	--	--	--	298	.41	6,887	28	1.01	455	7.5
Apr. 1.....	2,182	--	2.99	.90	1.52	--	2.54	.00	--	--	--	--	--	350	.48	1,039	28	1.09	530	7.5
Apr. 2-4.....	7,420	--	2.59	.90	1.09	--	2.28	.00	--	--	--	--	--	293	.40	2,957	24	.82	450	7.8
Apr. 5-17.....	44,299	--	2.10	.66	.78	--	2.05	.00	--	--	--	--	--	236	.32	14,218	22	.67	356	7.4
Apr. 18-19.....	8,390	--	1.60	.40	.52	--	1.54	.00	--	--	--	--	--	164	.22	1,871	21	.52	253	7.1

SAN JUAN RIVER BASIN--Continued

9-3555. SAN JUAN RIVER NEAR ARCHULETA, N. MEX.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 20-28, 1961	41,361	14	1.35	0.29	0.44	0.07	1.34	0.00	0.71	0.10	0.02	0.02	0.05	141	0.19	7,931	20	0.48	214	7.1
Apr. 29-30	9,402	--	1.10	.22	.35	--	1.13	.00	--	--	--	--	--	120	.16	1,534	21	.43	173	7.5
May 1-2	13,230	--	1.10	.30	.44	--	1.25	.00	--	--	--	--	--	133	.18	2,393	24	.52	183	7.7
May 3-5	20,547	--	.90	.26	.30	--	1.05	.00	--	--	--	--	--	112	.15	3,130	21	.39	148	7.1
May 6-8	13,704	--	1.10	.32	.42	--	1.20	.00	--	--	--	--	--	135	.18	2,516	23	.50	187	7.1
May 9-11	11,109	--	1.20	.38	.48	--	1.34	.00	--	--	--	--	--	149	.20	2,251	23	.54	210	7.5
May 12-14	17,750	--	1.15	.05	.33	--	1.05	.00	--	--	--	--	--	114	.16	2,752	22	.43	157	7.2
May 15-18	16,724	--	1.10	.20	.42	--	1.10	.00	--	--	--	--	--	124	.17	3,156	25	.52	177	6.9
May 19-29	80,553	--	.90	.16	.31	--	.97	.00	--	--	--	--	--	104	.14	11,393	23	.43	141	7.2
May 30-June 3	40,165	--	.80	.16	.29	--	.92	.00	--	--	--	--	--	95	.13	5,189	23	.42	152	7.3
June 4-18	70,542	--	.95	.23	.40	--	1.11	.00	--	--	--	--	--	117	.16	11,225	26	.53	163	7.5
June 19-25	19,008	--	1.25	.27	.52	--	1.39	.00	--	--	--	--	--	143	.19	3,697	26	.60	212	7.3
June 26-30	8,727	--	1.45	.33	.65	--	1.64	.00	--	--	--	--	--	172	.23	2,041	27	.69	248	7.5
July 1-6	10,128	--	1.60	.32	.74	--	1.84	.00	--	--	--	--	--	181	.25	2,493	28	.76	268	7.4
July 7	1,587	--	2.20	.36	1.22	--	2.49	.00	--	--	--	--	--	239	.33	516	32	1.08	372	7.7
July 8-13	9,187	--	1.65	.41	.74	--	1.93	.00	--	--	--	--	--	192	.26	2,390	26	.73	278	7.5
July 14-22	8,926	12	1.60	.44	.91	.11	2.07	.00	.96	.19	.02	.03	.05	206	.28	2,501	28	.86	317	7.4
July 23-31	7,819	--	2.00	.54	1.04	--	2.29	.00	--	--	--	--	--	246	.33	2,616	29	.93	354	7.5
Aug. 1-12	18,208	--	1.75	.77	.96	--	2.33	.00	--	--	--	--	--	209	.28	5,176	28	.85	330	7.6
Aug. 13	1,230	--	2.20	.70	1.13	--	2.23	.27	--	--	--	--	--	268	.36	448	28	.94	390	8.4
Aug. 14-16	4,760	--	1.75	.73	.96	--	2.26	.00	--	--	--	--	--	206	.28	1,334	28	.86	318	7.5
Aug. 17-18	5,772	--	2.25	.99	1.17	--	2.75	.00	--	--	--	--	--	268	.36	2,104	27	.92	408	7.7
Aug. 19-22	9,187	--	1.50	.46	.78	--	1.90	.00	--	--	--	--	--	166	.23	2,074	29	.79	277	7.5
Aug. 23-27	8,241	--	1.80	.68	.87	--	2.23	.00	--	--	--	--	--	210	.29	2,354	26	.78	329	7.4
Aug. 28-Sept. 9	15,961	--	1.60	.76	.83	--	1.95	.00	--	--	--	--	--	168	.26	4,081	26	.76	292	7.4
Sept. 10-16	13,704	--	1.35	.37	.70	--	1.67	.00	--	--	--	--	--	166	.23	3,094	29	.75	252	7.4
Sept. 17-18	3,277	--	1.90	.50	.70	--	2.20	.00	--	--	--	--	--	201	.27	896	22	.64	309	7.9
Sept. 19	4,562	--	3.74	1.23	1.00	--	3.87	.00	--	--	--	--	--	362	.49	2,246	17	.63	555	7.7
Sept. 20-21	7,279	--	1.50	.52	.61	--	1.90	.00	--	--	--	--	--	172	.23	1,703	23	.61	261	7.5
Sept. 22-30	18,458	--	1.30	.34	.61	--	1.54	.00	--	--	--	--	--	152	.21	3,816	27	.67	230	7.3
Total or weighted average	703,476	--	1.60	0.42	0.74	--	1.82	--	--	--	--	--	--	187	0.25	173,059	27	0.74	274	7.4

SAN JUAN RIVER BASIN

9-3795. SAN JUAN RIVER NEAR BLUFF, UTAH

LOCATION.--At bridge on State Highway 47, 1,800 feet downstream from gaging station, 20 miles southwest of Bluff, San Juan County, and 114 miles upstream from mouth.
DRAINAGE AREA.--23,000 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: February to June 1927, October 1929 to September 1961.
Water temperatures: May 1944 to September 1961 (discontinued).
Sediment records: August to September 1928, July 1929 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,830 micromhos Jan. 9; minimum daily, 258 micromhos June 4.
Percent sodium: Maximum, 44 Oct. 1-3, 15-31; minimum, 20 May 22-31.
EXTREMES, 1929-61.--Specific conductance (1941-61): Maximum daily, 2,790 micromhos Sept. 19, 1959; minimum daily, 208 micromhos June 17, 1952.
Percent sodium: Maximum, 58 Sept. 10, 1954; minimum, 11 May 21, 23-27, 29-31, July 1-10, 1944.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-3, 5-14, 1960	7,968	7.8	5.94	2.71	6.87	0.13	2.82	0.00	10.72	1.35		0.44	0.09	995	1.35	10,782	44	3.30	1,370	7.9
Oct. 4	536	8.8	8.78	4.28	7.92	.15	2.10	.00	17.20	1.10		.50	.09	1,400	1.90	1,020	37	3.10	1,750	8.2
Oct. 15-31	49,466	13	5.14	1.65	5.48	.12	3.36	.00	7.95	.90		.13	.10	804	1.09	54,088	44	2.98	1,120	7.9
Nov. 1-30	39,570	12	5.74	2.88	4.96	.10	3.06	.00	9.51	1.13		.21	.16	899	1.22	48,380	36	2.39	1,250	8.2
Dec. 1-31	39,598	11	5.89	2.96	5.22	.10	3.18	.00	9.83	1.18		.21	.15	934	1.27	50,299	37	2.48	1,290	8.1
Jan. 1-5, 1961	4,522	10	6.79	3.04	5.44	.09	3.69	.00	10.41	1.35		.19	.08	1,000	1.36	6,150	35	2.45	1,370	7.7
Jan. 6-12	7,081	12	7.93	3.78	6.87	.13	3.90	.00	13.24	1.69		.26	.12	1,240	1.69	11,941	37	2.84	1,650	8.0
Jan. 13-31	22,951	10	6.04	2.55	4.83	.10	3.28	.00	9.24	1.13		.16	.08	889	1.21	27,748	36	2.33	1,230	8.2
Feb. 1-28	40,820	11	6.69	2.80	4.96	.11	3.13	.00	10.39	1.07		.18	.07	961	1.31	53,350	34	2.28	1,310	8.0
Mar. 1-18	27,170	8.2	6.09	2.88	5.00	.10	3.20	.00	9.49	1.13		.14	.07	942	1.28	34,807	36	2.36	1,290	8.0
Mar. 19-31	38,884	10	4.34	1.81	3.13	.09	2.74	.00	6.02	.65		.10	.06	618	.84	32,681	33	1.79	888	7.8
Apr. 1-6	24,670	13	4.34	1.73	3.39	.09	2.85	.00	6.33	.59		.10	.07	636	.86	21,339	36	1.95	906	8.1
Apr. 7-20	69,949	13	3.54	1.40	1.61	.07	2.49	.00	3.64	.42		.07	.06	436	.59	41,477	24	1.02	638	7.9
Apr. 21-30	62,261	11	2.54	.82	1.13	.05	1.95	.00	2.31	.28		.05	.05	296	.40	25,064	25	.87	451	8.1
May 1-9, 14-21	139,765	12	2.50	.66	.96	.04	1.90	.00	1.96	.25		.03	.04	262	.36	49,801	23	.76	408	7.7

SAN JUAN RIVER BASIN--Continued

9-3795. SAN JUAN RIVER NEAR BLUFF, UTAH--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
May 10-13, 1961.	20,009	13	3.04	1.07	1.39	0.05	2.20	0.00	2.98	0.34		0.04	0.06	352	0.48	9,579	25	0.97	536	7.5
May 22-31.....	125,593	9.8	1.95	.42	.61	.03	1.54	.00	1.25	.18		.03	.04	188	.26	32,112	20	.56	300	7.8
June 1-17.....	164,717	9.3	1.95	.54	.74	.04	1.46	.00	1.52	.23		.04	.04	202	.27	45,251	23	.66	323	7.7
June 18-30.....	62,271	9	2.45	.82	1.31	.05	1.67	.00	2.56	.34		.04	.05	292	.40	24,729	28	1.02	456	7.8
July 1-4.....	8,807	9.4	3.39	1.15	2.18	.07	2.15	.00	3.96	.59		.08	.11	428	.58	5,126	32	1.44	648	7.6
July 5-22.....	30,097	11	4.44	1.65	3.31	.10	2.77	.00	5.79	.73		.14	.05	626	.85	25,624	35	1.90	900	7.8
July 23-31.....	4,284	8.8	5.39	2.55	5.48	.12	2.39	.00	9.89	1.18		.32	.11	907	1.23	5,285	40	2.75	1,280	7.7
Aug. 1, 7-12, 16-18, 22.....	28,167	15	4.89	.99	4.31	.13	3.52	.00	5.81	.73		.09	.11	642	.87	24,593	42	2.51	919	7.8
Aug. 2-6.....	13,944	16	8.38	1.97	7.09	.16	4.51	.00	12.49	.71		.02	.17	1,160	1.58	21,998	40	3.12	1,550	7.8
Aug. 13-15, 19-21, 28-29..	28,022	16	5.74	1.65	5.66	.14	3.82	.00	8.70	.85		.10	.12	858	1.17	32,699	43	2.94	1,210	7.7
Aug. 23-27, 30-31	17,355	15	4.09	.99	3.18	.12	3.11	.00	4.68	.59		.08	.09	532	.72	12,557	38	1.99	793	7.8
Sept. 1-9, 11-22	74,392	13	5.64	1.40	4.13	.13	3.16	.00	7.60	.68		.90	.09	738	1.00	74,666	37	2.20	1,050	7.7
Sept. 10.....	4,582	1.5	3.79	.78	3.00	.12	4.26	.00	3.00	.45		.03	.11	a464	.63	2,891	39	1.98	692	7.5
Sept. 23-30.....	30,403	12	4.04	.64	2.22	.09	2.29	.00	4.33	.45		.10	.05	453	.62	18,730	32	1.45	682	7.8
Total or weighted average	1,187,886	11	3.74	1.31	2.57	0.07	2.40	--	4.72	0.38		0.08	0.07	498	0.68	804,440	33	1.61	719	7.8

a Calculated from determined constituents.

VIRGIN RIVER BASIN

9-4150. VIRGIN RIVER AT LITTLEFIELD, ARIZ.

LOCATION.--At gaging station, 0.4 mile downstream from Beaver Dam Wash, 0.4 mile upstream from Littlefield, Mohave County, and 36 miles upstream from waterline of Lake Mead at elevation 1,221 feet above mean sea level.
DRAINAGE AREA.--5,090 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: July 1949 to September 1961.
Water temperatures: October 1947 to September 1961.
Sediment records: October 1947 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 3,800 micromhos Aug. 11; minimum daily, 2,360 micromhos Oct. 12.
Percent sodium: Maximum, 35 Dec. 1-31; minimum, 22 Aug. 1-31.
EXTREMES, 1949-61.--Specific conductance: Maximum daily, 4,090 micromhos Oct. 5, 1955; minimum daily, 734 micromhos Apr. 28, 1952.
Percent sodium: Maximum, 37 Feb. 24-25, 27-28, 1958; minimum, 8 May 12, 1958.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 14-31, 1960...	4,815	20	15.92	8.31	12.09	0.64	5.02	0.00	21.44	10.72		0.03	0.89	2,320	3.16	15,193	33	3.47	3,140	7.9
Oct. 11-13.....	1,410	11	16.42	5.84	8.22	.41	4.59	.00	19.57	7.33		.01	.62	1,960	2.67	3,759	27	2.46	2,610	7.8
Nov. 1-30.....	12,555	18	14.82	6.58	11.14	.54	5.31	.00	18.53	9.31		.03	.72	2,060	2.80	35,175	34	3.40	2,860	7.9
Dec. 1-31.....	7,993	16	13.42	6.99	11.14	.49	5.64	.00	16.82	10.01		.04	.73	1,990	2.71	21,633	35	3.49	2,800	8.0
Jan. 1-31, 1961.	7,686	17	15.42	5.59	11.01	.59	5.69	.00	17.45	9.87		.03	.70	2,030	2.76	21,219	34	3.40	2,850	7.9
Feb. 1-28.....	7,220	16	14.72	7.07	11.40	.59	5.62	.00	17.68	10.01		.00	.85	2,060	2.80	20,227	34	3.45	2,880	8.0
Mar. 1-31.....	7,870	19	14.82	6.91	11.05	.61	5.20	.00	18.72	10.01		.00	.79	2,090	2.84	22,371	33	3.35	2,890	8.0
Apr. 1-30.....	4,433	22	16.62	8.23	11.05	.66	5.44	.00	21.65	10.01		.00	.87	2,290	3.11	13,806	30	3.14	3,080	8.0
May 1-31.....	3,825	21	16.92	8.80	10.18	.69	4.47	.00	22.90	9.73		.00	.94	2,310	3.14	12,015	28	2.84	3,080	7.7
June 1-30.....	3,850	21	16.32	9.21	10.40	.69	4.43	.00	22.90	9.87		.01	.90	2,310	3.14	12,095	28	2.91	3,080	7.9
July 1-31.....	8,301	19	19.61	8.88	9.05	.64	4.59	.00	24.15	9.03		.04	.84	2,370	3.22	26,755	24	2.40	3,120	7.7
Aug. 1-31.....	16,725	19	24.80	6.58	9.18	.56	5.13	.00	28.32	8.12		.02	.77	2,630	3.58	59,821	22	2.32	3,260	7.8
Sept. 1-30.....	21,779	19	21.01	7.32	10.14	.59	5.02	.00	25.40	8.91		.03	.77	2,470	3.36	73,158	26	2.69	3,190	7.8
Total or weighted average	108,462	19	18.16	7.24	10.40	0.59	5.14		22.28	9.31		0.02	0.79	2,290	3.11	337,140	29	3.02	3,040	7.9

GILA RIVER BASIN

9-4740. 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 19.5 miles upstream from Ashurst-Hayden Dam.
DRAINAGE AREA.--18,011 square miles at gaging station, of which 5,125 square miles is below Coolidge Dam.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1961.
Water temperatures: December 1950 to September 1961.
Sediment records: January 1958 to September 1961.
EXTREMES, 1960-61: Specific conductance: Maximum daily, 5,120 micromhos May 22; minimum daily, 631 micromhos July 30.
Percent sodium: Maximum, 61 Aug. 1; minimum, 12 June 1 to July 20.
Extremes, 1950-61.--Specific conductance: Maximum daily, 5,120 micromhos May 22, 1961; minimum daily, 407 micromhos Jan. 20, 1952.
Percent sodium: Maximum, 67 July 15, 1955; minimum, 9 July 11-18, Sept. 10-30, 1956.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. No appreciable inflow from Mineral Creek between sampling point and gaging station, except during periods of heavy local rains.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-7, 1960..	348	--	17.86	5.35	10.09	--	1.85		--	--	--	--	--	2,160	2.94	1,024	30	2.96	2,730	7.3
Oct. 8.....	121	--	10.23	1.56	3.35	--	2.56		--	--	--	--	--	924	1.26	152	22	1.38	1,350	7.5
Oct. 9-15.....	369	--	22.06	6.33	9.92	--	1.02		--	--	--	--	--	2,640	3.59	1,326	26	2.63	3,070	6.6
Oct. 16-20.....	254	--	20.21	5.43	9.40	--	2.07		--	--	--	--	--	2,350	3.20	811	27	2.62	2,870	6.8
Oct. 21-31.....	391	29	26.20	6.99	10.53	0.79	.62		36.44	6.77	0.06	0.02	0.25	3,020	4.11	1,604	24	2.58	3,390	6.4
Nov. 1-17.....	519	--	26.20	6.58	10.83	--	.93		--	--	--	--	--	3,020	4.11	2,133	25	2.68	3,420	6.7
Nov. 18.....	34	--	28.94	8.23	10.53	--	.00		--	--	--	--	--	3,260	4.43	149	22	2.44	3,890	a3.3
Nov. 19-29.....	314	--	19.96	6.83	11.09	--	3.21		--	--	--	--	--	2,470	3.36	1,055	29	3.03	3,020	7.5
Nov. 30.....	351	--	5.79	1.97	8.09	--	3.38		--	--	--	--	--	914	1.24	436	51	4.11	1,570	7.3
Dec. 1-9.....	3,374	--	5.44	1.97	8.00	--	3.41		--	--	--	--	--	974	1.32	4,469	52	4.16	1,520	7.9
Dec. 10-11.....	238	--	11.28	2.96	8.40	--	3.26		--	--	--	--	--	1,500	2.04	486	37	3.15	2,050	7.6
Dec. 12-31.....	976	--	16.22	4.61	9.14	--	2.61		--	--	--	--	--	2,050	2.79	2,721	30	2.83	2,530	7.7
Jan. 1-7, 1961..	290	--	16.72	4.85	9.35	--	2.44		--	--	--	--	--	2,180	2.96	860	30	2.85	2,600	7.8
Jan. 8-16.....	362	--	20.86	5.35	9.48	--	1.75		--	--	--	--	--	2,540	3.45	1,252	27	2.62	2,890	7.4
Jan. 17.....	42	--	26.55	6.66	9.14	--	.00		--	--	--	--	--	3,070	4.18	174	22	2.24	3,410	b3.9

a Approximately equivalent to 0.55 equivalents per million hydrogen ion.
b Approximately equivalent to 0.12 equivalents per million hydrogen ion.

Jan. 18-25, 1961	308	--	17.47	4.94	9.48	--	1.80	--	--	--	--	--	2,250	3.08	942	30	2.83	2,650	7.4
Jan. 26-27.....	107	--	23.20	5.84	8.61	--	.00	--	--	--	--	--	2,760	3.75	402	23	2.26	3,140	c3.4
Jan. 28-Feb. 18.	1,021	--	23.45	5.76	9.35	--	.59	--	--	--	--	--	2,640	3.59	3,666	24	2.45	3,040	6.5
Feb. 19-28.....	4,998	23	6.69	3.13	12.96	.31	3.34	6.77	12.64	.07	.04	.28	1,440	1.96	9,789	56	5.85	2,290	7.5
Mar. 1-8.....	2,888	--	7.73	3.29	14.09	--	3.21	--	--	--	--	--	1,610	2.19	6,323	56	6.00	2,500	7.7
Mar. 9-31.....	2,176	--	13.57	4.36	13.49	--	2.02	--	--	--	--	--	2,120	2.88	6,274	43	4.50	2,900	7.6
Apr. 1-10.....	726	--	14.87	5.10	15.53	--	1.82	--	--	--	--	--	2,340	3.18	2,310	44	4.91	3,220	7.5
Apr. 11-30.....	1,127	26	17.86	5.76	16.79	.56	1.02	24.15	15.66	.07	.03	.34	2,690	3.66	4,122	41	4.89	3,580	6.9
May 1-12.....	195	--	19.96	6.00	13.66	--	2.33	--	--	--	--	--	2,700	3.67	717	34	3.79	3,340	7.4
May 13-25.....	124	--	31.44	7.98	12.88	--	.00	--	--	--	--	--	3,780	5.14	636	25	2.90	4,270	d3.2
May 26-31.....	24	--	24.70	7.49	11.27	--	2.92	--	--	--	--	--	2,990	4.07	97	26	2.81	3,440	7.5
June 1-30.....	30	--	26.35	9.05	4.87	--	4.85	--	--	--	--	--	2,780	3.78	112	12	1.16	2,920	7.5
July 1-20.....	16	--	25.70	9.54	4.61	--	4.75	--	--	--	--	--	2,700	3.67	58	12	1.10	2,880	7.8
July 21,25.....	182	--	14.87	3.70	3.87	--	6.52	--	--	--	--	--	1,500	2.04	372	17	1.27	1,870	7.7
July 22-24.....	1,511	--	8.63	2.47	1.83	--	10.82	--	1.07	--	--	--	696	.95	1,431	14	.78	1,180	7.8
July 26.....	50	--	7.14	1.73	1.78	--	4.29	--	--	--	--	--	694	.94	47	17	.85	989	7.7
July 27-29.....	189	--	9.78	2.80	3.22	--	7.80	--	--	--	--	--	980	1.33	251	20	1.28	1,380	7.8
July 30-31.....	1,642	--	4.79	1.32	2.13	--	7.74	--	--	--	--	--	458	.62	1,023	26	1.22	739	8.2
Aug. 1.....	516	--	10.48	3.95	22.62	--	4.29	--	--	--	--	--	2,340	3.18	1,641	61	8.42	3,730	7.9
Aug. 2.....	1,333	--	6.49	2.39	11.22	--	6.92	--	--	--	--	--	1,220	1.66	2,212	56	5.33	2,060	7.8
Aug. 3-5.....	1,684	--	5.29	1.48	5.96	--	5.57	--	--	--	--	--	807	1.10	1,848	47	3.24	1,290	7.5
Aug. 6-10.....	754	28	7.58	2.14	6.57	.28	5.70	6.00	4.80	.06	.10	.19	1,050	1.43	1,076	40	2.98	1,540	7.7
Aug. 11-13.....	1,035	--	5.49	1.32	1.70	--	6.59	--	--	--	--	--	514	.70	724	20	.92	791	7.7
Aug. 14-16, 18-19, 22.....	3,677	--	7.19	1.81	1.65	--	7.83	--	--	--	--	--	627	.85	3,136	16	.78	961	7.7
Aug. 17, 20-21..	450	--	9.38	2.22	3.83	--	4.98	--	--	--	--	--	1,010	1.37	619	25	1.59	1,370	7.9

c Approximately equivalent to 0.43 equivalents per million hydrogen ion.
d Approximately equivalent to 0.71 equivalents per million hydrogen ion.

GILA RIVER BASIN--Continued

9-4740. GILA RIVER AT KELVIN, ARIZ.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Aug. 23-24, 1961	6,208	--	5.59	1.65	1.61	--	7.54		--	--	--	--	--	500	0.68	4,222	18	.85	809	8.0
Aug. 25-29.....	847	--	19.96	3.21	5.61	--	2.36		--	--	--	--	--	2,090	2.84	2,407	19	1.65	2,400	7.4
Aug. 30-31.....	1,987	--	5.19	1.56	2.31	--	7.51		--	--	--	--	--	543	.74	1,468	25	1.25	861	7.9
Sept. 1-5,7,9-11	3,290	--	5.79	1.25	5.00	--	3.52		--	--	--	--	--	788	1.07	3,520	42	2.67	1,170	7.7
Sept. 6.....	266	--	7.29	1.67	6.18	--	1.61		--	--	--	--	--	1,040	1.41	375	41	2.92	1,460	7.1
Sept. 8, 12-13..	4,040	--	5.89	1.15	2.22	--	3.59		--	--	--	--	--	595	.81	3,269	24	1.18	867	7.7
Sept. 14.....	1,093	--	4.29	.90	1.96	--	5.11		--	--	--	--	--	407	.55	605	27	1.21	675	7.8
Sept. 15-20.....	1,285	--	6.59	1.48	5.35	--	3.05		--	--	--	--	--	905	1.23	1,582	40	2.66	1,300	7.8
Sept. 21-22.....	434	--	3.64	1.00	5.44	--	3.15		--	--	--	--	--	663	.90	391	54	3.57	1,030	8.1
Sept. 23-30.....	2,260	--	5.29	1.27	5.31	--	2.66		--	--	--	--	--	799	1.09	2,460	45	2.93	1,180	7.6
Total or weighted average	56,450	--	8.63	2.55	6.79	--	4.57		--	--	--	--	--	1,160	1.58	88,720	38	2.87	1,650	5.5

9-5195. GILA RIVER BELOW GILLESPIE DAM, ARIZ.

LOCATION.--About 1 mile downstream from gaging station on Gila Bend Canal, 200 feet downstream from Gillespie Dam, Maricopa County, and 6 miles downstream from Hassayampa River. Gila Bend Canal diverts from left bank and Enterprise Canal diverts from right bank at Gillespie Dam.
DRAINAGE AREA (revised).--49,650 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1961.
Water temperatures: December 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 10,400 micromhos on several days during November and December; minimum daily, 556 micromhos July 27.
Percent sodium: Maximum, 71 Aug. 7-9; minimum, 52 July 25-31; Sept. 11.
EXTREMES, 1950-61.--Specific conductance: Maximum daily, 10,400 micromhos on several days during December 1959, November and December 1960; minimum daily, 370 micromhos Aug. 2, 1955.
Percent sodium: Maximum, 77 Nov. 5-7, 1957; minimum, 36 Jan. 23-24, 1952.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. Samples from canal are believed to be representative of total flow passing Gillespie Dam, including spill and amounts diverted into Gila Bend and Enterprise Canals.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	578	28	19.21	12.83	65.69	0.28	4.72		31.65	60.93	0.18	0.76	3.60	6,190	8.42	4,866	67	16.41	8,960	7.7
Nov. 1-30.....	676	--	20.36	13.82	67.43	--	5.28		--	--	--	--	--	6,440	8.76	5,941	66	16.31	9,210	7.7
Dec. 1-22.....	510	--	23.15	15.22	75.26	--	5.47		--	--	--	--	--	6,960	9.47	4,830	66	17.18	10,200	7.5
Dec. 23-24.....	44	--	19.36	11.85	57.86	--	5.70		--	--	--	--	--	5,490	7.47	326	65	14.65	8,110	7.6
Dec. 25-31.....	185	--	22.36	14.64	70.04	--	5.88		--	--	--	--	--	6,730	9.15	1,690	65	16.28	9,730	7.7
Jan. 1-Feb. 9, 1961.....	1,206	30	21.96	14.64	71.78	.31	5.57		35.60	67.14	.15	.89	3.30	6,550	8.91	10,743	66	16.78	9,700	7.8
Feb. 10-11.....	60	--	19.46	13.33	63.51	--	4.62		--	--	--	--	--	5,910	8.04	478	66	15.69	8,710	7.7
Feb. 12-28.....	415	--	21.71	14.31	71.78	--	5.21		--	--	--	--	--	6,680	9.08	3,768	67	16.91	9,620	7.8
Mar. 1-12.....	359	--	21.56	14.81	66.99	--	5.54		--	--	--	--	--	6,530	8.88	3,192	65	15.71	9,380	7.7
Mar. 13-14.....	56	--	15.87	10.12	46.55	--	4.10		--	--	--	--	--	4,500	6.12	340	64	12.91	6,730	7.4
Mar. 15-31.....	445	--	20.96	14.23	66.56	--	5.23		--	--	--	--	--	6,450	8.77	3,904	65	15.87	9,340	7.5
Apr. 1-30.....	702	32	19.21	13.57	66.12	.31	4.80		32.48	61.22	.18	.73	3.30	6,220	8.46	5,940	67	16.33	8,950	7.5
May 1-20.....	317	--	19.56	13.66	69.60	--	4.74		--	--	--	--	--	6,510	8.85	2,810	68	17.08	9,210	7.6
May 21-June 6...	287	--	17.07	12.75	62.64	--	4.02		--	--	--	--	--	5,850	7.96	2,280	68	16.22	8,440	7.6
June 7-10.....	51	--	19.56	14.48	74.82	--	4.20		--	--	--	--	--	6,920	9.41	478	69	18.14	9,720	7.5
June 11-17.....	93	--	15.57	10.86	58.29	--	3.79		--	--	--	--	--	5,480	7.45	693	69	16.04	7,870	7.6

GILA RIVER BASIN--Continued

9-5195. GILA RIVER BELOW GILLESPIE DAM, ARIZ.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
June 18-26, 1961	70	--	17.71	13.49	72.21	--	2.95		--	--	--	--	--	6,570	8.94	622	70	18.28	9,390	7.7
June 27-30	30	--	15.97	12.67	63.51	--	2.47		--	--	--	--	--	5,930	8.06	243	69	16.78	8,480	7.5
July 1-2	11	--	17.07	13.33	68.30	--	3.08		--	--	--	--	--	6,480	8.81	98	69	17.52	8,820	7.9
July 3	7	--	11.88	8.72	44.37	--	2.82		--	--	--	--	--	4,240	5.77	40	66	13.83	6,140	7.8
July 4-6	29	--	17.22	13.82	70.47	--	3.70		--	--	--	--	--	6,320	8.60	251	69	17.89	9,160	7.7
July 7-8	31	--	11.98	8.80	43.94	--	2.62		--	--	--	--	--	4,200	5.71	177	68	13.63	6,070	7.6
July 9-19	105	--	15.72	13.49	67.43	--	2.88		--	--	--	--	--	6,290	8.55	896	70	17.64	8,780	7.6
July 20-21	18	--	10.73	7.24	36.02	--	2.82		--	--	--	--	--	3,500	4.76	87	67	12.02	5,170	7.5
July 22	8	--	4.54	1.65	12.70	--	4.46		--	--	--	--	--	1,140	1.55	12	67	7.22	1,950	7.5
July 23	274	--	2.15	.33	3.13	--	3.41		--	--	--	--	--	358	.49	133	56	2.82	576	7.4
July 24	218	--	11.78	7.32	37.67	--	4.26		--	--	--	--	--	3,520	4.79	1,044	66	12.19	5,330	7.5
July 25-31	569	19	2.40	.42	3.31	0.21	3.11		1.15	1.89	0.05	0.08	0.23	392	.53	303	52	2.79	620	7.7
Aug. 1-2	405	--	5.14	2.30	14.66	--	3.21		--	--	--	--	--	1,360	1.85	748	66	7.60	2,210	7.4
Aug. 3	38	--	9.43	6.50	35.58	--	3.54		--	--	--	--	--	3,170	4.31	162	69	12.61	4,870	7.6
Aug. 4-6	40	--	14.72	11.27	58.73	--	3.57		--	--	--	--	--	5,210	7.09	282	69	16.29	7,710	7.7
Aug. 7-9	26	--	9.73	7.24	42.11	--	3.64		--	--	--	--	--	3,610	4.91	126	71	14.46	5,540	7.7
Aug. 10-17	78	--	15.97	13.00	63.95	--	3.84		--	--	--	--	--	5,840	7.94	618	69	16.80	8,480	7.6
Aug. 18-Sept. 5	633	--	16.72	9.71	49.59	--	4.93		--	--	--	--	--	4,700	6.39	4,047	65	13.64	6,990	7.8
Sept. 6-10	68	--	18.21	13.57	65.25	--	4.34		--	--	--	--	--	6,020	8.19	560	67	16.37	8,770	7.7
Sept. 11	16	--	10.73	3.78	15.75	--	3.15		--	--	--	--	--	1,970	2.68	42	52	5.85	2,920	7.6
Sept. 12	22	--	15.57	6.42	29.41	--	3.61		--	--	--	--	--	3,320	4.52	99	57	8.87	4,860	7.7
Sept. 13-16	78	--	8.53	4.28	19.58	--	3.05		--	--	--	--	--	2,070	2.82	219	60	7.73	3,220	7.9
Sept. 17-18	69	--	13.97	7.24	30.23	--	4.52		--	--	--	--	--	3,300	4.49	312	59	9.28	4,980	7.6
Sept. 19	36	--	9.23	5.18	24.62	--	3.54		--	--	--	--	--	2,520	3.43	122	63	9.97	3,790	7.8
Sept. 20-30	170	--	20.16	14.23	67.86	--	4.98		--	--	--	--	--	6,380	8.68	1,477	66	16.36	9,190	7.8
Total or weighted average	9,035	--	19.62	12.67	62.64	--	4.95		--	--	--	--	--	5,850	7.96	64,999	66	15.65	8,550	7.5

9-5020. SALT RIVER BELOW STEWART MOUNTAIN DAM, ARIZ.

LOCATION.--Just below dam, 3.5 miles upstream from gaging station below Stewart Mountain Dam, 6 miles upstream from Verde River, Maricopa County.
DRAINAGE AREA.--6,211 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1961.
Water temperatures: December 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,120 micromhos Sept. 29; minimum daily, 884 micromhos Oct. 17.
Percent sodium: Maximum, 65 Aug. 1 to Sept. 30; minimum, 62 Oct. 1 to Nov. 30, Jan. 1 to Feb. 28.
EXTREMES, 1950-61.--Specific conductance: Maximum daily, 2,490 micromhos Aug. 20, 1951; minimum daily, 620 micromhos Mar. 28, 1953.
Percent sodium: Maximum, 76 July 21-31, Aug. 11-26, 1951; minimum, 53 Mar. 21-31, Apr. 11-30, 1953.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex. No inflow between sampling point and gaging station except during periods of heavy local rains.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-Nov. 30, 1960	14,398	20	2.30	0.78	5.26	0.12	2.39		0.83	5.25	0.02	0.02	0.12	511	0.69	10,006	62	4.24	902	7.8
Dec. 1-31	4,003	--	2.35	.90	5.48	--	2.47		--	--	--	--	--	516	.70	2,809	63	4.30	947	7.7
Jan. 1-Feb. 28, 1961	17,788	19	2.35	.82	5.35	.12	2.47		.87	5.36	.03	.01	.15	514	.70	12,434	62	4.25	932	7.7
Mar. 1-31	82,393	--	2.40	.80	5.35	--	2.46		--	--	--	--	--	517	.70	57,932	63	4.23	924	7.8
Apr. 1-30	51,590	20	2.40	.90	5.87	.15	2.54		.90	5.70	.02	.02	.13	531	.72	37,256	63	4.57	969	7.5
May 1-31	75,691	--	2.50	.78	5.74	--	2.52		--	--	--	--	--	552	.75	56,823	64	4.49	986	7.7
June 1-30	88,066	--	2.50	.90	6.18	--	2.62		--	--	--	--	--	574	.78	68,748	64	4.74	1,030	7.8
July 1-31	101,455	23	2.54	.90	6.44	.12	2.62		.98	6.49	.02	.01	.12	594	.81	81,959	64	4.90	1,070	7.8
Aug. 1-28	65,867	--	2.54	.90	6.39	--	2.59		--	--	--	--	--	597	.81	53,479	65	4.87	1,070	7.7
Aug. 29-Sept. 30	64,604	--	2.64	.90	6.66	--	2.69		--	--	--	--	--	597	.81	52,453	65	5.00	1,080	7.8
Total or weighted average	566,000	--	2.50	0.90	6.05	--	2.57		--	--	--	--	--	564	0.77	433,899	64	4.64	1,010	7.7

GILA RIVER BASIN--Continued

9-5100. VERDE RIVER BELOW BARTLETT DAM, ARIZ.

LOCATION.--At gaging station, 2.2 miles downstream from Bartlett Dam, Maricopa County, and 3.5 miles upstream from Camp Creek.
DRAINAGE AREA.--6,188 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1961.
Water temperatures: December 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 685 micromhos Dec. 12; minimum daily, 527 micromhos Sept. 14.
Percent sodium: Maximum, 32 Sept. 1-13; minimum, 23 Mar. 1-31.
EXTREMES, 1950-61.--Specific conductance: Maximum daily, 958 micromhos Nov. 10, 1956; minimum daily, 234 micromhos Jan. 13, 15, 1952.
Percent sodium: Maximum, 32 Sept. 1-13, 1961; minimum, 12 Jan. 4-20, 1952.
REMARKS.--Values reported for sodium (Na) are determined by analysis and do not include potassium (K). Records of specific conductance of daily samples available in district office at Albuquerque, N. Mex.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	4,439	28	2.40	2.71	1.96	0.10	4.62	0.00	1.71	0.79	0.03	0.02	0.17	397	0.54	2,397	27	1.22	643	8.2
Nov. 1-30.....	14,162	--	2.50	2.80	1.91	--	4.82	.00	--	--	--	--	--	398	.54	7,666	27	1.18	647	8.2
Dec. 1-31.....	12,605	--	2.54	2.80	1.91	--	4.75	.10	--	.79	--	--	--	400	.54	6,657	26	1.17	648	8.3
Jan. 1-31, 1961.	6,579	26	2.54	2.80	1.87	.09	4.84	.13	1.52	.73	.02	.01	.18	397	.54	3,552	26	1.14	645	8.3
Feb. 1-28.....	4,276	--	2.54	2.88	1.74	--	4.97	.00	--	--	--	--	--	394	.54	2,291	24	1.06	637	8.1
Mar. 1-31.....	11,929	--	2.59	2.96	1.70	--	4.97	.00	--	--	--	--	--	386	.52	6,262	23	1.02	641	8.2
Apr. 1-30.....	3,160	25	2.50	2.80	1.78	.09	4.98	.00	1.42	.73	.02	.01	.18	386	.52	1,659	25	1.10	640	8.0
May 1-31.....	4,662	--	2.69	2.55	1.78	--	4.85	.00	--	--	--	--	--	385	.52	2,556	25	1.10	631	8.2
June 1-30.....	34,966	--	2.89	2.06	1.65	--	4.59	.00	--	--	--	--	--	373	.51	17,749	25	1.05	605	8.0
July 1-31.....	14,941	--	2.45	2.63	2.00	--	4.56	.00	--	--	--	--	--	408	.55	8,291	28	1.26	650	8.1
Aug. 1-31.....	7,932	24	2.35	2.71	2.09	.11	4.49	.00	1.79	.87	.02	.03	.23	412	.56	4,444	29	1.31	658	8.0
Sept. 1-13.....	5,286	--	2.05	2.63	2.16	--	4.26	.00	--	--	--	--	--	391	.53	2,811	32	1.42	639	8.2
Sept. 14-20.....	2,874	--	2.10	1.97	1.74	--	3.61	.00	--	--	--	--	--	334	.45	1,306	30	1.22	544	7.9
Sept. 21-30.....	5,038	--	2.20	2.55	2.09	--	4.23	.00	--	--	--	--	--	386	.52	2,645	31	1.36	636	8.2
Total or weighted average	133,100	--	2.54	2.60	1.82	--	4.66	--	--	--	--	--	--	389	0.53	70,090	26	1.14	632	8.1

PART 10. THE GREAT BASIN

SEVIER LAKE BASIN

10-1915. SEVIER RIVER BELOW PIUTE DAM, NEAR MARYSVALE, UTAH

LOCATION.--At outlet below Piute Dam, 0.8 mile upstream from gaging station, and about 9 miles south of Maryvale, Piute County.
DRAINAGE AREA.--2,440 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: March 1958 to September 1959, February to September 1961.

Chemical analyses, February to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 28, 1961...	258	28	2.32	1.56	1.09	0.07	4.06	0.00	0.56	0.34		0.03	0.02	280	0.38	98	22	0.8	453	7.9
Mar. 13.....	280	29	2.18	1.58	1.09	.07	4.00	.00	.58	.34		.02	.03	279	.38	106	22	.8	446	8.0
Mar. 21.....	272	26	2.16	1.56	1.13	.07	3.97	.00	.58	.34		.02	.05	282	.38	103	23	.6	445	7.9
Mar. 27.....	286	25	2.16	1.52	1.13	.07	3.95	.00	.62	.37		.02	.04	280	.39	109	23	.8	445	7.9
Apr. 3.....	228	24	2.14	1.66	1.13	.08	4.06	.00	.58	.31		.00	.17	270	.37	84	23	.8	445	7.4
Apr. 10.....	208	29	2.22	1.62	1.13	.08	4.06	.00	.58	.31		.01	.17	273	.37	77	22	.8	457	8.2
Apr. 17.....	192	29	2.30	1.66	1.17	.08	4.20	.00	.62	.31		.01	.18	279	.38	73	22	.8	472	7.7
Apr. 25.....	119	28	2.36	1.68	1.22	.08	3.75	.50	.69	.34		.03	.16	293	.40	48	23	.9	447	8.5
May 9.....	637	28	2.12	1.72	1.22	.08	4.02	.00	.71	.34		.01	.16	284	.39	248	24	.9	472	7.8
May 15.....	932	27	2.12	1.72	1.26	.08	3.98	.00	.75	.34		.01	.17	285	.39	363	24	.9	472	7.8
May 23.....	805	27	2.06	1.74	1.30	.09	4.03	.00	.77	.39		.00	.17	285	.39	314	25	.9	477	7.7
May 29.....	357	29	2.14	1.72	1.39	.09	4.05	.00	.83	.39		.01	.19	294	.40	143	26	1.0	489	7.8
June 4.....	430	24	2.16	1.62	1.35	.09	3.95	.00	.83	.45		.01	.18	293	.40	172	26	1.0	484	7.7
June 13.....	420	25	2.36	1.40	1.00	.08	3.79	.00	.65	.42		.01	.15	273	.37	155	21	.7	455	7.6
June 19.....	399	26	2.36	1.52	1.00	.09	3.88	.00	.60	.40		.01	.17	282	.38	152	20	.7	455	7.8
June 26.....	417	31	2.46	1.34	1.00	.10	3.92	.00	.56	.45		.03	.11	284	.39	163	20	.7	455	8.0
July 6.....	585	25	2.56	1.28	.96	.10	3.90	.00	.62	.45		.03	.07	277	.38	222	20	.7	448	7.8

SEVIER LAKE BASIN--Continued

10-1915. SEVIER RIVER BELOW PIUTE DAM, NEAR MARYSVALE, UTAH--Continued

Chemical analyses, February to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
July 12, 1961...	579	29	2.56	1.36	0.96	0.10	3.92	0.00	0.60	0.45		0.02	0.07	280	0.38	220	19	0.7	449	7.6
July 17.....	403	29	2.56	1.38	.96	.12	4.00	.00	.62	.45		.03	.07	288	.39	157	19	.7	459	7.8
July 25.....	60	35	2.66	1.42	1.04	.10	4.15	.00	.69	.45		.02	.07	300	.41	25	20	.7	480	7.6
Aug. 2.....	67	34	2.72	1.44	1.08	.10	4.21	.00	.71	.48		.01	.07	306	.42	28	20	.8	487	7.8
Aug. 8.....	258	30	2.76	1.84	1.09	.10	4.29	.00	.73	.51		.00	.08	312	.42	108	19	.7	492	7.8
Aug. 14.....	286	32	3.04	1.40	1.17	.10	4.39	.00	.79	.51		.02	.09	322	.44	126	20	.8	506	8.0
Aug. 22.....	69	29	2.92	1.52	1.22	.10	4.47	.00	.87	.51		.00	.09	334	.45	31	21	.8	516	8.2
Aug. 29.....	131	27	2.88	1.62	1.30	.10	4.20	.27	.92	.51		.00	.10	330	.45	59	22	.9	514	8.5
Sept. 11.....	44	--	--	--	--	--	--	--	--	.56		--	--	--	--	--	--	--	353	--
Sept. 18.....	83	--	--	--	--	--	--	--	--	.45		--	--	--	--	--	--	--	504	--
Sept. 26.....	61	--	--	--	--	--	--	--	--	.40		--	--	--	--	--	--	--	460	--
Total or weighted average	a74,960	28	2.45	1.56	1.13	0.09	4.26	0.00	0.54	0.39		0.02	0.12	295	0.40	29,980	22	0.8	470	--

a Includes estimated data for missing periods. Represents 100 percent of runoff for water year.

10-2240. SEVIER RIVER NEAR LYNNDYL, UTAH

LOCATION.--At bridge on county road, 1.5 miles upstream from gaging station, and about 2 miles south of Lynndyl, Millard County.
DRAINAGE AREA.--6,270 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to Septembsr 1961.
Water temperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 3,160 micromhos July 10; minimum daily, 1,310 micromhos Aug. 3.
Percent sodium: Maximum, 57 July 1-20, 26-31, Aug. 7-17; minimum, 43 Jan. 1-31.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 7,040 micromhos Jan. 21, 1955; minimum daily, 855 micromhos Mar. 11, 1955.
Percent sodium: Maximum, 61 Sept. 11-20, 1955; minimum, 34 Apr. 17-20, 1956.
REMARKS.--Records of specific conductance of daily samples available in district office at Salt Lake City, Utah. Discharges are adjusted to compensate for inflow from a deep well discharging to the river between the sampling site and the gaging station.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (calculated)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	2,097	11	3.34	8.33	8.09	0.11	4.43	0.00	5.33	8.18		0.03	0.26	1,030	1.40	2,937	45	3.88	1,720	7.9
Nov. 1-30.....	2,168	11	3.74	6.17	7.87	.10	4.69	.00	5.08	7.90		.03	.23	1,010	1.37	2,975	44	3.54	1,700	8.1
Dec. 1-31.....	2,250	13	3.99	5.78	7.66	.10	4.87	.00	4.98	7.90		.02	.16	1,010	1.37	3,091	44	3.47	1,700	8.0
Jan. 1-31, 1961.	2,140	14	4.14	5.59	7.57	.10	4.95	.00	4.93	7.87		.02	.18	1,000	1.36	2,910	43	3.43	1,690	8.0
Feb. 1-28.....	1,849	11	4.24	5.92	8.83	.10	4.72	.00	5.70	8.75		.00	.19	1,100	1.50	2,787	46	3.92	1,850	8.0
Mar. 1-31.....	1,672	9.7	4.79	7.32	11.05	.12	4.90	.00	7.25	11.28		.00	.24	1,350	1.84	3,071	47	4.49	2,230	8.0
Apr. 1-15.....	708	13	4.59	7.57	11.92	.14	4.97	.00	7.77	11.71		.01	.29	1,410	1.92	1,358	49	4.83	2,340	8.0
Apr. 18-30.....	997	16	4.14	8.33	9.14	.13	4.87	.00	5.95	9.17		.03	.24	1,150	1.56	1,559	46	3.99	1,930	8.1
May 1-31.....	28,530	24	4.54	5.84	12.09	.15	5.33	.00	6.93	10.72		.09	.38	1,350	1.84	52,382	53	5.31	2,240	8.0
June 1-30.....	12,198	19	4.44	6.75	14.05	.18	5.00	.00	8.37	12.41		.04	.41	1,510	2.05	25,051	55	5.94	2,480	7.8
July 1-20, 26-31	10,417	21	5.19	7.32	16.83	.19	5.02	.00	9.76	14.67		.03	.47	1,750	2.38	24,793	57	8.73	2,830	7.7
July 21-25.....	300	13	3.14	6.66	9.53	.13	4.59	.00	5.43	9.03		.02	.28	1,100	1.50	450	49	4.30	1,900	8.0
Aug. 1-6.....	2,832	22	4.49	2.39	6.79	.28	4.85	.00	3.71	5.47		.02	.32	828	1.13	3,190	49	3.66	1,350	7.5
Aug. 7-17.....	1,783	23	5.04	6.25	15.40	.19	3.98	.00	9.08	13.88		.04	.27	1,810	2.19	3,903	57	6.48	2,620	7.5
Aug. 18-31.....	722	15	4.14	4.03	8.70	.14	4.21	.00	4.85	7.56		.01	.28	981	1.33	963	51	4.30	1,840	7.7
Sept. 1-7.....	224	13	3.34	4.28	8.31	.10	4.26	.00	3.81	6.18		.01	.42	812	1.10	247	45	3.23	1,370	7.8
Sept. 8-17.....	484	13	4.79	6.83	12.62	.14	4.67	.00	8.14	11.62		.00	.07	1,430	1.94	941	52	5.23	2,350	7.7
Sept. 18-30.....	505	12	4.34	5.76	9.92	.13	4.61	.00	6.35	9.31		.00	.10	1,180	1.60	811	49	4.41	1,950	7.8
Total or weighted average	71,870	20	4.52	6.14	12.24	0.16	5.04	--	7.23	11.01		0.05	0.36	1,360	1.86	133,399	52	5.27	2,250	7.9

HUMBOLDT RIVER BASIN

10-3350. HUMBOLDT RIVER NEAR RYE PATCH, NEV.

LOCATION.--Below Rye Patch Dam, 1,000 feet upstream from gaging station, and 2 miles northwest of Rye Patch, Pershing County.
DRAINAGE AREA.--16,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1951 to September 1958, October 1959 to September 1961.
Water temparatures: December 1951 to September 1958, October 1959 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,790 micromhos June 3; minimum daily, 965 micromhos July 4.
Percent sodium: Maximum, 69 Apr. 22-30; minimum, 55 July 1-19.
EXTREMES, 1951-58, 1959-61.--Specific conductance: Maximum daily, 4,010 micromhos Sept. 2, 1954; minimum daily, 384 micromhos June 24, 1956.
Percent sodium: Maximum, 71 Sept. 1-5, 1954; minimum, 21 June 24, 1956.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Sacramento, Calif. Flow completely regulated by Rye Patch Reservoir.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 22-30, 1961	5,159	30	4.14	2.63	17.10	0.77	5.18		3.33	16.22		0.02	1.50	1,510	2.05	10,595	69	9.29	2,550	7.8
May 1-31, June 1-3.....	10,992	43	5.49	2.80	14.49	.72	6.26		3.29	14.39		.03	1.50	1,440	1.96	21,528	62	7.12	2,420	7.9
June 4-9.....	550	38	4.14	2.22	10.88	.59	5.80		2.73	9.45		.04	1.20	1,090	1.48	815	61	6.10	1,830	7.9
June 10-13.....	532	37	3.34	1.56	6.83	.43	4.85		1.64	5.87		.03	.80	749	1.02	541	56	4.36	1,240	7.7
July 1-19.....	2,970	36	2.89	1.23	5.48	.41	4.59		1.39	4.09		.01	.60	606	.82	2,447	55	3.82	1,010	7.8
July 20-31.....	1,162	37	3.14	1.73	7.53	.54	5.02		1.83	5.92		.01	.90	782	1.06	1,235	58	4.82	1,320	7.9
Total or weighted average	a21,360	38	4.59	2.47	13.18	0.66	5.65		2.89	12.61		0.02	1.30	1,280	1.74	37,170	63	7.00	2,150	--

a Represents 99 percent of runoff for water year.

PART 11. PACIFIC SLOPE BASINS IN CALIFORNIA

SAN JOAQUIN RIVER BASIN

11-2535. SAN JOAQUIN RIVER NEAR BIOLA, CALIF.

LOCATION.--At Skaggs Bridge, 1.9 miles upstream from gaging station, and about 2.5 miles northwest of Biola, Fresno County.
DRAINAGE AREA.--1,805 square miles upetream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: November 1952 to September 1958, November 1959 to December 1961 (discontinued).
Water temperatures: November 1952 to September 1958, November 1959 to December 1961 (discontinued).
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 138 micromhos Jan. 6; minimum daily, 59 micromhos Dec. 13, 1960.
Percent sodium: Maximum, 46 Mar. 11-20; minimum, 35 Nov. 16-23, 1960.
EXTREMES, 1952-58, 1959-61.--Specific conductance: Maximum daily, 178 micromhos Mar. 18, 1958; minimum daily, 33 micromhos June 18, 1956.
Percent sodium: Maximum, 49 Nov. 1-5, 7-10, 1952; minimum, 24 Nov. 29, 1957.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Sacramento, Calif.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1960.	1,779		0.24	0.16	0.32		0.41							59	0.08	143	45	0.71	75	6.8
Oct. 11-20.....	1,738		.32	.08	.32		.46							60	.08	142	44	.71	60	6.8
Oct. 21-31.....	1,948		.28	.12	.32		.48							62	.08	164	44	.71	78	6.7
Nov. 1-7.....	1,336		.28	.20	.33		.43							55	.07	100	41	.68	78	6.4
Nov. 8-15.....	1,112		.30	.20	.33		.49							63	.09	95	40	.66	82	6.5
Nov. 16-23.....	670		.30	.28	.32		.52							65	.09	59	35	.59	85	6.5
Nov. 24-30.....	387		.40	.28	.40		.75							76	.10	40	37	.69	105	6.7
Dec. 1-3.....	434		.40	.20	.37		.69							80	.11	47	39	.68	102	6.6
Dec. 4-18.....	6,539		.32	.04	.24		.39							49	.07	569	40	.57	67	6.5
Dec. 19-31.....	1,813		.40	.04	.33		.56							54	.07	133	43	.71	85	6.9
Jan. 1-10, 1961.	2,301		.36	.08	.32		.49							58	.08	181	42	.68	84	6.7
Jan. 11-20.....	3,412		.40	.04	.32		.46							51	.07	237	42	.68	73	6.6
Jan. 21-31.....	2,400		.32	.08	.29		.46							50	.07	163	42	.64	73	6.5
Feb. 1-10.....	1,000		.37	.22	.38		.79							67	.09	91	39	.70	97	7.5
Feb. 11-20.....	968		.33	.27	.38		.70							66	.09	87	39	.70	99	7.4

SAN JOAQUIN RIVER BASIN--Continued

11-2535. SAN JOAQUIN RIVER NEAR BIOLA, CALIF.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 21-28, 1961	1,055		0.32	0.22	0.37		0.66							60	0.06	86	40	0.71	92	7.2
Mar. 1-10.....	1,690		.32	.12	.35		.52							55	.07	126	44	.74	79	7.0
Mar. 11-20.....	1,660		.24	.18	.36		.49							58	.08	131	46	.76	76	7.2
Mar. 21-31.....	1,625		.30	.16	.34		.49							56	.08	124	43	.71	75	7.2
Apr. 1-10.....	1,450		.30	.10	.33		.48							56	.08	110	45	.74	76	6.7
Apr. 11-20.....	1,664		.28	.14	.31		.43							58	.08	131	42	.67	73	7.2
Apr. 21-30.....	1,902		.24	.18	.31		.44							56	.08	145	42	.67	69	7.1
May 1-10.....	1,950		.28	.12	.31		.36							52	.07	136	43	.69	71	6.5
May 11-19.....	1,892		.28	.16	.29		.39							50	.07	129	40	.62	69	6.6
May 21-31.....	2,114		.24	.16	.29		.39							50	.07	144	42	.66	70	6.6
June 1-30.....	4,177		.26	.14	.31		.43							55	.07	312	44	.69	73	7.2
July 1-30.....	3,954		.26	.14	.31		.41							58	.08	312	44	.69	74	6.7
Aug. 1-31.....	3,585		.24	.20	.29		.44							56	.08	273	40	.61	74	7.0
Sept. 1-15.....	1,732		.28	.16	.30		.46							53	.07	125	41	.65	74	7.1
Sept. 16-30.....	1,375		.28	.20	.30		.51							55	.07	103	39	.61	76	7.4
Total or weighted average	a61,660		0.30	0.13	0.31		0.46							55	0.07	4,320	42	0.67	75	--

a Represents 100 percent of runoff for water year.

11-3035. SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.

LOCATION.--At gaging station at Durham Ferry highway bridge, 3 miles downstream from Stanislaus River, and 3.4 miles northeast of Vernalis, San Joaquin County.
DRAINAGE AREA.--14,010 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1961.
Water tsmperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 2,350 micromhos Aug. 11; minimum daily, 629 micromhos Dec. 16.
Percent sodium: Maximum, 57 Jan. 11-20; minimum, 48 Dec. 1-10, Apr. 22-30.
EXTREMES, 1951-58, 1959-61.--Specific conductance: Maximum daily, 2,350 micromhos Aug. 11, 1961; minimum daily, 60 micromhos June 21, 1953.
Percent sodium: Maximum, 56 Jan. 21-31, 1954, Jan. 11-20, 1961; minimum, 27 Dec. 24-28, 1955.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Sacramento, Calif.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-12, 1960.	12,900	37	3.09	2.22	6.13	0.13	3.29	0.00	1.87	6.35	0.01	0.06	0.40	690	0.94	12,106	53	3.76	1,200	7.7
Oct. 13-20.....	12,853	32	2.20	1.65	4.18	.11	2.41	.00	1.39	4.23	.00	.05	.20	489	.67	8,548	51	3.01	858	7.1
Oct. 21-31.....	18,067	28	2.10	1.65	4.16	.09	2.29	.00	1.52	4.23	.00	.05	.20	485	.66	11,930	52	3.05	855	7.5
Nov. 1-10.....	19,755	26	1.95	1.48	3.70	.08	1.98	.10	1.31	3.84	.01	.04	.20	436	.59	11,714	51	2.62	762	8.4
Nov. 11-20.....	21,362	26	1.90	1.46	3.57	.07	2.10	.10	1.19	3.67	.01	.05	.30	423	.58	12,301	51	2.75	741	8.5
Nov. 21-30.....	19,101	30	2.20	1.56	4.05	.07	2.25	.10	1.39	4.34	.01	.05	.30	484	.66	12,573	51	2.95	837	8.4
Dec. 1-10.....	25,785	27	1.80	1.40	3.00	.09	2.03	.00	1.23	3.10	.01	.05	.30	386	.52	13,536	48	2.37	711	7.5
Dec. 11-20.....	25,765	25	1.70	1.23	3.00	.07	1.85	.00	1.21	3.10	.01	.05	.20	373	.51	13,070	50	2.48	669	8.2
Dec. 21-31.....	27,600	25	1.65	1.23	3.00	.07	1.82	.00	1.17	3.10	.01	.05	.30	370	.50	13,888	50	2.50	667	7.4
Jan. 1-10, 1961.	24,258	24	1.80	1.15	3.18	.07	1.82	.00	1.42	3.16	.01	.03	.20	387	.53	12,767	51	2.62	712	8.0
Jan. 11-20.....	26,616	24	1.95	1.48	4.39	.07	2.33	.00	1.87	3.81	.01	.05	.40	484	.66	17,521	56	3.36	831	8.0
Jan. 21-31.....	31,416	21	1.90	1.40	4.44	.09	2.10	.00	1.96	4.01	.02	.06	.40	485	.66	20,723	57	3.46	838	7.9
Feb. 1-6.....	17,637	18	1.90	1.56	3.83	.13	2.16	.00	1.77	3.61	.01	.08	.40	452	.61	10,842	52	2.91	811	7.7
Feb. 7-17.....	23,542	26	2.40	2.06	5.35	.13	2.69	.00	2.31	5.08	.01	.10	.50	606	.82	19,402	54	3.59	1,070	7.5
Feb. 16-28.....	20,945	26	2.20	2.63	5.74	.10	2.66	.00	2.50	5.59	.02	.08	.60	642	.87	18,288	54	3.70	1,140	8.1

SAN JOAQUIN RIVER BASIN--Continued

11-3035. SAN JOAQUIN RIVER NEAR VERNALIS, CALIF.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-9, 1961..	10,925	26	2.89	2.30	6.05	0.10	2.72	0.00	2.27	6.32	0.01	0.08	0.50	676	0.92	10,044	53	3.75	1,220	7.9
Mar. 10-19.....	6,744	33	3.39	2.47	6.22	.16	2.67	.40	1.54	7.90	.01	.08	.40	732	1.00	6,714	51	3.63	1,310	8.3
Mar. 20-31.....	9,640	27	5.94		6.22	.12	3.44	.00	2.02	7.11	.01	.07	.50	727	.99	9,531	51	3.61	1,290	8.1
Apr. 1-12.....	5,522	29	3.94	2.63	7.09	.07	2.95	.00	1.71	9.25	.01	.06	.40	809	1.10	6,076	52	3.91	1,480	7.4
Apr. 13-18.....	1,690	31	4.34	2.80	7.53	.08	2.88	.00	1.69	10.44	.01	.09	.50	872	1.19	2,004	51	3.98	1,600	7.4
Apr. 19-21.....	466	25	4.69	3.54	8.70	.07	2.92	.00	2.08	11.71	.01	.09	.60	[a]974	1.32	617	51	4.29	1,780	7.3
Apr. 22-30.....	4,195	28	3.54	3.21	6.26	.08	2.88	.00	1.62	7.96	.01	.10	.40	739	1.01	4,216	48	3.41	1,340	7.3
May 1-7.....	3,513	27	3.59	2.63	7.18	.14	3.16	.00	1.75	8.12	.01	.01	.40	770	1.05	3,679	53	4.07	1,390	7.6
May 8-16.....	7,765	24	3.09	2.39	6.00	.13	3.11	.00	1.92	6.26	.01	.00	.40	667	.91	7,044	52	3.63	1,210	7.6
May 17-31.....	12,079	30	3.19	2.55	6.57	.13	3.16	.00	1.92	7.05	.01	.03	.50	721	.98	11,845	53	3.88	1,250	8.2
June 1-9.....	4,838	32	3.49	2.63	6.48	.15	3.20	.00	1.77	7.67	.01	.06	.40	746	1.01	4,908	51	3.70	1,360	7.6
June 10-20.....	4,211	33	3.79	2.88	7.40	.14	3.20	.00	1.79	9.25	.01	.06	.60	834	1.13	4,776	52	4.05	1,500	7.6
June 21-30.....	3,273	35	3.89	2.96	7.48	.15	3.18	.00	1.83	9.73	.01	.06	.40	860	1.17	3,828	52	4.04	1,550	7.6
July 1-10.....	3,293	36	3.84	2.88	6.96	.14	3.31	.00	1.19	8.97	.01	.04	.50	792	1.08	3,546	50	3.80	1,500	7.7
July 11-19.....	1,378	32	4.54	3.45	8.35	.14	3.08	.00	1.25	11.57	.01	.05	.60	929	1.26	1,741	51	4.18	1,790	7.6
July 20,21.....	188	29	5.09	3.78	10.01	.14	3.08	.00	1.42	13.96	.01	.04	.50	1,070	1.46	274	53	4.75	2,060	7.8
July 22-31.....	1,523	31	4.34	3.54	8.53	.15	3.11	.00	2.00	11.43	.01	.05	.60	962	1.31	1,993	51	4.30	1,770	7.6
Aug. 1-9.....	1,321	34	4.54	3.45	6.87	.14	3.23	.00	1.87	11.48	.01	.06	.50	975	1.33	1,752	52	4.44	1,800	7.5
Aug. 10,11.....	159	30	5.54	4.52	11.14	.15	3.11	.00	2.58	15.32	--	.04	.80	1,220	1.66	263	52	4.96	2,270	7.6
Aug. 12-20.....	2,642	35	4.04	2.88	7.70	.15	3.34	.00	1.44	9.65	.01	.05	.50	849	1.15	3,051	52	4.14	1,560	7.6
Aug. 21-31.....	5,127	31	3.79	2.88	7.61	.15	3.56	.00	2.23	8.80	.01	.04	.70	852	1.16	5,941	53	4.17	1,520	7.7
Sept. 1-5.....	3,620	31	3.29	2.88	7.57	.14	3.74	.00	2.27	8.32	.01	.04	.60	831	1.13	4,091	55	4.31	1,440	7.9
Sept. 6-17.....	7,069	33	2.99	3.54	7.00	.13	3.64	.00	1.83	7.84	.01	.08	.50	783	1.06	7,528	51	3.88	1,370	8.2
Sept. 18-30.....	8,432	31	3.34	3.04	7.18	.13	3.41	.27	2.33	8.04	.01	.05	.50	816	1.11	9,357	52	4.02	1,430	8.4
Total or weighted average	[b]437,300	27	2.38	1.85	4.73	0.10	2.47	--	1.68	4.96	0.01	0.06	0.40	578	0.74	345,400	52	3.22	968	--

a Calculated from determined constituents.
b Represents 100 percent of runoff for water year.

SACRAMENTO RIVER BASIN

11-4250. FEATHER RIVER AT NICOLAUS, CALIF.

LOCATION.--At gaging station at highway bridge at Nicolaus, Sutter County, and 2.9 miles downstream from Bear River.
DRAINAGE AREA.--5,290 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1961.
Water temperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 189 micromhos Nov. 23; minimum daily, 77 micromhos May 22.
Percent sodium: Maximum, 21 Oct. 21-31, minimum, 10 May 11-31.
EXTREMES, 1951-58, 1959-61.--Specific conductance (1951-55, 1956-58, 1959-61): Maximum daily, 291 micromhos July 26, 1958; minimum daily, 50 micromhos May 28, 1952.
Percent sodium (1951-54, 1957-58, 1959-61): Maximum, 27 Dec. 1-2, 4, 7, 1952; minimum, 8 June 21-30, 1951, Jan. 11-20, 1953.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Sacramento, Calif.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1960.	22,512		0.70	0.46	0.26		1.21							83	0.11	2,480	18	0.34	145	7.4
Oct. 11-20.....	16,780		.70	.50	.27		1.34							94	.13	2,145	18	.34	148	7.5
Oct. 21-31.....	17,651		.70	.50	.32		1.36							99	.13	2,377	21	.42	150	7.5
Nov. 1-12.....	25,753		.65	.51	.27		1.31							95	.13	3,327	19	.35	142	8.2
Nov. 13-22.....	61,924		.65	.45	.27		1.15							89	.12	7,495	20	.36	137	7.7
Nov. 23-24.....	12,099		.90	.68	.31		1.28							148	.20	2,420	16	.35	189	7.7
Nov. 25-30.....	57,576		.55	.48	.25		1.03							89	.12	6,969	20	.35	127	7.7
Dec. 1-11.....	116,618		.50	.50	.23		.93							86	.12	13,640	19	.33	121	7.5
Dec. 12-20.....	78,081		.50	.48	.24		.95							82	.11	8,708	20	.34	118	7.3
Dec. 12-31.....	87,273		.50	.48	.23		.98							84	.11	9,970	19	.33	117	7.5
Jan. 1-15, 1961.	84,585		.55	.49	.25		1.02							85	.12	9,778	19	.35	122	7.7
Jan. 16-31.....	87,939		.60	.48	.25		1.00							83	.11	9,927	19	.34	129	7.6
Feb. 1-9.....	209,931		.48	.36	.19		.82							65	.09	18,890	19	.30	105	7.2
Feb. 10-18.....	281,336		.50	.34	.17		.80							73	.10	27,931	17	.26	100	7.0
Feb. 19-28.....	134,301		.47	.45	.17		.92							74	.10	13,516	16	.26	107	7.2

SACRAMENTO RIVER BASIN--Continued

11-4250. FEATHER RIVER AT NICOLAUS, CALIF.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1961.	80,073		0.60	0.32	0.19		0.92							78	0.11	8,494	17	0.28	112	6.7
Mar. 11-20.....	152,826		.50	.38	.17		.84							78	.11	16,212	17	.26	109	6.7
Mar. 21-31.....	257,455		.55	.37	.17		.85							80	.11	28,011	16	.26	110	6.7
Apr. 1-10.....	191,583		.44	.34	.17		.72							68	.09	17,718	18	.28	90	6.7
Apr. 11-20.....	125,514		.44	.28	.17		.72							64	.09	10,925	19	.28	86	6.8
Apr. 21-30.....	90,050		.48	.32	.17		.75							74	.10	9,000	18	.28	92	7.0
May 1-10.....	81,164		.44	.32	.09		.67							55	.07	5,680	11	.15	89	6.8
May 11-21.....	118,036		.44	.32	.09		.64							65	.09	10,620	10	.14	82	6.8
May 22-31.....	80,648		.44	.32	.08		.62							59	.08	6,471	10	.13	83	6.9
June 1-5.....	38,221		.42	.34	.15		.67							68	.09	3,440	16	.24	86	7.5
June 6-18.....	50,668		.50	.34	.18		.82							71	.10	4,892	18	.28	101	7.6
June 19-30.....	16,257		.60	.52	.25		1.07							92	.13	2,034	18	.34	133	6.9
July 1-12.....	16,709		.60	.52	.23		1.11							90	.12	2,045	17	.30	132	7.0
July 13-31.....	21,707		.60	.56	.25		1.16							100	.14	3,040	18	.33	134	7.1
Aug. 1-31.....	41,258		.65	.47	.23		1.15							85	.12	4,769	17	.31	133	7.5
Sept. 1-10.....	8,212		.70	.56	.28		1.34							97	.13	1,083	18	.36	153	7.8
Sept. 11-20.....	11,683		.70	.62	.30		1.36							104	.14	1,652	19	.38	162	7.3
Sept. 21-30.....	14,023		.70	.54	.31		1.36							91	.12	1,680	20	.40	155	7.8
Total or weighted average	a2,690,000		0.50	0.39	0.19		0.87							76	0.10	269,000	18	0.28	108	--

a Represents 100 percent of runoff for water year.

SACRAMENTO RIVER BASIN--Continued

11-4465. AMERICAN RIVER AT FAIR OAKS, CALIF.

LOCATION.--At old highway bridge, 2.2 miles downstream from gaging station, 1,500 feet upstream from new highway bridge at Fair Oaks, Sacramento County, 2.6 miles downstream from Nimbus Dam, and 10 miles downstream from South Fork.
DRAINAGE AREA.--1,889 square miles upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: January to December 1906, March 1951 to September 1958, November 1959 to September 1961.
Water temperatures: March 1951 to September 1958, December 1959 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 108 micromhos Oct. 14; minimum daily, 53 micromhos Aug. 14, 17.
Percent sodium: Maximum, 26 Feb. 11-20; minimum, 9 May 11-20.
EXTREMES, 1951-58, 1959-61.--Specific conductance: Maximum daily, 112 micromhos Aug. 28, 1951; minimum daily, 29 micromhos June 3, 1952.
Percent sodium (1951-54, 1957-58, 1959-61): Maximum, 34 Aug. 1, 1958; minimum, 8 Jan. 21-31, 1953.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Sacramento, Calif.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-10, 1960..	10,830		0.32	0.23	0.17		0.61							50	0.07	736	23	0.32	71	7.8
Oct. 11-20.....	10,532		.31	.23	.18		.61							50	.07	716	25	.35	71	7.8
Oct. 21-31.....	11,433		.31	.19	.13		.51							44	.06	684	20	.25	63	7.6
Nov. 1-10.....	20,430		.30	.24	.12		.52							45	.06	1,250	18	.23	64	7.2
Nov. 11-21.....	24,000		.31	.20	.13		.52							45	.06	1,469	21	.27	64	7.2
Nov. 22-30.....	20,529		.33	.21	.12		.54							46	.06	1,284	18	.22	65	7.3
Dec. 1-10.....	31,934		.32	.20	.11		.43							47	.06	2,041	18	.22	67	6.4
Dec. 11-20.....	42,645		.36	.20	.11		.46							48	.07	2,784	17	.21	68	6.5
Dec. 21-31.....	57,818		.40	.12	.11		.46							46	.06	3,617	18	.22	66	6.7
Jan. 1-9, 1961...	47,306		.40	.12	.11		.46							48	.07	3,088	18	.22	68	6.6
Jan. 10-20.....	57,382		.40	.12	.13		.46							47	.06	3,668	19	.25	67	6.7
Jan. 21-31.....	32,727		.40	.12	.13		.46							48	.07	2,136	19	.25	68	6.7
Feb. 1-10.....	21,421		.37	.24	.12		.57							51	.07	1,486	17	.22	73	7.4
Feb. 11-20.....	18,625		.39	.17	.20		.57							52	.07	1,317	26	.38	75	7.4
Feb. 21-28.....	11,314		.38	.26	.14		.57							55	.07	846	18	.25	79	7.1

SACRAMENTO RIVER BASIN--Continued

11-4465. AMERICAN RIVER AT FAIR OAKS, CALIF.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Mar. 1-10, 1961..	11,147		0.44	0.20	0.14		0.54							54	0.07	819	18	0.25	77	7.1
Mar. 11-20.....	13,051		.44	.20	.14		.52							54	.07	958	18	.25	77	7.1
Mar. 21-31.....	18,000		.44	.20	.14		.52							55	.07	1,346	18	.25	78	6.9
Apr. 1-10.....	18,843		.44	.18	.13		.52							55	.07	1,409	16	.24	76	6.7
Apr. 11-20.....	19,458		.44	.20	.16		.52							55	.07	1,455	20	.28	78	6.9
Apr. 21-30.....	20,231		.44	.18	.13		.51							54	.07	1,486	18	.24	77	7.1
May 1-10.....	20,628		.40	.26	.09		.52							53	.07	1,487	12	.16	76	6.9
May 11-20.....	20,430		.40	.32	.07		.49							52	.07	1,445	9	.12	75	6.7
May 21-31.....	22,255		.40	.24	.09		.52							51	.07	1,544	12	.15	73	6.8
June 1-31.....	123,769		.36	.20	.12		.46							48	.07	8,080	17	.22	66	7.4
July 1-31.....	231,193		.32	.16	.10		.43							41	.06	12,891	18	.21	59	6.8
Aug. 1-31.....	196,760		.26	.20	.09		.43							39	.05	10,436	16	.19	56	7.2
Sept. 1-30.....	63,669		.32	.20	.13		.48							43	.06	3,723	20	.25	62	7.3
Total or weighted average	a1,198,000		0.35	0.18	0.11		0.48							54	0.07	83,860	17	0.22	65	--

a Represents 100 percent of runoff for water year.

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

COLUMBIA RIVER MAIN STEM

12-3995. COLUMBIA RIVER AT NORTHPORT, WASH.

LOCATION.--At bridge on State Highway 22 at Northport, Stevens County, and 12 miles downstream from gaging station at international boundary.
DRAINAGE AREA.--59,700 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: February 1910 to January 1911, November 1951 to September 1961.
Water temperatures: November 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 175 micromhos Jan. 5, 29, Feb. 13, 15; minimum daily, 126 micromhos July 13, Aug. 3.
EXTREMES, 1958-61.--Specific conductance: Maximum daily, 188 micromhos Mar. 2, 1959; minimum daily, 123 micromhos Aug. 2, 1960.
REMARKS.--Samples were collected at station at International Boundary, Wash., 2.2 miles downstream from gaging station February 1910 to January 1911, and November 1951 to June 1958. Records of specific conductance of daily samples available in district office at Portland, Oreg. No appreciable inflow between sampling site and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	3,521,395	4.1	1.05	0.35	0.06	0.02	1.15		0.29	0.00	0.01	0.01	0.03	85	0.12	407,073	4	0.07	144	7.7
Nov. 1-23.....	2,574,783	--	1.48		.07	--	1.25		--	--	--	--	--	87	.12	304,648	4	.08	150	7.7
Nov. 24-Dec. 18.	2,184,793	--	1.52		.08	--	1.28		--	--	--	--	--	97	.13	288,218	5	.09	159	7.7
Dec. 19-Jan. 10, 1961.....	1,497,243	4.8	1.20	.42	.08	.02	1.34		.33	.01	.01	.01	.06	102	.14	207,698	5	.09	167	7.8
Jan. 11-31.....	1,541,990	--	1.64		.07	--	1.31		--	--	--	--	--	98	.13	205,516	4	.08	171	7.7
Feb. 1-16.....	1,434,446	--	1.62		.07	--	1.33		--	--	--	--	--	98	.13	191,183	4	.08	169	7.8
Feb. 17-28.....	1,526,876	--	1.56		.09	--	1.34		--	--	--	--	--	97	.13	201,425	5	.10	164	7.7
Mar. 1-25.....	2,876,033	--	1.60		.10	--	1.34		--	--	--	--	--	99	.13	387,229	6	.11	166	7.7
Mar. 26-Apr. 10.	2,316,377	--	1.54		.11	--	1.33		--	--	--	--	--	97	.13	305,576	7	.12	157	7.8
Apr. 11-30.....	3,276,694	6.3	1.20	.32	.11	.03	1.33		.29	.03	.01	.01	.04	94	.13	418,893	7	.13	155	7.7
May 1-20.....	5,648,925	--	1.44		.08	--	1.25		--	--	--	--	--	88	.12	676,063	5	.10	149	7.9
May 21-June 6...	11,201,454	--	1.34		.07	--	1.18		--	--	--	--	--	82	.11	1,249,186	5	.09	140	7.9
June 7-30.....	19,931,503	--	1.30		.05	--	1.15		--	--	--	--	--	77	.10	2,087,227	4	.06	135	7.7
July 1-12.....	5,305,388	5.3	.95	.29	.04	.02	1.10		.19	.00	.01	.01	.01	74	.10	533,934	3	.06	129	7.7
July 13-31.....	5,773,487	--	1.24		.05	--	1.08		--	--	--	--	--	74	.10	581,044	4	.06	126	7.6
Aug. 1-30.....	6,075,372	--	1.28		.05	--	1.11		--	--	--	--	--	76	.10	627,950	4	.07	133	7.6
Aug. 31-Sept. 30	3,732,912	--	1.34		.07	--	1.11		--	--	--	--	--	80	.11	406,141	5	.09	135	7.5
Total or weighted average	80,420,000	--	1.38		0.07	--	1.18		--	--	--	--	--	83	0.11	9,079,000	--	0.08	142	--

YAKIMA RIVER BASIN

12-5105. YAKIMA RIVER AT KIONA, WASH.

LOCATION.--At highway bridge just downstream from gaging station at Kiona, Benton County, 3.5 miles downstream from intake of Kiona Canal, and 25 miles upstream from mouth.
DRAINAGE AREA.--5,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1952 to September 1961.
Water temperatures: December 1952 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 390 micromhos Sept. 16; minimum daily, 109 micromhos June 6.
EXTREMES, 1952-61.--Specific conductance: Maximum daily, 390 micromhos Oct. 10, 1958, Sept. 16, 1961; minimum daily, 99 micromhos Dec. 17, 1959.
REMARKS.--Records of specific conductance of daily samples available in district office at Portland, Oreg.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million											Boron (B) ppm	Dissolved solids (residus at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)			Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	135,800	29	1.60	0.98	0.91	0.09	2.85	0.00	0.44	0.20	0.00	0.05		0.10	230	0.31	42,100	25	0.8	331	8.0
Nov. 1-19.....	89,570	--	--	--	.78	--	2.54	.00	--	--	--	--		--	210	.29	25,980	--	--	296	8.0
Nov. 20-Dec. 5..	100,000	--	--	--	.65	--	2.00	.00	--	--	--	--		--	175	.24	24,000	--	--	243	7.9
Dec. 6-13.....	37,170	--	--	--	.74	--	2.38	.00	--	--	--	--		--	188	.26	9,680	--	--	279	8.1
Dec. 14-Jan. 8, 1961.....	110,600	--	--	--	.78	--	2.33	.00 .00	--	--	--	--		--	181	.25	27,650	--	--	280	8.1
Jan. 9-17.....	52,420	27	1.10	.73	.65	.06	2.00	.00	.27	.18	.01	.04		.01	158	.21	11,010	26	.7	245	8.2
Jan. 18-27.....	72,020	--	--	--	.52	--	1.66	.00	--	--	--	--		--	129	.18	12,960	--	--	201	7.8
Jan. 28-Feb. 2..	35,230	--	--	--	.65	--	1.90	.00	--	--	--	--		--	150	.20	7,050	--	--	233	7.9
Feb. 3-11.....	109,400	--	--	--	.52	--	1.54	.00	--	--	--	--		--	131	.18	19,690	--	--	195	7.8
Feb. 12-21.....	150,400	--	--	--	.48	--	1.48	.00	--	--	--	--		--	120	.16	24,060	--	--	180	7.6
Feb. 22-Mar. 7..	205,700	--	--	--	.38	--	1.29	.00	--	--	--	--		--	100	.14	28,800	--	--	152	7.7
Mar. 8-14.....	74,480	--	--	--	.44	--	1.44	.00	--	--	--	--		--	112	.15	11,170	--	--	173	7.9
Mar. 15-Apr. 4..	326,000	--	--	--	.37	--	1.34	.00	--	--	--	--		--	110	.15	48,900	--	--	155	7.8
Apr. 5-10.....	93,600	21	.70	.40	.31	.03	1.25	.00	.12	.06	.01	.02		.01	103	.14	13,100	22	.4	140	7.8
Apr. 11-28.....	173,500	--	--	--	.40	--	1.43	.00	--	--	--	--		--	114	.16	27,760	--	--	166	8.0

Apr. 29-May 19, 1961.....	341,200	--	--	--	.34	--	1.21	.00	--	--	--	--	--	93	.13	44,380	--	--	140	7.7
May 20-28.....	201,200	--	--	--	.28	--	1.03	.00	--	--	--	--	--	81	.11	22,130	--	--	120	7.8
May 29-June 12..	307,700	--	--	--	.30	--	1.05	.00	--	--	--	--	--	84	.11	33,850	--	--	125	7.6
June 13-17.....	50,140	--	--	--	.52	--	1.57	.00	--	--	--	--	--	121	.16	8,020	--	--	186	8.0
June 18-22.....	73,330	--	--	--	.33	--	1.11	.00	--	--	--	--	--	87	.12	8,800	--	--	134	7.9
June 23-27.....	37,190	--	--	--	.48	--	1.54	.00	--	--	--	--	--	117	.16	5,950	--	--	180	8.0
June 28-30.....	13,730	--	--	--	.52	--	1.72	.00	--	--	--	--	--	131	.18	2,470	--	--	207	8.1
July 1-12.....	34,040	24	1.50	.82	.83	.09	2.52	.00	.42	.21	.02	.04	.04	195	.27	9,190	26	.8	306	8.1
July 13-27.....	31,920	--	--	--	.96	--	2.77	.20	--	--	--	--	--	222	.30	9,580	--	--	352	8.4
July 28-Aug. 22.	70,950	--	--	--	.96	--	2.85	.00	--	--	--	--	--	222	.30	21,280	--	--	331	8.2
Aug. 23-Sept. 10	62,320	--	--	--	1.00	--	2.90	.00	--	--	--	--	--	218	.30	18,700	--	--	338	8.1
Sept. 11-30.....	63,190	--	--	--	1.09	--	2.97	.10	--	--	--	--	--	233	.32	20,220	--	--	366	8.3
Total or weighted average	3,053,000	--	--	--	0.50	--	1.62	--	--	--	--	--	--	129	0.18	538,400	--	--	192	--

PART 13. SNAKE RIVER BASIN

SNAKE RIVER MAIN STEM

13-375. SNAKE RIVER NEAR HEISE, IDAHO

LOCATION.--At Eagle Rock Canal headgate, 1.2 miles upstream from Heise, 1.6 miles downstream from Anderson Canal headgate, 1.8 miles downstream from gaging station, 4.8 miles east of Ririe, and 21 miles upstream from Henrys Fork.
DRAINAGE AREA.--5,752 square miles upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: January 1953 to September 1961.
Water temperatures: January 1953 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 579 micromhos Dec. 6; minimum daily, 273 micromhos July 21.
EXTREMES, 1953-61.--Specific conductance: Maximum daily, 791 micromhos Nov. 13, 1956; minimum daily, 240 micromhos June 27, 1954.
REMARKS.--Records of specific conductance of daily samples available in district office at Portland, Oreg. Approximately 2.5 percent of normal annual stream flow of 5,000,000 acre-feet is diverted by Anderson Canal between sampling site and gaging station. Thie diversion occurs during the months of May to November. Except for leakage through the headgate, no other diversion of appreciable inflow between sampling point and gaging station except during during periods of heavy local runoff.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-14, 1960.	116,700	9.8	2.20	0.80	0.61	0.06	2.43	0.00	0.83	0.39	0.03	0.01	0.05	217	0.30	35,010	17	0.5	361	7.9
Oct. 15-Nov. 4..	68,270	--	--	--	.83	--	3.08	.00	--	--	--	--	--	284	.39	26,630	--	--	469	8.1
Nov. 5-Dec. 3...	82,830	--	--	--	.87	--	3.36	.00	--	--	--	--	--	316	.43	35,620	--	--	519	8.2
Dec. 4-10.....	19,360	--	--	--	.96	--	3.61	.00	--	--	--	--	--	344	.47	9,100	--	--	554	8.2
Dec. 11-30.....	54,340	--	--	--	.83	--	3.39	.00	--	--	--	--	--	319	.43	23,370	--	--	523	8.1
Dec. 31-Jan. 9, 1961..	36,770	--	--	--	.74	--	3.25	.00	--	--	--	--	--	309	.42	15,440	--	--	496	8.1
Jan. 10-Feb. 8..	108,900	9.7	3.19	1.26	.70	.07	3.21	.00	1.27	.56	.04	.01	.01	302	.41	44,650	13	.5	489	8.2
Feb. 9-Mar. 8...	92,270	--	--	--	.74	--	3.21	.07	--	--	--	--	--	318	.43	39,680	--	--	507	8.3
Mar. 9-Apr. 2...	88,920	--	--	--	.78	--	3.28	.00	--	--	--	--	--	300	.41	35,640	--	--	494	8.2
Apr. 3-17.....	63,930	9.8	2.94	1.29	.74	.07	3.18	.00	1.33	.51	.03	.01	.04	289	.39	24,930	14	.5	475	8.1
Apr. 18-24.....	51,250	--	--	--	.61	--	2.88	.00	--	--	--	--	--	260	.35	17,940	--	--	426	8.0
Apr. 25-May 15..	303,200	--	--	--	.61	--	2.66	.00	--	--	--	--	--	238	.32	97,020	--	--	397	8.0
May 16-June 8...	544,700	--	--	--	.52	--	2.59	.00	--	--	--	--	--	220	.30	163,400	--	--	372	8.0
June 9-20.....	297,100	--	--	--	.42	--	2.46	.00	--	--	--	--	--	204	.28	83,190	--	--	342	7.9
June 21-July 8..	446,700	--	--	--	.36	--	2.26	.00	--	--	--	--	--	180	.24	107,200	--	--	306	8.0

July 9-Aug. 7, 1961..	671,900	11	1.80	.79	.38	.04	2.07	.00	.65	.20	.02	.00	.07	174	.24	161,300	13	.3	278	8.1
Aug. 8-Sept. 2..	419,700	--	--	--	.52	--	2.08	.00	--	--	--	--	--	174	.24	100,700	--	--	285	8.0
Sept. 3-15.....	130,500	--	--	--	.57	--	2.34	.03	--	--	--	--	--	203	.28	36,540	--	--	331	8.3
Sept. 16-21.....	43,060	--	--	--	.61	--	2.59	.00	--	--	--	--	--	228	.31	43,060	--	--	364	8.1
Sept. 22-30.....	43,020	--	--	--	.65	--	2.59	.20	--	--	--	--	--	242	.33	14,200	--	--	412	8.7
Total or weighted average	3,682,000	--	--	--	0.53	--	2.49	--	--	--	--	--	--	216	0.29	1,114,620	--	--	357	--

SNAKE RIVER BASIN--Continued

13-1545. SNAKE RIVER AT KING HILL, IDAHO

LOCATION.--At county highway bridge, approximately 400 yards downstream from gaging station at King Hill, Elmore County, and 20 miles downstream from Malad River.
DRAINAGE AREA.--35,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1961.
Water temperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 553 micromhos Oct. 19, Nov. 15; minimum daily, 469 micromhos May 24, 29, 31.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 594 micromhos Oct. 3, 1952; minimum daily, 394 micromhos May 7, 1952.
REMARKS.--Records of specific conductance of daily samples available in district office at Portland, Oreg. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-31, 1960.	540,800	35	2.45	1.65	1.57	0.12	3.77	0.00	1.15	0.73	0.04	0.06	0.06	354	0.50	270,400	27	1.1	542	8.2
Nov. 1-30.....	507,500	--	--	--	1.52	--	3.77	.00	--	--	--	--	--	349	.49	248,700	--	--	537	8.2
Dec. 1-11.....	179,300	--	--	--	1.52	--	3.74	.00	--	--	--	--	--	346	.48	86,060	--	--	530	8.1
Dec. 12-31.....	324,400	--	--	--	1.48	--	3.70	.00	--	--	--	--	--	343	.47	152,500	--	--	537	8.2
Jan. 1-16, 1961.	247,900	34	2.40	1.60	1.48	.12	3.67	.00	1.04	.71	.04	.07	.11	335	.46	114,000	26	1.0	528	8.2
Jan. 17-Feb. 5..	300,900	--	--	--	1.44	--	3.48	.06	--	--	--	--	--	330	.45	135,400	--	--	518	8.3
Feb. 6-21.....	241,700	--	--	--	1.44	--	3.93	.06	--	--	--	--	--	321	.44	106,300	--	--	506	8.3
Feb. 22-Mar. 10.	250,300	--	--	--	1.44	--	3.51	.00	--	--	--	--	--	324	.44	110,100	--	--	499	8.2
Mar. 11-28.....	255,800	--	--	--	1.44	--	3.16	.26	--	--	--	--	--	316	.43	110,000	--	--	497	8.4
Mar. 29-Apr. 15.	254,800	32	2.10	1.54	1.44	.14	3.31	.00	1.04	.73	.03	.05	.08	309	.42	107,000	28	1.1	484	8.1
Apr. 16-May 3...	245,900	--	--	--	1.44	--	3.21	.20	--	--	--	--	--	317	.43	105,700	--	--	493	8.3
May 4-June 3....	409,800	--	--	--	1.39	--	3.11	.00	--	--	--	--	--	291	.40	163,900	--	--	480	8.0
June 4-July 2...	381,300	--	--	--	1.48	--	3.34	.00	--	--	--	--	--	312	.42	160,100	--	--	503	8.2
July 3-Aug. 2...	407,900	33	2.10	1.84	1.39	.11	3.38	.00	1.12	.73	.03	.04	.09	318	.43	175,400	26	1.0	505	8.2
Aug. 3-31.....	400,300	--	--	--	1.52	--	3.26	.00	--	--	--	--	--	311	.42	168,100	--	--	486	7.5
Sept. 1-24.....	352,800	--	--	--	1.81	--	3.44	.20	--	--	--	--	--	314	.43	151,700	--	--	516	8.3
Sept. 25-30.....	89,080	--	--	--	1.61	--	2.96	.74	--	--	--	--	--	337	.46	40,980	--	--	542	8.7
Total or weighted average	5,391,000	--	--	--	1.48	--	3.47	0.03	--	--	--	--	--	326	0.44	2,406,000	--	--	513	--

BOISE RIVER BASIN

13-2125. BOISE RIVER AT NOTUS, IDAHO

LOCATION.--At highway bridge, 1,100 feet downstream from gaging station, 0.2 mile southeast of Notus, Canyon County, and 7 miles northwest of Caldwell.
DRAINAGE AREA.--3,820 squars miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: January 1939 to January 1940, November 1950 to September 1961.
Water temperatures: November 1950 to September 1961.
Sediment records: January 1939 to June 1940.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 903 micromhos Aug. 5, 18; minimum daily, 390 micromhos Apr. 24.
EXTREMES, 1939-40, 1950-61.--Specific conductance: Maximum daily, 1,470 micromhos July 30, Aug. 26, 1939; minimum daily, 82 micromhos Apr. 27, 1952.
REMARKS.--Records of specific conductance of daily samples available in district office at Portland, Oreg. No appreciable inflow between gaging station and sampling point except during periods of heavy local runoff.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-9, 1960..	8,930	32	2.20	0.96	2.78	0.12	4.00	0.00	1.42	0.45	0.03	0.08	0.10	375	0.51	4,550	46	2.2	562	8.0
Oct. 10-16.....	12,120	--	--	--	2.39	--	3.61	.00	--	--	--	--	--	330	.45	5,450	--	--	498	7.9
Oct. 17-Nov. 16.	48,690	--	--	--	3.35	--	4.69	.00	--	--	--	--	--	436	.59	28,730	--	--	661	7.6
Nov. 17-Dec. 3..	24,820	--	--	--	3.39	--	4.65	.00	--	--	--	--	--	444	.60	14,890	--	--	667	7.6
Dec. 4-Jan. 2, 1961..	36,960	--	--	--	3.57	--	4.74	.00	--	--	--	--	--	458	.62	22,920	--	--	689	7.6
Jan. 3-28.....	27,590	36	2.69	1.24	3.22	.13	4.70	.00	1.79	.56	.04	.15	.03	468	.64	17,660	44	2.3	694	7.6
Jan. 29-Feb. 16.	20,250	--	--	--	3.18	--	4.69	.00	--	--	--	--	--	465	.63	12,760	--	--	690	7.6
Feb. 17-Mar. 13.	24,110	--	--	--	3.57	--	4.72	.00	--	--	--	--	--	449	.61	14,710	--	--	699	7.7
Mar. 14-18.....	4,810	--	--	--	3.44	--	4.72	.00	--	--	--	--	--	431	.59	2,840	--	--	680	7.6
Mar. 19-Apr. 10.	19,510	--	--	--	3.48	--	4.61	.00	--	--	--	--	--	435	.59	11,510	--	--	672	7.8
Apr. 11-16.....	1,430	28	2.59	1.36	4.52	.20	5.62	.00	2.17	.85	.04	.09	.20	508	.69	987	52	3.2	788	7.7
Apr. 17-19.....	409	--	--	--	2.78	--	3.39	.00	--	--	--	--	--	351	.48	196	--	--	537	7.9
Apr. 20-22.....	270	--	--	--	4.00	--	4.33	.00	--	--	--	--	--	490	.67	181	--	--	736	8.1
Apr. 23-26.....	1,170	--	--	--	1.87	--	2.64	.00	--	--	--	--	--	275	.37	433	--	--	418	7.9
Apr. 27-29.....	428	--	--	--	3.13	--	3.65	.00	--	--	--	--	--	395	.54	231	--	--	604	7.8

BOISE RIVER BASIN--Continued

13-2125. BOISE RIVER AT NOTUS, IDAHO--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 30-May 3, 1961...	1,310	--	--	--	2.04	--	2.85	0.00	--	--	--	--	--	286	0.39	511	--	--	438	7.6
May 4.....	369	--	--	--	4.31	--	4.62	.00	--	--	--	--	--	516	.70	258	--	--	765	7.7
May 5-8.....	2,060	--	--	--	1.96	--	2.85	.00	--	--	--	--	--	277	.38	783	--	--	428	7.9
May 9.....	244	--	--	--	2.78	--	3.51	.00	--	--	--	--	--	356	.48	117	--	--	536	8.0
May 10-11.....	196	--	--	--	3.83	--	4.28	.00	--	--	--	--	--	474	.64	125	--	--	715	7.9
May 12-15.....	750	--	--	--	3.04	--	3.69	.00	--	--	--	--	--	371	.50	375	--	--	571	8.1
May 16-19.....	361	--	--	--	4.22	--	4.29	.23	--	--	--	--	--	495	.67	242	--	--	761	8.5
May 20-27.....	787	--	--	--	4.52	--	4.67	.00	--	--	--	--	--	506	.69	543	--	--	791	8.0
May 28-29.....	309	--	--	--	3.04	--	3.80	.00	--	--	--	--	--	384	.52	161	--	--	598	7.9
May 30-June 5...	3,420	--	--	--	2.48	--	3.38	.00	--	--	--	--	--	324	.44	1,500	--	--	506	8.0
June 6-16.....	3,290	--	--	--	3.35	--	4.08	.00	--	--	--	--	--	412	.56	1,840	--	--	636	8.1
June 17-28.....	1,970	--	--	--	4.31	--	4.72	.00	--	--	--	--	--	514	.70	1,380	--	--	783	8.1
June 29-July 5..	1,780	--	--	--	3.39	--	4.33	00	--	--	--	--	--	449	.61	1,090	--	--	672	8.0
July 6-11.....	2,330	33	2.10	1.10	3.09	0.13	4.05	.00	1.67	0.56	0.03	0.07	0.16	410	.56	1,300	48	2.4	607	8.2
July 12-31.....	2,100	--	--	--	4.96	--	4.92	.13	--	--	--	--	--	545	.74	1,550	--	--	802	8.3
Aug. 1-30.....	3,650	--	--	--	5.18	--	5.21	.00	--	--	--	--	--	561	.76	2,770	--	--	831	8.1
Aug. 31-Sept. 18	3,920	--	--	--	4.70	--	5.02	.00	--	--	--	--	--	516	.70	2,740	--	--	781	8.0
Sept. 19-30.....	14,210	--	--	--	3.04	--	4.03	.00	--	--	--	--	--	372	.51	7,250	--	--	573	7.6
Total or weighted average	274,500	--	--	--	3.47	--	4.54	--	--	--	--	--	--	436	0.59	162,583	--	--	660	--

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

COLUMBIA RIVER MAIN STEM

14-1057. COLUMBIA RIVER NEAR THE DALLES, OREG.

LOCATION.--At The Dalles Dam, 3.2 miles upstream from gaging station, and 2.6 miles northeast of the Dalles, Wasco County.
DRAINAGE AREA.--237,000 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1961.
Water temperatures: December 1950 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 236 micromhos Jan. 22; minimum daily, 109 micromhos June 7, 8.
EXTREMES, 1950-61.--Specific conductance: Maximum daily, 324 micromhos Dec. 7, 1955; minimum daily, 102 micromhos May 27, 1956.
REMARKS.--Records of specific conductance of daily samples available in district office at Portland, Oreg. Chemical quality samples were collected from Maryhill Ferry for period December 1950 to August 1953 and at Rufus, Oreg. for period September 1953 to September 1958. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-15, 1960.	2,879,000	8.1	1.10	0.45	0.39	0.04	1.48		0.40	0.11	0.01	0.01	--	115	0.16	460,600	20	0.4	197	8.0
Oct. 16-31.....	3,059,000	--	--	--	.48	--	1.54		--	--	--	--	--	124	.17	520,000	--	--	208	8.0
Nov. 1-29.....	6,043,000	--	--	--	.48	--	1.57		--	--	--	--	--	130	.18	1,088,000	--	--	208	8.0
Nov. 30-Dec. 22.	4,411,000	--	--	--	.44	--	1.51		--	--	--	--	--	126	.17	749,900	--	--	200	7.9
Dec. 23-24.....	364,800	--	--	--	.52	--	1.67		--	--	--	--	--	147	.20	72,960	--	--	227	8.0
Dec. 25-31.....	1,290,000	--	--	--	.48	--	1.64		--	--	--	--	--	140	.19	245,100	--	--	221	8.0
Jan. 1-29, 1961.	5,759,000	14	1.30	.48	.52	.05	1.66		.44	.16	.02	.02	0.02	146	.20	1,152,000	22	.6	223	7.9
Jan. 30-Feb. 5..	1,789,000	--	--	--	.42	--	1.57		--	--	--	--	--	125	.17	304,100	--	--	205	8.0
Feb. 6-10.....	1,442,000	--	--	--	.52	--	1.64		--	--	--	--	--	149	.20	288,400	--	--	221	8.1
Feb. 11-17.....	2,517,000	--	--	--	.36	--	1.36		--	--	--	--	--	112	.15	377,600	--	--	179	7.9
Feb. 18-26.....	3,176,000	--	--	.--	.32	--	1.31		--	--	--	--	--	107	.15	476,400	--	--	169	8.0
Feb. 27-Mar. 6..	2,725,000	--	--	--	.31	--	1.29		--	--	--	--	--	108	.15	408,800	--	--	167	8.1
Mar. 7-22.....	4,891,000	--	--	--	.33	--	1.38		--	--	--	--	--	114	.16	782,600	--	--	178	8.0
Mar. 23-31.....	3,116,000	--	--	--	.30	--	1.23		--	--	--	--	--	106	.14	436,200	--	--	158	8.0
Apr. 1-10.....	3,570,000	15	.90	.43	.33	.05	1.25		.31	.10	.01	.01	.06	112	.15	535,500	19	.4	159	7.8

COLUMBIA RIVER MAIN STEM--Continued

14-1057. COLUMBIA RIVER NEAR THE DALLES, OREG.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Apr. 11-30, 1961	6,763,000	--	--	--	0.27	--	1.18		--	--	--	--	--	98	0.13	881,600	--	--	145	7.8
May 1-23.....	12,410,000	--	--	--	.20	--	1.08		--	--	--	--	--	65	.12	1,469,000	--	--	134	7.6
May 24-31.....	8,210,000	--	--	--	.13	--	.92		--	--	--	--	--	71	.10	821,000	--	--	116	7.6
June 1-19.....	24,290,000	--	--	--	.11	--	.95		--	--	--	--	--	73	.10	2,429,000	--	--	114	7.7
June 20-30.....	10,890,000	--	--	--	.12	--	1.02		--	--	--	--	--	77	.10	1,069,000	--	--	125	7.7
July 1-31.....	14,120,000	7.1	0.95	0.27	.12	0.02	1.13		0.21	0.03	0.01	0.01	0.01	80	.11	1,553,000	9	0.2	137	7.6
Aug. 1-8.....	2,257,000	--	--	--	.17	--	1.20		--	--	--	--	--	81	.11	246,300	--	--	141	7.9
Aug. 9-30.....	5,095,000	--	--	--	.22	--	1.26		--	--	--	--	--	93	.13	662,400	--	--	154	7.9
Aug. 31-Sept. 30	5,772,000	--	--	--	.32	--	1.38		--	--	--	--	--	105	.14	808,100	--	--	170	7.7
Total or weighted average	136,900,000	--	--	--	0.25	--	1.20		--	--	--	--	--	96	0.13	17,860,000	--	--	152	--

WILLAMETTE RIVER BASIN

14-1910. WILLAMETTE RIVER AT SALEM, OREG.

LOCATION.--At bridge on State Highway 22, 300 feet downstream from gaging station at Salem, Marion County.
DRAINAGE AREA.--7,280 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August to December 1910, August 1911 to August 1912, February 1951 to September 1961.
Water temparatures: February 1951 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 71 micromhos Dec. 24; minimum daily, 35 micromhos Feb. 12.
EXTREMES, 1951-61.--Specific conductance: Maximum daily, 133 micromhos Nov. 7, 1954; minimum daily, 35 micromhos Jan. 20, 1953, Feb. 12, 1961.
REMARKS.--Records of specific conductance of daily samplee available in district office at Portland, Oreg.

Chemical analyses, water year October 1960 to September 1961

Date of collection	Ruaoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Oct. 1-28, 1960.	494,300	16	0.27	0.14	0.16	0.02	0.49		0.04	0.06	0.00	0.01	0.02	53	0.07	34,600	27	0.4	61	7.1
Oct. 29-Nov. 15.	525,400	--	--	--	.13	--	.43		--	--	--	--	--	53	.07	36,780	--	--	54	7.0
Nov. 16-24.....	963,600	--	--	--	.11	--	.30		--	--	--	--	--	52	.07	67,450	--	--	46	6.6
Nov. 25-27.....	870,700	--	--	--	.09	--	.48		--	--	--	--	--	--	--	--	--	--	61	6.2
Nov. 28-Dec. 7..	1,196,000	--	--	--	.11	--	.36		--	--	--	--	--	56	.08	95,680	--	--	48	6.9
Dec. 8-19.....	625,800	--	--	--	.13	--	.38		--	--	--	--	--	61	.08	50,060	--	--	56	6.9
Dec. 20-23.....	407,000	--	--	--	.13	--	.33		--	--	--	--	--	66	.10	40,700	--	--	50	6.8
Dec. 24-Jan. 6, 1961.....	611,300	--	--	--	.14	--	.38		--	--	--	--	--	63	.09	55,020	--	--	59	6.7
Jan. 7-23.....	1,144,000	14	.27	.10	.13	.01	.36		.07	.06	.00	.02	.01	47	.08	91,520	25	.3	53	6.8
Jan. 24-Feb. 2..	404,000	--	--	--	.14	--	.39		--	--	--	--	--	51	.08	32,320	--	--	60	6.8

WILLAMETTE RIVER BASIN--Continued

14-1910. WILLAMETTE RIVER AT SALEM, OREG.--Continued

Chemical analyses, water year October 1960 to September 1961--Continued

Date of collection	Runoff (acre-feet)	Silica (SiO_2) ppm	Equivalents per million										Boron (B) ppm	Dissolved solids (residue at 180°C)			Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
			Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)		Parts per million	Tons per acre-foot	Total tons				
Feb. 3-11, 1961.	1,136,000	--	--	--	0.12	--	0.33		--	--	--	--	--	53	0.07	79,520	--	--	50	6.6
Feb. 12-18.....	2,055,000	--	--	--	.11	--	.31		--	--	--	--	--	49	.07	143,800	--	--	44	6.8
Feb. 19-Mar. 7..	2,648,000	--	--	--	.12	--	.33		--	--	--	--	--	47	.06	158,900	--	--	48	6.9
Mar. 8-Apr. 7...	3,309,000	--	--	--	.13	--	.38		--	--	--	--	--	48	.07	231,600	--	--	51	7.1
Apr. 8-21.....	524,800	16	0.25	0.14	.14	0.01	.36		0.08	0.06	0.01	0.02	0.00	57	.08	41,980	26	0.3	57	6.8
Apr. 22-May 21..	1,427,000	--	--	--	.13	--	.36		--	--	--	--	--	50	.07	99,890	--	--	51	6.9
May 22-June 21..	890,900	--	--	--	.16	--	.36		--	--	--	--	--	56	.08	71,270	--	--	59	6.8
June 22-July 5..	211,200	--	--	--	.18	--	.44		--	--	--	--	--	61	.08	16,900	--	--	66	6.8
July 6-Aug. 4...	371,500	17	.30	.14	.18	.02	.49		.07	.09	.01	.01	.01	51	.07	26,000	28	.4	68	7.1
Aug. 5-Sept. 4..	374,600	--	--	--	.18	--	.49		--	--	--	--	--	51	.07	26,220	--	--	65	7.0
Sept. 5-18.....	183,000	--	--	--	.17	--	.49		--	--	--	--	--	54	.07	12,810	--	--	64	7.0
Sept. 19-30.....	148,700	--	--	--	.18	--	.52		--	--	--	--	--	61	.08	11,900	--	--	66	7.2
Total or weighted average	20,521,800	--	--	--	0.13	--	0.37		--	--	--	--	--	49	0.07	1,424,920	--	--	52	--

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