

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 340—J

STREAM-GAGING STATIONS
AND
PUBLICATIONS RELATING TO WATER RESOURCES
1885-1913

PART X. THE GREAT BASIN

COMPILED BY B. D. WOOD

Part of Water-Supply Paper 340



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STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES. 1885-1913.

Compiled by B. D. Wood.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic basins.

II. South Atlantic and eastern Gulf of Mexico basins.

III. Ohio River basin.

IV. St. Lawrence River basin.

V. Upper Mississippi River and Hudson Bay basins.

VI. Missouri River basin.

VII. Lower Mississippi River basin.

VIII. Western Gulf of Mexico basins.

IX. Colorado River basin.

X. Great Basin.

XI. Pacific basins in California.

XII. North Pacific basins.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will, on application, furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Albany, N. Y., Room 18, Federal Building.
 Atlanta, Ga., Post Office Building.
 St. Paul, Minn., Old Capitol Building.
 Madison, Wis., Old Capitol Building.
 Helena, Mont., Montana National Bank Building.
 Denver, Colo., 302 Chamber of Commerce Building.
 Salt Lake City, Utah, Federal Building.
 Boise, Idaho, 615 Idaho Building.
 Portland, Oreg., 416 Couch Building.
 Tacoma, Wash., Federal Building.
 San Francisco, Cal., 505 Customhouse.
 Los Angeles, Cal., Federal Building.
 Phoenix, Ariz., 417 Fleming Building.
 Santa Fe, N. Mex., Capitol Building.
 Honolulu, Hawaii, Kapiolani Building.

A list of the Geological Survey's publications will be sent on application to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 1,550 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; WS=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2.....	Descriptive information only.....	1884 to Sept., 1890.
11th A, pt. 2.....	Monthly discharge and descriptive information.....	
12th A, pt. 2.....	.....do.....	1884 to June 30, 1891.
13th A, pt. 3.....	Mean discharge in second-feet.....	1884 to Dec. 31, 1892.
14th A, pt. 2.....	Monthly discharge (long-time records, 1871 to 1893).....	1888 to Dec. 31, 1893.
B 131.....	Descriptions, measurements, gage heights, and ratings.....	1893 and 1894.
16th A, pt. 2.....	Descriptive information only.....	1895.
B 140.....	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	
WS 11.....	Gage heights (also gage heights for earlier years).....	1896.
18th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
WS 15.....	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
WS 16.....	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
WS 27.....	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
WS 28.....	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A, pt. 4.....	Monthly discharge (also for many earlier years).....	1898.
WS 35 to 39.....	Descriptions, measurements, gage heights, and ratings.....	1899.
21st A, pt. 4.....	Monthly discharge.....	1899.
WS 47 to 52.....	Descriptions, measurements, gage heights, and ratings.....	1900.
22d A, pt. 4.....	Monthly discharge.....	1900.
WS 65, 66.....	Descriptions, measurements, gage heights, and ratings.....	1901.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
WS 75.....	Monthly discharge.....	1901.
WS 82 to 85.....	Complete data.....	1902.
WS 97 to 100.....	.....do.....	1903.
WS 124 to 135.....	.....do.....	1904.
WS 165 to 178.....	.....do.....	1905.
WS 201 to 214.....	.....do.....	1906.
WS 241 to 252.....	.....do.....	1907-8.
WS 261 to 272.....	.....do.....	1909.
WS 281 to 292.....	.....do.....	1910.
WS 301 to 312.....	.....do.....	1911.
WS 321 to 332 ^a.....	.....do.....	1912.
WS 351 to 362 ^a.....	.....do.....	1913.

^a In preparation.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1912. The data for any particular station will in general be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1913, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, and 351, which contain records for the New England streams from 1903 to 1913. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899-1913.

	1899 ^a	1900 ^b	1901	1902	1903	1904	1905	1906	1907-8	1909	1910	1911	1912	1913
North Atlantic.....	35	47, ^c 48	65, 75	82	97	^d 124, ^e 125 ^f 126	^d 165, ^e 166 ^f 167	^e 201, ^c 202 ^f 203	241	261	281	301	321	351
South Atlantic and eastern														
Gulf of Mexico.....	^g 35, 36	48	65, 75	^g 82, 83	^g 97, 98	^f 126, 127	^f 167, 168	^f 203, 204	242	262	282	302	322	352
Ohio River basin.....	36	48, ^h 49	65, 75	83	98	128	169	205	243	263	283	303	323	353
St. Lawrence River and														
Great Lakes.....	36	49	65, 75	ⁱ 82, 83	97	129	170	206	244	264	284	304	324	354
Hudson Bay and Upper Mis-														
sissippi River.....	36	49	^j 65, 66, 75	^j 83, 85	^j 98, 99, ^k 100	^j 128, 130	171	207	245	265	285	305	325	355
Missouri River.....	^l 36, 37	49, ^m 50	66, 75	84	99	130, ⁿ 131	172	208	246	266	286	306	326	356
Lower Mississippi River.....	37	50	^j 65, 66, 75	^j 83, 84	^j 98, 99	^j 128, 131	^j 169, 173	^j 205, 209	247	267	287	307	327	357
Western Gulf of Mexico.....	37	50	66, 75	84	99	132	174	210	248	268	288	308	328	358
Colorado River.....	^o 37, 38	50	66, 75	85	100	133	175, ^p 177	211	249	269	289	309	329	359
Great Basin.....	38, ^q 39	51	66, 75	85	100	133, ^r 134	176, ^r 177	212, ^r 213	250, ^r 251	270, ^r 271	290, ^r 291	310	330	360
California.....	38, ^s 39	51	66, 75	85	100	134	177	213	251	271	291	311	331	361
North Pacific.....	38	51	66, 75	85	100	135	^t 177, 178	214	252	272	292	312	^u 332	^u 362

^a Rating tables and index to Water-Supply Papers 35-39 contained in Water-Supply Paper 39.

^b Rating tables and index to Water-Supply Papers 47-52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

^c Wissahickon and Schuylkill rivers to James River.

^d New England rivers only.

^e Hudson River to Delaware River, inclusive.

^f Susquehanna River to Yadkin River, inclusive.

^g James River only.

^h Scioto River.

ⁱ Lake Ontario and tributaries to St. Lawrence River proper.

^j Tributaries of Mississippi from east.

^k Hudson Bay only.

^l Gallatin River.

^m Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

ⁿ Platte and Kansas rivers.

^o Green and Gunnison rivers and Grand River above junction with Gunnison.

^p Below junction with Gila.

^q Mohave River only.

^r Great Basin in California, excepting Truckee and Carson drainage basins.

^s Kings and Kern rivers only.

^t Rogue, Umpqua, and Siletz rivers only.

^u In three parts: *A*, Pacific basins in Washington and upper Columbia River; *B*, Snake River basin; *C*, Lower Columbia River and Pacific basins in Oregon.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated on page III, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

PART X. THE GREAT BASIN.

PRINCIPAL DIVISIONS.

The Great Basin is made up of a number of minor basins whose streams do not discharge into the ocean. The largest of these minor basins are the depressions that hold Great Salt Lake, Sevier Lake, Humboldt Sink, Truckee, Walker, Carson, and Owens rivers, and Honey, Mono, Malheur, Harney, Warner, Abert, Summer, and Silver lakes. The streams of this section drain wholly or in part the States of California, Idaho, Nevada, Oregon, and Utah.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations. (See p. 129.)

GAGING STATIONS.

NOTE.—Dash after a date indicates that station was being maintained June 30, 1913. Period after a date indicates discontinuance.

GREAT SALT LAKE BASIN.

Great Salt Lake at Saltair, Utah, 1904.

Great Salt Lake at Garfield Beach gage, Utah, 1875–1899.

Bear River near Evanston, Wyo., 1913–

Bear River at Dingle, Idaho, 1903–

Bear (Mud) Lake inlet canal near Dingle, Idaho, 1911–

Bear River at Soda Springs, Idaho, 1896.

Bear River at Alexander, Idaho, 1911–

Bear River near Preston, Idaho, 1889–

Bear River near Collinston, Utah, 1889–

West Side canal near Collinston, Utah, 1913–

Hammond ditch near Collinston, Utah, 1913–

Bear Lake at Fishhaven, Idaho, 1904–1906.

Georgetown Creek near Georgetown, Idaho, 1911–

Soda Creek near Soda Springs, Idaho, 1913–

Cub Creek near Franklin, Idaho, 1900–1901.

Logan River near Logan, Utah, 1896–

Logan, Hyde Park, and Smithfield canal, near Logan, Utah, 1904–1907; 1909–1910; 1912–

Logan Northern canal near Logan, Utah, 1913–

Blacksmith Fork near Hyrum, Utah, 1900–1902; 1904–1910.

Blacksmith Fork power plant race near Hyrum, Utah, 1904–1910.

Little Malad River near Malad, Idaho, 1911–

Box Elder Creek at Brigham, Utah, 1909–1912.

Weber River near Oakley, Utah, 1904–

Weber River at Devils Slide (Croydon), Utah, 1905–

Weber River near Uinta, Utah, 1889–1903.

Great Salt Lake—Continued.

- Weber River near Plain City, Utah, 1903—
- Chalk Creek at Coalville, Utah, 1904-5.
- Lost Creek near Croydon, Utah, 1905.
- Ogden River at Ogden, Utah, 1895-1899.
- Ogden River near Ogden, Utah, 1904—
- Jordan River near Lehi, Utah, 1904; 1913—
- Utah Lake near Spanish Fork, Utah, 1895-6.
- Utah Lake near Outlet, Utah, 1896-1900.
- Santaquin (Summit) Creek near Santaquin, Utah, 1905; 1910—
- Peeteetneet Creek near Payson, Utah, 1908—
- Spanish Fork at Thistle, Utah, 1908—
- Spanish Fork near Spanish Fork, Utah, 1900-1901; 1903—
- United States Reclamation Service power canal near Spanish Fork, Utah, 1909—
- Spanish Fork near Mapleton, Utah, 1900-1901.
- Spanish Fork at Lake Shore, Utah, 1903-1907; 1909—
- Diamond Fork near Thistle, Utah, 1908-1910.
- Hobble Creek near Springville, Utah, 1904—
- Maple Creek near Springville, Utah, 1910-1913.
- Provo River at Forks, Utah, 1911—
- Provo River above Telluride Power Co.'s dam near Provo, Utah, 1905-1911.
- Provo River at mouth of canyon near Provo, Utah, 1889-1906.
- Provo River at Denver & Rio Grande Railroad bridge near Provo, Utah, 1905.
- Provo River at San Pedro, Los Angeles & Salt Lake Railroad bridge near Provo, Utah, 1903-4.
- South Fork of Provo River near Forks, Utah, 1911—
- American Fork near American Fork, Utah, 1900-1901; 1903-1905; 1912—
- South Fork of American Fork, 1912—
- Little Cottonwood Creek near Salt Lake City, Utah, 1898—
- Big Cottonwood Creek near Salt Lake City, Utah, 1898—
- Mill Creek near Salt Lake City, Utah, 1898—
- Parleys Creek near Salt Lake City, Utah, 1898—
- Emigration Creek near Salt Lake City, Utah, 1898—
- City Creek near Salt Lake City, Utah, 1898—

SEVIER LAKE BASIN.

- Sevier River near Hatch, Utah, 1911—
- Sevier River near Circleville, Utah, 1912—
- Sevier River near Junction, Utah, 1911—
- Sevier River at Piute Reservoir near Junction, Utah, 1911—
- Sevier River below Piute Dam, near Marysville, Utah, 1906—
- Sevier River at Marysville, Utah, 1912—
- Sevier River at Sevier, Utah, 1911—
- Sevier River at Joseph, Utah, 1889.
- Sevier River near Vermilion, Utah, 1912.
- Sevier River near Gunnison, Utah, 1900—
- Sevier River near Juab, Utah, 1911—
- Sevier River at Leamington, Utah, 1889-1893; 1912—
- Sevier River near Delta, Utah, 1912.

Sevier River at Oasis, Utah, 1912-

Assay Creek near Hatch, Utah, 1912-

Mammoth Creek near Hatch, Utah, 1912-

Otter Creek near Coyote, Utah, 1913.

East Fork of Sevier River, near Kingston, Utah, 1912-

East Fork of Sevier River, at Junction, Utah, 1913.

Clear Creek at Sevier, Utah, 1912-

Salina Creek near Salina, Utah, 1900-1901.

San Pitch Creek near Gunnison, Utah, 1900-1905; 1912-

Manti Creek near Manti, Utah, 1900.

Beaver River near Beaver, Utah, 1906.

Beaver River at Minersville, Utah, 1909-1913.

Beaver River at Rocky Ford dam, near Minersville, Utah, 1913-

South Creek near Beaver, Utah, 1906.

North Fork of North Creek (head of North Creek) near Beaver, Utah, 1906.

South Fork of North Creek near Beaver, Utah, 1906.

Indian Creek near Beaver, Utah, 1906.

Canals in Sevier Valley:

Sevier Valley canal at Joseph, Utah, 1912-

Sevier Valley canal near Elsinore, Utah, 1913-

State canal near Richfield, Utah, 1912.

Sevier Valley canal near Vermilion, Utah, 1913.

Sevier Valley canal near Aurora, Utah, 1913.

Canal A at spillway near Delta, Utah, 1912-

Canal B at intake near Delta, Utah, 1912-13.

Canal C at head gate near Delta, Utah, 1912-13.

Lymans ditch near Delta, Utah, 1912-13.

Abraham canal near Delta, Utah, 1913-

Melville main canal near Delta, Utah, 1912-

Melville west side canal near Delta, Utah, 1912-13.

Deseret canal near Delta, Utah, 1913-

Deseret high-line canal near Delta, Utah, 1913-

Minersville canal at Minersville, Utah, 1906.

MINOR BASINS IN NEVADA.

Snake Creek near Garrison, Utah, 1913-

Thousand Springs Creek near Tecoma, Nev., 1910-

Steptoe Creek near Ely, Nev., 1913.

Baker Creek near Baker, Nev., 1913-

White River near Preston, Nev., 1913-

Currant Creek above reservoir, near Currant, Nev., 1913-

Currant Creek at Cozier's ranch, near Currant, Nev., 1913-

Currant Creek at ranger station near Currant, Nev., 1913.

SALTON SINK BASIN.

Salton Sea near Salton, Cal., 1904-

Alamo River near Brawley, Cal., 1909-1912.

New River near Brawley, Cal., 1909-1911.

OWENS LAKE BASIN.

Owens River near Round Valley, Cal., 1903-

Owens River near Big Pine [Tinemaha], Cal., 1906-

Owens River near Citrus, Cal., 1903-1906.

Owens River near Lone Pine, Cal., 1909-

Owens Lake near Olancho, Cal., 1908-

Rock Creek near Round Valley, Cal., 1903-
Pine Creek near Round Valley, Cal., 1903-
Bishop Creek near Bishop, Cal., 1903-1911.
Baker Creek near Big Pine, Cal., 1908-1911.
Big Pine Creek near Big Pine, Cal., 1903-1911.
Tinemaha Creek near Big Pine (Tinemaha), Cal., 1906-1911.
Birch Creek near Big Pine (Tinemaha), Cal., 1905; 1906-1911.
Taboose Creek near Aberdeen, Cal., 1906-1911.
Goodale Creek near Aberdeen, Cal., 1906-1910.
Division Creek near Independence, Cal., 1906-1910.
Eightmile (Sawmill) Creek near Independence, Cal., 1906-1910.
Thebaut Creek near Independence, Cal., 1908-1911.
Oak Creek near Independence, Cal., 1905-1911.
Independence Creek near Independence, Cal., 1905-1911.
Shepherd Creek near Thebe, Cal., 1906-1910.
Bairs Creek near Thebe, Cal., 1906-1911.
George Creek near Thebe, Cal., 1906-1911.
Little Pine Creek near Independence, Cal., 1905-1911.
Lone Pine Creek near Lone Pine, Cal., 1906-1911.
Tuttle Creek near Lone Pine, Cal., 1906-11.
Cottonwood Creek near Olancho, Cal., 1906-1911.
Ash Creek near Olancho, Cal., 1907-1911.

Canals in Owens River valley:

Bishop Creek canal near Bishop, Cal., 1903-1905.
Collins (George) canal near Bishop, Cal., 1903-1906.
Collins (A. O.) canal near Bishop, Cal., 1903-1906.
Dell canal near Bishop, Cal., 1903-1906.
East Side canal near Citrus, Cal., 1903-1906.
Farmers canal near Bishop, Cal., 1903-1905.
Hillside (North) canal near Bishop, Cal., 1903-1905.
Hillside (South) canal near Bishop, Cal., 1903-1905.
McNally canal near Bishop, Cal., 1903-1905.
Owens River and Big Pine canal near Bishop, Cal., 1903-1905.
Owens River canal near Bishop, Cal., 1903-1905.
Powers canal near Bishop, Cal., 1903-1905.
Rawson canal near Bishop, Cal., 1903-1905.
Sanger canal near Alvord, Cal., 1903-1905.
Stevens canal near Citrus, Cal., 1903-1905.

ANTELOPE VALLEY BASIN.

Littlerock Creek near Palmdale, Cal., 1896-1898.

MOHAVE RIVER BASIN.

Mohave River near Victorville, Cal., 1899-1906.

MONO LAKE BASIN.

Mono Lake near Mono Lake, Cal., 1912-
Rush Creek near Mono Lake, Cal., 1910-
Leevining Creek near Mono Lake, Cal., 1910-

WALKER LAKE BASIN.

- East Walker River (head of Walker River), Bridgeport, Cal., 1911-
- East Walker River near Yerington, Nev., 1902-1908.
- East Walker River near Mason, Nev., 1910-1912.
- Walker River near Nordyke, Nev., 1895.
- Walker River at Mason, Nev., 1910-1912.
- Walker River near Wabuska, Nev., 1902-1908.
 - Robinson Creek near Bridgeport, Cal., 1910-
 - Buckeye Creek near Bridgeport, Cal., 1910-
 - Swagar Creek near Bridgeport, Cal., 1911-
 - West Walker River near Coleville, Cal., 1902-1908; 1909-10.
 - West Walker River near Wellington, Nev., 1910.
 - West Walker River at Smith, Nev., 1910.
 - East Fork of West Walker River near Bridgeport, Cal., 1910.

HONEY LAKE BASIN.

- Susan River near Susanville, Cal., 1900-1905.
- Willow Creek at Merrillville, Cal., 1904-5.
- Willow Creek near Standish, Cal., 1900-1901; 1905.

CARSON-HUMBOLDT SINK.

Carson River basin:

- East Fork of Carson River (head of Carson River) at Silver King Valley, near Markleeville, Cal., 1910-1913.
- East Fork of Carson River near Markleeville, Cal., 1910-
- East Fork of Carson River at Rodenbah's ranch, near Gardnerville, Nev., 1900-1907.
- East Fork of Carson River at Horseshoe Bend, near Gardnerville, Nev., 1900-1910.
- Carson River and Brunswick Mill power canal near Empire, Nev., 1900-1911.
- Carson River near Empire, Nev., 1900-
- Carson River near Fort Churchill, Nev., 1911-
- Carson River near Hazen, Nev., 1908-1910.
- Silver Creek near Markleeville, Cal., 1910-1913.
- Markleeville Creek above Markleeville, Cal., 1911-
- Markleeville Creek at Markleeville, Cal., 1910-
- Pleasant Valley Creek near Markleeville, Cal., 1910-11.
- West Fork of Carson River at Woodfords, Cal., 1900-

Humboldt River basin:

- Humboldt River near Elko, Nev., 1895-1902.
- Humboldt River at Palisade, Nev., 1902-1906; 1911-
- Humboldt River at Battle Mountain, Nev., 1896-7.
- Humboldt River near Golconda, Nev., 1894-1909; 1910-
- Humboldt River near Oreana, Nev., 1896-1909; 1910-
- Humboldt River near Lovelocks, Nev., 1912-
- Bishop Creek near Wells, Nev., 1910.
- Marys River near Carlin, Nev., 1913-
- Marys River near Buena Vista, Nev., 1913-
- Marys River near Deeth, Nev., 1902-3; 1912-
- Hanks Creek near Buena Vista, Nev., 1913-
- North Fork of Humboldt River near Peko, Nev., 1898-1900.

Humboldt River basin—Continued.**Humboldt River tributaries—Continued.**

North Fork of Humboldt River near Halleck, Nev., 1902-1913.

North Fork of Humboldt River near Elko, Nev., 1913-

Starr Creek near Deeth, Nev., 1913-

Lamoille Creek near Halleck, Nev., 1913-

South Fork of Humboldt River near Elko, Nev., 1896-1909; 1910-

Maggie Creek near Carlin, Nev., 1913-

Jacks Creek near Tuscarora, Nev., 1913-

Pine Creek at Palisade, Nev., 1902-1904; 1912-

Reese River near Austin, Nev., 1913-

Big Creek near Austin, Nev., 1913-

Birch Creek near Austin, Nev., 1913-

Rock Creek near Battle Mountain, Nev., 1896.

PYRAMID AND WINNEMUCCA LAKE BASINS.

Lake Tahoe at Tahoe, Cal., 1900-

Truckee River at Tahoe, Cal., 1895, 1900-

Truckee River near Boca, Cal., 1890.

Truckee River at Iceland, Cal., 1912-

Truckee River at Nevada-California State line, 1899-1912.

Truckee River at Loughton, Nev., 1890.

Truckee River at Reno, Nev., 1906-

Truckee River near Essex, Nev., 1889.

Truckee River at Vista, Nev., 1899-1908.

Truckee River at Clark, Nev., 1907-

Truckee River at Derby Dam, Nev., 1907-1910.

Truckee River near Wadsworth, Nev., 1902-1905.

Lake Winnemucca inlet near Wadsworth, Nev., 1902-1905.

Donner Creek at Donner Lake near Truckee, Cal., 1909-10.

Donner Creek near Truckee, Cal., 1902-

Prosser Creek near Hobart Mills (Truckee), Cal., 1903-4; 1907-1912.

Prosser Creek near Boca, Cal., 1889-90; 1902-3.

South Fork of Prosser Creek near Truckee, Cal., 1909-10.

Little Truckee River near Truckee, Cal., 1909-10.

Little Truckee River near Boca, Cal., 1890.

Little Truckee River at Boca, Cal., 1911-

Little Truckee River at Pine Station and Starr, Cal., 1903-1910.

Webber Creek near Truckee, Cal., 1909-10.

Independence Creek below Independence Lake, Cal., 1902-1907.

Independence Creek near Truckee, Cal., 1909-10.

Steamboat Creek at Steamboat Springs, Nev., 1900-1901.

QUINN RIVER BASIN.

Kings River near Amos, Nev., 1913-

SURPRISE VALLEY DRAINAGE BASIN.

Bidwell Creek near Fort Bidwell, Cal., 1912.

WARNER LAKE BASIN.

Pelican Lake near Adel, Oreg., 1913-

Crump Lake near Adel, Oreg., 1910-

Hart Lake near Plush, Oreg., 1910-

Flagstaff Lake near Plush, Oreg., 1910-

Bluejoint Lake, near Plush, Oreg., 1911-

- Twentymile Creek near Warner Lake, Oreg., 1910-
- Fifteenmile Creek above Twelvemile Creek near Fort Bidwell, Cal., 1913-
- Fifteenmile Creek below Rock Creek near Fort Bidwell, Cal., 1913-
- Twelvemile Creek near Fort Bidwell, Cal., 1912-13.
- Cowhead Lake near Fort Bidwell, Cal., 1911-1913.
- Rock Creek near Fort Bidwell, Cal., 1913-
- Deep Creek near Fort Bidwell, Cal., 1913-
- Deep Creek at Big Valley near Lakeview, Oreg., 1911-
- Deep Creek at Adel, Oreg., 1909-
- Dismal Creek near Fort Bidwell, Cal., 1913-
- Camas Creek near Plush, Oreg., 1911-12.
- Camas Creek below Blue Creek near Lakeview, Oreg., 1912-
- Mud Creek near Plush, Oreg., 1911-12.
- Honey Creek at Chalstrand's ranch near Plush, Oreg., 1910-11.
- Honey Creek near Plush, Oreg., 1909-
- Twelvemile Creek near Plush, Oreg., 1911.
- Snyder Creek near Plush, Oreg., 1911.

ABERT LAKE BASIN.

- Chewaucan River at dam site near Paisley, Oreg., 1912-13.
- Chewaucan River above Conn's ditch near Paisley, Oreg., 1912.
- Chewaucan River at Paisley, Oreg., 1905-1907; 1909-1912.
- Crooked Creek near Valley Falls, Oreg., 1912-13.

SUMMER LAKE BASIN.

- Ana River near Summer Lake, Oreg., 1905; 1909-10.

SILVER LAKE BASIN.

- Silver Creek near Silver Lake, Oreg., 1904-1907; 1909-
- Bridge Creek near Silver Lake, Oreg., 1905-6; 1911-12.
- Bear (Buck) Creek near Silver Lake, Oreg., 1905-6; 1909-1911.

MALHEUR AND HARNEY LAKES BASIN.

- Malheur Lake at Narrows, Oreg., 1911-
- Silvies River near Silvies, Oreg., 1903-1905; 1909-1912.
- Silvies River near Burns, Oreg., 1903-1906; 1909-1913.
- Donner und Blitzen River near Diamond, Oreg., 1911-
- Mud Creek near Diamond, Oreg., 1911-
- Bridge Creek near Diamond, Oreg., 1911-
- Krumbo Creek near Diamond, Oreg., 1911.
- Keiger Creek near Diamond, Oreg., 1909-
- Cucamonga Creek near Diamond, Oreg., 1911-
- McCoy Creek near Diamond, Oreg., 1909-
- Riddle Creek near Smith, Oreg., 1911.
- Silver Creek above Riley, Oreg., 1904-1906; 1909-1912.
- Silver Creek below Riley, Oreg., 1912-13.

ALVORD LAKE BASIN.

- Trout Creek near Denio, Oreg., 1911-12.
- Little Cottonwood Creek near Denio, Oreg., 1911-12.

TUMTUM LAKE BASIN.

- Van Horn Creek near Denio, Oreg., 1911
- Home Creek near Narrows, Oreg., 1911.

REPORTS ON WATER RESOURCES OF THE GREAT BASIN.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

- *7. Seepage water of northern Utah, by Samuel Fortier. 1897. 50 pp., 3 pls.
Describes Cache Valley and its water supply and seepage waters in Ogden Valley.
- *43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls.
Describes the location and construction of various types of canals for irrigation.
- *57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp.
- 61. Preliminary list of deep borings in the United States, Part II, (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.
A second revised edition was published in 1905 as Water-Supply Paper 149 (q. v.).
- *81. California hydrography, by J. B. Lippincott. 1903. 440 pp., 1 pl. 25c.
A collection of published records of stream flow "hitherto much scattered, some of them out of print and difficult to secure," brought together as a book of reference.
- 140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.
Flow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.
- 146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15c. [Inquiries concerning this report should be addressed to the Reclamation Service.]. Contains:
A brief report on "Hydrographic investigations in Nevada," by A. E. Chandler. Gives notes concerning fluctuations and average discharge at stations on Truckee, Humboldt, Carson, and Walker rivers.
A report on "Underground waters of southern California," by W. C. Mendenhall. Discusses the origin, distribution, and character of the artesian waters, the causes of fluctuations in the supply, and the need of moderation in use.
- 149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.
Gives by States (and within the States by counties), location, depth, diameter, yield, height of water, and other available information, concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 to 61: mentions also principal publications relating to deep borings.
- *157. Underground water in the valleys of Utah Lake and Jordan River, Utah, by G. B. Richardson. 1906. 81 pp., 9 pls. 20c.
Discusses the source, distribution, recovery, and quality of waters; contains list of typical wells.
- *162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.
Gives estimates of flood flow and frequency of Bear River at Collinston, Utah, and Humboldt River at Golconda, Nev. (p. 85), also index to literature of floods on American streams.
- *181. Geology and water resources of Owens Valley, Cal., by W. T. Lee. 1906. 28 pp., 6 pls. 15c.
Discusses artesian conditions, utilization of underground waters by pumping and power plants, and undrained lakes as registers of climate. See also Water-Supply Paper 294.

- *199. Underground water in Sanpete and central Sevier valleys, Utah, by G. B. Richardson. 1907. 63 pp., 6 pls. 25c.
Describes topography and geology of the area, the sources, distribution, recovery, and quality of the ground waters; presents tabulated data concerning springs and wells.
- *217. Water resources of Beaver Valley, Utah, by W. T. Lee. 1908. 57 pp., 4 pls. 10c.
Describes possible development of surface and underground waters, and quality of waters; contains field assays of well water, and sanitary and other exact analyses.
- *220. Geology and water resources of a portion of south-central Oregon, by G. A. Waring. 1908. 86 pp., 10 pls. 20c.
Describes the rocks, streams, lakes and lake valleys, deep and shallow wells, climate, soils, vegetation, industries, and reclamation projects in Lake County; gives analyses of soils and waters.
- *224. Some desert watering places in southeastern California and southwestern Nevada, by W. C. Mendenhall. 1909. 98 pp., 4 pls. 20c.
Describes physical features of the Colorado and Mohave deserts and the Death Valley region, mineral resources and industrial development, climate, rivers, springs, and camping places; gives hints on desert traveling; describes main routes of travel, and gives details concerning the springs.
- *225. Ground waters of the Indio region, California, with a sketch of the Colorado Desert, by W. C. Mendenhall. 1909. 56 pp., 12 pls. 20c.
Describes the structural features and deposits of the Colorado Desert, rainfall and drainage, the origin, source, character, and development of underground waters; gives history of development of the Indio region, and discusses soils, crops, and cost of reclamation.
- *231. Geology and water resources of the Harney Basin region, Oregon, by G. A. Waring. 1909. 93 pp., 5 pls. 25c.
Describes topography, climate, vegetation, settlements and industries, the rocks and their successive lakes, springs, and streams, and artesian conditions; discusses conservation of water supply, temperature of underground waters, and well-drilling methods; describes in detail Harney, Catlow, Alvord, Whitehorse basins, and Malheur River drainage area.
237. The quality of the surface waters of California, by Walton Van Winkle and F. M. Eaton. 1910. 142 pp., 1 pl. 20c.
Describes geography, climate, industrial development, and drainage, and gives results of mineral analyses of the river waters.
274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.
Describes collection of samples, plan of analytical work and methods of analyses; discusses soap consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Carson, Truckee, and Owens rivers.
277. Ground water in Juab, Millard, and Iron counties, Utah, by O. E. Meinzer. 1911. 162 pp., 5 pls. 25c.
Describes the physiographic features, geologic formations, and history, the rainfall, soil, vegetation, streams, and industrial development; discusses the occurrence of ground water in the bedrock and in unconsolidated sediments, artesian conditions and springs, the quality of the ground waters, irrigation, construction of wells, and watering places on routes of travel; describes in detail Juab, Valley, Round, Little, Sage, Dog, and Fernow valleys, Tintic Valley and Tintic mining district, Pavant and Lower Beaver valleys, Old River Bed and Cherry Creek region, Drum and Swasey Wash region, Sevier Desert, Wah Wah Valley, Sevier Lake bottoms, White, Fish Springs, Snake, Parowan, and Rush Lake valleys and Escalante Desert; analyses.
- *278. Water resources of Antelope Valley, Cal., by H. R. Johnson. 1911. 92 pp., 7 pls. 25c.
Describes topography, drainage, climate, physiography, and the water-bearing and nonwater-bearing rocks of areas in Kern, Los Angeles, and San Bernardino counties; discusses the influence of rainfall on the surface and underground waters, the artesian water and nonartesian water, bedrock springs, chemical character (analyses, alkali, dissolved solids, hygienic conditions), fallacies as to origin and quantities of artesian water and the present and future development of the underground supplies.

- *294. An intensive study of the water resources of a part of Owens Valley, Cal., by C. H. Lee. 1912. 135 pp., 30 pls. 55c.
Describes topography, drainage, and structure of the valley, and discusses precipitation, stream flow, evaporation, percolation, and ground waters; bibliography.
- *297. Gazetteer of surface waters of California, Pt. III: Pacific coast and Great Basin streams, by B. D. Wood. 1913. 244 pp. 20c.
Contains description of streams and lakes of the Great Basin in California.
- *300. Water resources of California, Pt. III: Stream measurements in the Great Basin and Pacific coast river basins, by H. D. McGlashan and H. J. Dean. 1913. 956 pp., 4 pls. 55c.
Describes the general features of the Great Basin in California, the Great Basin lakes in California and Nevada and gives results of stream-flow investigations available up to September 30, 1912.
833. Ground water in Box Elder and Tooele counties, Utah, by Everett Carpenter. 1913. 90 pp., 2 pls. 10c.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

- *Third Annual Report of the United States Geological Survey, 1881-82, J. W. Powell, Director. 1883. xviii, 564 pp., 67 pls. \$2.35. Contains:

*Sketch of the geological history of Lake Lahontan, by I. C. Russell, pp. 189-235, Pls. XVIII-XXIII. Describes the physical features of the Great Basin.

- *Fourth Annual Report of the United States Geological Survey, 1882-83, J. W. Powell, Director. 1884. xxxii, 473 pp., 85 pls. \$1.65. Contains:

*A geological reconnaissance in southern Oregon, by I. C. Russell, pp. 431-464, Pls. LXXXIII-LXXXV. Describes the interior drainage of southern Oregon; discusses the area, extent, quality of waters, and recent changes in the existing lakes.

- *Eighth Annual Report of the United States Geological Survey, 1886-87, J. W. Powell, Director. 1889. 2 parts. Part I, pp. i-xix, 1-474, i-xii, pls. i-liii. \$1.50. Contains:

*The Quaternary history of Mono Valley, Calif., by I. C. Russell, pp. 261-394, Pls. XVI-XLIV. Describes the physiographic features and drainage of the Mono Lake basin, the sources of water supply of the present lake, including streams and springs, and discusses the chemical composition of the water and the fluctuations in lake level.

- *Tenth Annual Report of the United States Geological Survey, 1888-89, J. W. Powell, Director. 1890. 2 parts. *Pt. II. Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

- Eleventh Annual Report of the United States Geological Survey, 1889-90, J. W. Powell, Director. 1891. 2 parts. Pt. II. Irrigation. pp. xiv, 395, 30 plates and maps. \$1.25. Contains:

*Hydrography, pp. 1-110. Discusses scope of work, methods of stream measurement, rainfall and evaporation, and describes the more important streams.

*Engineering, pp. 111-200. Defines the scope of the work and gives an account of the surveys in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*The arid lands, pp. 201-289. Includes statement to the Director of the House Committee on Irrigation, extracts from the constitutions of States relating to irrigation.

*Topography, pp. 291-343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

*Irrigation literature, pp. 345-388. Gives a list of books and pamphlets on irrigation and allied subjects, mainly contained in the library of the United States Geological Survey.

Twelfth Annual Report of the United States Geological Survey, 1890-91, J. W. Powell, Director. 1891. 2 parts. Pt. II. Irrigation, pp. xviii, 576, 93 pls. \$2.00. Contains:

* Report upon the location and survey of reservoir sites during the fiscal year ending June 30, 1891, by A. H. Thompson, pp. 1-212, Pls. LIV-LVII. Describes reservoir sites in Carson River basin at Red Lake, Pleasant Valley, Mount Bullion, Indian Pool, Heenan Lake, Silver King Valley, Wolf Creek, Dumont's Meadow, all in Alpine County, along Rush Creek, in Halls Meadow, on Little Truckee River, at Twin Valley on the North Fork of Prosser Creek, at Monument Peak, at Grass Lake, and at Hope Valley, in California, and on Truckee River, Nev.; for each reservoir site gives the location, height of dam, area inclosed by contour, approximate contents of reservoir, position of irrigable lands, and areas of segregated lands.

Thirteenth Annual Report of the United States Geological Survey, 1891-92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. Pt. III, Irrigation, pp. xi, 486, 77 pls. \$1.85. Contains:

* Engineering results of irrigation survey, by H. N. Wilson, pp. 351-437, Pls. CXLVII-CLXXXII. Describes Donner Lake, Independence Lake, and Webber Lake reservoirs, also Truckee canals in the Truckee River system, and Long Valley and Hope Valley reservoirs in the Carson River basin, Nev.

Report upon the location and survey of reservoir sites during the fiscal year ending June 30, 1892, by A. H. Thompson, pp. 451-478. Describes Bear Lake reservoir site (Utah-Idaho), Silver Lake, Twin Lakes, and Marys Lake sites, and sites on Sanpitch, Sevier, East Fork of Sevier, Otter Creek, Panquitch Lake, and at Blue Spring, Utah.

***Sixteenth Annual Report of the United States Geological Survey, 1894-95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, pp. xix, 598, 43 pls. \$1.25. Contains:**

*The public lands and their water supply, by F. H. Newell, pp. 457-533, Pls. XXXV-XXXIX. Describes general character of the public lands, the lands disposed of (railroad, grant, and swamp lands, and private miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Eighteenth Annual Report of the United States Geological Survey, 1896-97, Charles D. Walcott, Director. 1897. (Pts. II and III, 1898.) 5 parts in 6 vols. *Pt. IV, Hydrography, pp. x, 756, 102 pls. \$1.75. Contains:

* Reservoirs for irrigation, by J. D. Schuyler, pp. 617-740, Pls. XLVII-CII. Discusses proposed Rock Creek reservoir on Humboldt River, Nev.; gives tables of reservoir capacities and areas; describes proposed reservoir of Antelope Valley Water Co., California, and on Rock Creek Humboldt River, Nev.

Twentieth Annual Report of the United States Geological Survey, 1898-99, Charles D. Walcott, Director. 1899. (Pts. II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest Reserves, pp. xix, 498, 159 pls., 8 maps in separate case. \$2.80. Contains:

*The San Gabriel Forest Reserve, by J. B. Leiberg, pp. 411-428, Pls. CXLIII-CXLVI. The San Bernardino Forest Reserve, by J. B. Leiberg, pp. 429-454, Pls. CXLVII-CLIII. The San Jacinto Forest Reserve, by J. B. Leiberg, pp. 455-478, Pls. CLIV-CLIX. Describes general topographic features of forest reserves and drainage, part of which is by streams tributary to the Pacific, and part by streams that are lost in the sands of the Mohave and other deserts.

MONOGRAPHS.

Monographs are of quarto size. They are not distributed free, but may be obtained from the Geological Survey at the prices indicated. An asterisk (*) indicates that the Survey's stock of the paper is exhausted.

***I. Lake Bonneville, by G. K. Gilbert. 1890. xx, 438 pp., 51 pls., 1 map.**

Contains in the introduction a description of the Great Basin; describes the present lakes and their oscillations, and gives analyses of the waters of Great Salt Lake and of fresh waters in the Salt Lake Basin.

***XI. Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada, by I. C. Russell. 1885. xiv, 288 pp., 46 pls. \$1.75.**

Contains descriptions of the present rivers and lakes; discusses the chemical deposits of the area and gives analyses showing the composition of the principal rivers and lakes of the Lahontan Basin.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

252. Preliminary report on the geology and water resources of central Oregon, by I. C. Russell. 1905. 138 pp., 24 pls. 15c.

Describes a portion of the extreme northern part of the Great Basin and a part of the drainage area of Deschutes River and its principal tributary, Crooked River; gives an account of the topography, drainage, rainfall, and temperature, winds, and forests; describes the volcanic and sedimentary rock formations, and discusses by counties the geology and topography, the surface and underground waters; treats of artesian conditions in the Deschutes Basin and makes suggestions concerning artesian well records.

264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to geologists; describes the general methods of work; gives tabulated records of wells in Utah.

- *298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in California, Idaho, Nevada, Oregon, and Utah; and detailed record of well at Salt Lake City, Utah. The well of which a detailed section is given was selected because it affords valuable stratigraphic information.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped. The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute a Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but 80 or 90 per cent of the folios are usable. They will be sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive, also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sell for 25 cents a copy, except that some folios which contain an unusually large amount

of matter sell for 50 cents a copy. The octavo edition of folio 185 and higher numbers sell for 50 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; \$5.10 is the minimum amount accepted at this rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

39. Truckee folio, California.

Describes the general and economic geology of an area extending westward and northward from Truckee Lake, drained by streams a part of which flow through Yuba and American rivers to the Sacramento, and part through Lake Tahoe to the Great Basin; discusses the topography and geology, and under "Economic geology" the mineral springs which occur abundantly throughout the area.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the Great Basin are the reports of the reclamation board, the State engineer and surveyor, the State Conservation Commission of California, the State board of land commissions, and the State engineers of Idaho, Oregon, Utah, and Wyoming, the biennial reports of the Bureau of Industry, Agriculture, and Irrigation of Nevada, and the annual reports of the United States Reclamation Service.

The following reports deserve special mention:

Oregon system of water titles, by John H. Lewis: Oregon State Engineer Bull. 2, 1912, with detailed statement of the Oregon system of water titles.

State and national water laws, by John H. Lewis, with a discussion by Messrs. Clarence T. Johnston and L. J. Le Conte: Am. Soc. Civil Eng. Trans., vol. 76, pp. 637-758, 1913.

Irrigation pumping in Nevada, etc., by Charles Norcross: Nevada Bureau of Industry, Agriculture, and Irrigation Bull. 8, 1913.

Report on irrigation investigations in Utah, under the direction of Elwood Mead: U. S. Dept. Agr. Office Exper. Sta. Bull. 124, 1903.

How to appropriate the public waters of the State of Nevada, compiled by W. M. Kearney, State engineer, 1911.

Requirements and regulations, including suggestions and instructions in relation to the appropriation, use, and measurement of water in the State of Nevada: State engineer of Nevada, 1912.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

- *1. Pumping water for irrigation, by H. M. Wilson. 1896. 57 pp., 9 pls.
Describes pumps and motive powers, windmills, water wheels, and various kinds of engines, also storage reservoirs to retain pumped water until needed for irrigation.
- *3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.)
Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.
- *8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls.
Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kansas; describes instruments and methods and draws conclusions.
- *14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood. 1898. 91 pp., 1 pl.
Discusses efficiency of pumps and water lifts of various types.
- *20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls.
Includes tables and descriptions of wind wheels, makes comparisons of wheels of several types and discusses results.
- *22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls.
Gives resumé of Water-Supply Paper No. 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.
- 32. Water resources of Puerto Rico, by H. M. Wilson. 1899. 48 pp., 17 pls. 15c.
Describes briefly topography, climate, rivers, irrigation methods, soils, forestation, water power, and transportation facilities.
- *41. The windmill; its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 15c.
- *42. The windmill; its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp., 2 pls. 10c.
Nos. 41 and 42 give details of results of experimental tests with windmills of various types.
- *43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls.
- 44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.
Gives elevations and distance along rivers of the United States, also brief descriptions of many of the streams. Arrangement geographic. Many river profiles are scattered through other reports on surface waters in various parts of the United States.
- *56. Methods of stream measurement. 1901. 51 pp., 12 pls.
Describes the methods used by the Survey in 1901-2. (See also Nos. 64, 94, and 95.)
- 57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. (See No. 149.) 5c.

61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second revised edition was published in 1905 as Water-Supply Paper 149 (q. v.). 5c.

64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged edition published as Water-Supply Paper 95.

- *67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls.

Discusses origin, depth, and amount of underground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of underground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing well; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

77. The water resources of Molokai, Hawaiian Islands, by Waldemar Lindgren. 1903. 62 pp., 4 pls. 10c.

Describes briefly the topography, geology, coral reefs, climate, soils, vegetation, forests, fauna of the island, the springs, running streams and wells, and discusses the utilization of the surface and underground waters.

- *80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effect of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of Reclamation Service, with accompanying papers, compiled by F. H. Newell, Chief Engineer. 1904. 361 pp. 25c.

Contains, in addition to an account of the organization of the hydrographic [water-resources] branch of the United States Geological Survey, and the reports of the conference, the following papers of more or less general interest:

Limits of an irrigation project, by D. W. Ross.

Relation of Federal and State laws to irrigation, by Morris Bien.

Electrical transmission of power for pumping, by H. A. Storrs.

Correct design and stability of high masonry dams, by Geo. Y. Wisner.

Irrigation surveys and the use of the plane-table, by J. B. Lippincott.

The use of alkaline waters for irrigation, by Thomas A. Means.

- *94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls.

Gives instruction for field and office work relating to measurements of stream flow by current meters. (See also No. 95.)

95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. (See also No. 94.)

103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.) 10c.

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiment relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

Notes on the hydrology of Cuba, by M. L. Fuller.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste oil and brine.

114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources, amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formation, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting underground waters in eastern United States.

115. River surveys and profiles made during 1903, by W. C. Hall and J. C. Hoyt. 1905. 115 pp., 4 pls. 10c.

Contains results of surveys made to determine location of undeveloped power sites.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

Scope indicated by title.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879-1904, by M. L. Fuller. 1905. 128 pp. 10c.

Scope indicated by title.

- *122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls.

Scope indicated by title.

144. The normal distribution of chlorine in the natural waters of New York and New England, by D. D. Jackson. 1905. 31 pp., 5 pls. 10c.

Discusses common salt in coast and inland waters, salt as an index to pollution of streams and wells, the solutions and methods used in chlorine determinations, and the use of the normal chlorine map; gives charts and tables for chlorine in the New England States and New York.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, Chief engineer. 1905. 267 pp. 15c.
Contains brief account of the organization of the hydrographic [water-resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of technical papers by members of the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest.
Proposed State code of water laws, by Morris Bien.
Power engineering applied to irrigation problems, by O. H. Ensign.
Estimates on tunneling in irrigation projects, by A. L. Fellows.
Collection of stream-gaging data, by N. C. Grover.
Diamond-drill methods, by G. A. Hammond.
Mean-velocity and area curves, by F. W. Hanna.
Importance of general hydrographic data concerning basins of streams gaged, by R. E. Horton.
Effect of aquatic vegetation on stream flow, by R. E. Horton.
Sanitary regulations governing construction camps, by M. O. Leighton.
Necessity of draining irrigated land, by Thos. H. Means.
Alkali soils, by Thos. H. Means.
Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Siltng of reservoirs, by W. M. Reed.
Farm-unit classification, by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast
147. Destructive floods in United States in 1904, by E. C. Murphy. 15c.
Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and areas of cross section.
149. Preliminary list of deep borings in the United States, second edition with additions, by N. H. Darton. 1905. 175 pp. 10c.
Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other available information, concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 to 61; mentions also principal publications relating to deep borings.
150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.
Scope indicated by title.
151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls. 10c.
Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.
152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.
Scope indicated by title.
155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.
Includes general discussion of fluctuation due to rainfall and evaporation, barometric changes, temperature changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, underground water developments, and to indeterminate causes.
- *160. Underground water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.
Gives account of work in 1905, lists of publications relating to underground waters, and contains the following brief reports of general interest.
Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.
- *162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.
Scope indicated by title.
- *179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.
Describes grain distillation, treatment of slop, sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.
180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.
Scope indicated by title.
- *185. Investigations on the purification of Boston sewage, by C-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.
Discusses composition, disposal, purification, and treatment of sewages and recent tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.
- *186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl. 10c.
Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.
- *187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.
Scope indicated by title.
- *189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls. 5c.
Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts and character of water used, raw material and finished product, and mechanical filtration.
- *194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri v. The State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls. 40c.
Scope indicated by amplification of title.
- *196. Water supply of Nome region, Seward Peninsula, Alaska, 1906, by J. C. Hoyt and F. F. Henshaw. 1907. 52 pp., 6 pls. 15c.
Gives results of measurements of flow of Alaskan streams, discusses available water supply for ditch and pipe lines and power development; presents notes for investors.
- *200. Weir experiments, coefficients, and formulas, revision of paper No. 150, by R. E. Horton. 1907. 195 pp., 38 pls. 35c.
Scope indicated by title.
- *218. Water-supply investigations in Alaska, 1906-7 (Nome and Kougarok regions, Seward Peninsula; Fairbanks district, Yukon-Tanana region), by F. F. Henshaw and C. C. Covert. 1908. 156 pp., 12 pls. 25c.
Describes the drainage basins, gives results of observations at the gaging stations, and discusses the water supply of the ditches and pipe lines, and possibilities of development; gives also meteorological records.
- *226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1908. 37 pp., 1 pl. 10c.
Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.
228. Water-supply investigations of the Yukon-Tanana region, Alaska, 1907 and 1908 (Fairbanks, Circle, and Rampart districts), by C. C. Covert and C. E. Ellsworth. 1909. 108 pp., 7 pls. 20c.
Describes the drainage basins; gives results of observations at gaging stations; discusses the water supplies of the ditches and pipe lines and possibilities of hydraulic development.

- *229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.
Scope indicated by title.
234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.
Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall, by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parke.
- *235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.
Discusses waste waters from wool-scouring, bleaching, and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.
236. The quality of surface waters in the United States: Part I, Analyses of waters east of the one-hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.
Describes collection of samples, method of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.
238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.
Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvement of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.
255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.
Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs, and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.
- *257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.
Discusses amount, distribution, and disposal of rainfall, water-bearing rocks, amount of underground water, artesian conditions and oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties; contamination of well waters and methods of prevention; tests of capacity and measurement of depth; and costs of sinking wells.
258. Underground water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 125 pp., 2 pls. 15c.
Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.
- *259. The underground waters of southwestern Ohio, by M. L. Fuller and F. G. Clapp, with a discussion of the chemical character of the waters, by R. B. Dole. 1912. 228 pp., 9 pls. 35c.
Describes the topography, climate, and geology of the region, the water-bearing formations, the source, mode of occurrence, and head of the waters, and municipal supplies; gives details by counties; discusses in supplement, under chemical character, method of analysis and expression of results, mineral constituents, effect of the constituents on waters for domestic, industrial, or medicinal uses, methods of purification, chemical composition; many analyses and field assays. The matter in the supplement was also published in Water-Supply Paper 254 (The underground waters of north-central Indiana).
274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.
Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of the Rio Grande and of Pecos, Gallinas, and Hondo rivers.

- *280. Gaging stations maintained by the United States Geological Survey, 1888-1910, and Survey publications relating to water resources, compiled by B. D. Wood. 1912. 102 pp. 10c.
314. Surface water supply of Seward Peninsula, Alaska, by F. F. Henshaw and G. L. Parker, with a sketch of the geography and geology by P. S. Smith, and a description of methods of placer mining by A. H. Brooks. 1913. 317 pp., 17 pls. 45c.
Contains results of work at gaging stations.
- *315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.
Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water, and municipal water softening.
- *318. Water resources of Hawaii, 1909-1911, by W. F. Martin and C. H. Pierce. 1913. 552 pp., 15 pls. 50c.
Describes the general features of the islands and gives results of measurements of streams and of observations of rainfall and evaporation; contains a gazetteer.
334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 32 pls. 20c.
Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.
336. Water resources of Hawaii, 1912, by C. H. Pierce and G. K. Larrison. 1914. 392 pp.
Contains results of stream measurements on the islands in 1912.
337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 76 pp., 7 pls. 15c.
Discusses methods of measuring the winter flow of streams.

ANNUAL REPORTS.

- *Fifth Annual Report of the United States Geological Survey, 1883-84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. \$2.25. Contains:
*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlain, pp. 125 to 173, Pl. XXI. Scope indicated by title.
- Twelfth Annual Report of the United States Geological Survey, 1890-91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. \$2. Contains:
*Irrigation in India, by H. M. Wilson, pp. 368-561, Pls. CVII to CXLVI. (See Water-Supply Paper 87.)
- Thirteenth Annual Report of the United States Geological Survey, 1891-92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. Pt. III, Irrigation, pp. xi, 486, 77 plates. \$1.85. Contains:
*American irrigation engineering, by H. M. Wilson, pp. 101-349, Pls. CXI to CXLV. Discusses the economical aspects of irrigation, alkaline drainage, silt and sedimentation; gives brief history of legislation; describes perennial canals in Idaho-California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply pumping and subirrigation.
- Fourteenth Annual Report of the United States Geological Survey, 1892-93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, pp. xx, 597, 73 pls. \$2.10. Contains:
*Potable waters of the eastern United States, by W. J. McGee, pp. 1 to 47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.
*Natural mineral waters of the United States, by A. C. Peale, pp. 49-88, Pls. III and IV. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897-98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, papers chiefly of a theoretical nature, pp. v, 958, 172 plates. \$2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59-294, Pls. VI to XVII. Discusses the amount of water stored in sandstone, in soil, and in other rocks, the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous media, and through sands, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295-384, Pls. XVII. Scope indicated by title.

Twentieth Annual Report of the United States Geological Survey, 1898-99, Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. IV, Hydrography, vii, 660 pp., 75 plates. \$1.40. Contains:

*Hydrography of Nicaragua, by A. P. Davis, pp. 563-637, Pls. LXIV to LXXV. Describes the topographic features of the boundary, the lake basin, and Rio San Juan; gives a brief résumé of the boundary dispute; discusses rainfall, temperature, and relative humidity, evaporation, resources, and productions, the ship, railway, and canal projects; gives the history of the investigations by the Canal Commission, and results of measurements on the Rio Grande, on streams tributary to Lake Nicaragua, and on Rio San Juan and its tributaries.

Twenty-second Annual Report of the United States Geological Survey, 1900-1901, Charles D. Walcott, Director. 1901. (Parts III and IV, 1902.) 4 parts. Pt. IV, Hydrography, 690 pp., 65 pls. \$2.20. Contains:

*Hydrography of the American Isthmus, by A. P. Davis, pp. 507-630, Pls. XXXVII to L. Describes the physiography, temperature, rainfall, and winds of Central America; discusses the hydrography of the Nicaragua Canal route and the Panama Canal route; gives estimated monthly discharges of many of the streams, rainfall, and evaporation tables at various points.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee river basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chatahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses so far as available.

264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 discuss the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to the geologist; describes the general methods of work; gives tabulated records of wells by States, and detailed records selected as affording valuable stratigraphic information.

- *319. Summary of the controlling conditions of artesian flows, by Myron L. Fuller. 1908. 10c.

Describes underground reservoirs, the sources of underground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

- *479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water, and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

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