DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 340—A

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

1885–1913

PART I. NORTH ATLANTIC COAST DRAINAGE BASINS

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.

Part I. NORTH ATLANTIC COAST DRAINAGE BASINS.

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 coast basins.
II. South Atlantic coast 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 coast basins in California.
XII. North Pacific coast basins.

The North Atlantic coast section, to which this part pertains, includes the area drained by streams flowing into the Atlantic Ocean from St. John River in Maine to York River, Va., inclusive. The principal streams in this division are the St. Croix, Machias, Union, Penobscot, Kennebec, Androscoggin, Saco, Merrimac, Mystic, Blackstone, Connecticut, Hudson, Delaware, Susquehanna, Potomac, and Rappahannock. The streams drain wholly or in part the States

of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

This part contains, in addition to the annotated list of publications relating specifically to the section, a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects; also brief references to reports published by State and other organizations (p. 19).

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.
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 Custom House.
Los Angeles, Cal., Federal 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	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
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	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
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.
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 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, 1899–1910.

	1899 [a]	1900 [b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910	1911	1912	1913
North Atlantic coast	35	47, [c] 48	65, 75	82	97	[d] 124, [e] 125, [f] 126	[d] 165, [e] 166, [f] 167	[d] 201, [e] 202, [f] 203	241	261	281	301	321	351
South Atlantic coast 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 Mississippi 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 Coast	38	51	66, 75	85	100	135	[t] 177, 178	214	252	272	292	312	332	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.

In these papers and in the following list 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 1, 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.

GAGING STATIONS.[1]

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

ST. JOHN RIVER BASIN.

St. John River near Dickey, Maine, 1910–11.
St. John River at Fort Kent, Maine, 1905–
St. John River at Van Buren, Maine, 1908–
Allagash River near Allagash, Maine, 1910–11.
St. Francis River at St. Francis, Maine, 1910–11.
Fish River at Wallagrass, Maine, 1903–1908; 1911.
Madawaska River at St. Rose du Degele, Quebec, 1910–1911.
Aroostook River at Fort Fairfield, Maine, 1903–1910.

ST. CROIX RIVER BASIN.

St. Croix River near Woodland, Maine, 1902–1911.
Grand Lake:
West Branch St. Croix River at Baileyville, Maine, 1910–

MACHIAS RIVER BASIN.

Machias River at Whitneyville, Maine, 1903–

UNION RIVER BASIN.

Union River, West Branch (head of Union River), at Amherst, Maine, 1909–
Union River, West Branch, near Mariaville, Maine, 1909.
Union River at Ellsworth, Maine, 1909–10.
Union River, East Branch, near Waltham, Maine, 1909.
Webbs Brook at Waltham, Maine, 1909.
Green Lake (head of Green Lake Stream) at Green Lake, Maine, 1909–
Green Lake Stream at Lakewood, Maine, 1909–
Branch Lake (head of Branch Lake Stream) near Ellsworth, Maine, 1909–
Branch Lake Stream near Ellsworth, Maine, 1909–

[1] St. John River to York River, inclusive.

PENOBSCOT RIVER BASIN.

Penobscot River, West Branch (head of Penobscot), at Millinocket, Maine, 1901–
Penobscot River at West Enfield, Maine, 1901–
Penobscot River at Sunk Haze rips, near Costigan, Maine, 1899–1900.
Penobscot River, East Branch, at Grand Lake Dam, Maine, 1912.
Penobscot River, East Branch, at Grindstone, Maine, 1902–
Mattawamkeag River at Mattawamkeag, Maine, 1902–
Piscataquis River near Foxcroft, Maine, 1902–
Cold Stream Pond (head of Cold Stream), 1900–1911 (record of opening and closing of pond).
Cold Stream at Enfield, Maine, 1904–1906.
Kenduskeag Stream near Bangor, Maine, 1908–
Phillips Lake outlets at Holden and Dedham, Maine, 1904–1908.

KENNEBEC RIVER BASIN.

Moose River (head of Kennebec River) at Rockwood, Maine, 1902–1908; 1910–
Moosehead Lake (on Kennebec River) at Greenville, Maine, 1903–1908 (stage only).
Moosehead Lake at East outlet, Maine, 1895– (stage only).
Kennebec River at The Forks, Maine, 1901–
Kennebec River at Bingham, Maine, 1907–1910.
Kennebec River at North Anson, Maine, 1901–1907.
Kennebec River at Waterville, Maine, 1891–
Kennebec River at Gardiner, Maine, 1785–1910 (record of opening and closing of navigation).
Roach River at Roach River, Maine, 1901–1908.
Dead River at The Forks, Maine, 1901–1907; 1910–
Carrabassett River at North Anson, Maine, 1901–1907.
Sandy River at Farmington, Maine, 1910–
Sandy River at Madison, Maine, 1904–1908.
Sebasticook River at Pittsfield, Maine, 1908–
Messalonskee Stream at Waterville, Maine, 1903–1905.
Cobbosseecontee Lake, Maine, 1839–1911 (dates of opening and closing).
Cobbosseecontee Stream at Gardiner, Maine, 1890–

ANDROSCOGGIN RIVER BASIN.

Rangeley Lake (head of Androscoggin River), Maine, 1879–1911 (dates of opening and closing).
Androscoggin River at Errol Dam, N. H., 1905–
Androscoggin River at Gorham, N. H., 1903 (fragmentary).
Androscoggin River at Shelburne, N. H., 1903–1907 and 1910.
Androscoggin River at Rumford Falls, Maine, 1892–
Androscoggin River at Dixfield, Maine, 1902–1908.
Auburn Lake, Maine, 1890–1911 (date of opening).

PRESUMPSCOT RIVER BASIN.

Presumpscot River at outlet of Sebago Lake, Maine, 1887–

SACO RIVER BASIN.

Saco River near Center Conway, N. H., 1903–1912.
Saco River at West Buxton, Maine, 1907–

MERRIMAC RIVER BASIN.

Pemigewasset River (head of Merrimac River) at Plymouth, N. H., 1886–
Merrimac River at Franklin Junction, N. H., 1903–
Merrimac River at Garvins Falls, N. H., 1904–
Merrimac River at Lawrence, Mass., 1890–
Lake Winnipesaukee at Lakeport, N. H., 1860– (Stage only).
Contoocook River at West Hopkinton, N. H., 1903–1907.
Suncook River at East Pembroke, N. H., 1904–5.
Souhegan River at Merrimac, N. H., 1909–
South Branch of Nashua River at Clinton, Mass., 1896–
Sudbury River at Framingham, Mass., 1875–
Lake Cochituate at Cochituate, Mass., 1863–

MYSTIC RIVER BASIN.

Mystic Lake near Boston, Mass., 1878–1897.

TAUNTON RIVER BASIN.

Matfield River at Elmwood, Mass., 1909–10.
Sautucket River near Elmwood, Mass., 1909–10.

TENMILE RIVER BASIN.

Tenmile River near Rumford, R. I., 1909.

BLACKSTONE RIVER BASIN.

Blackstone River at Woonsocket, R. I., 1904–5.
Blackstone River at Berkeley, R. I., 1901–1902.
Branch River at Branch Village, R. I., 1909–

WOONASQUATUCKETT RIVER BASIN.

Woonasquatuckett River at Olneyville, R. I., 1910.

PAWTUXET RIVER BASIN.

Pawtuxet River at Harris, R. I., 1909–10.

PAWCATUCK RIVER BASIN.

Wood River at Hope Valley, R. I., 1909–10.

THAMES RIVER BASIN.

Shetucket River at Willimantic, Conn., 1904–5.

CONNECTICUT RIVER BASIN.

Connecticut River at Orford, N. H., 1900–
Connecticut River at Sunderland, Mass., 1904–
Connecticut River at Holyoke, Mass., 1880–1898.
Connecticut River at Hartford, Conn., 1896–1908.
Connecticut River at Sunderland, Mass., 1904–
Israel River above South Branch at Jefferson Highlands, N. H., 1903–1906.
Israel River below South Branch at Jefferson Highlands, N. H., 1903–1907.
Passumpsic River at St. Johnsbury Center, Vt., 1903 and 1909–
Ammonoosuc River at Bretton Woods, N. H., 1903–1907.
Zealand River at Twin Mountain, N. H., 1903–1907.
Little River at Twin Mountain, N. H., 1904–5.

Connecticut River tributaries—Continued.
White River at Sharon, Vt., 1903–1905 and 1909–
Ashuelot River at Winchester, N. H., 1903–1905.
Ashuelot River at Hinsdale, N. H., 1907–1911.
Millers River at Wendell, Mass., 1909–1913.
Moss Brook, Wendell, Mass., 1910–
Deerfield River at Hoosac Tunnel, Mass., 1909–
Deerfield River at Shelburne Falls, Mass., 1907–
Deerfield River at Deerfield, Mass., 1904–5.
Ware River at Ware, Mass., 1904–1910; 1911–
Ware River at Gibbs Crossing, Mass., 1912–
Chicopee River:
Burnshirt River near Templeton, Mass., 1909–10.
Swift River at West Ware, Mass., 1910–
Quaboag River at West Warren, Mass., 1904–1907.
Quaboag River at West Brimfield, Mass., 1909–
Westfield River at Knightville, Mass., 1909–
Westfield River at Russell, Mass., 1904–5.
Westfield River, Middle Branch, Goss Heights, Mass., 1910.
Westfield Little River near Blandford, Mass., 1905–
Salmon River at Leesville, Conn., 1905–6.

HOUSATONIC RIVER BASIN.

Housatonic River at Great Barrington, Mass., 1913–
Housatonic River at Gaylordsville, Conn., 1900–
Tenmile River at Dover Plains, N. Y., 1901–1903.

MIANUS RIVER BASIN.

Mianus River near Stamford, Conn., 1903.
Mianus River at Bedford, N. Y., 1903.

BYRAM RIVER BASIN.

Byram River at Pemberwick, Conn., 1903.
Byram River, West Branch, near Port Chester, N. Y., 1903.
Byram River, East Branch, near Greenwich, Conn., 1903.
Byram River, Middle Branch, near Riverville, Conn., 1903–4.

HUDSON RIVER BASIN.

Hudson River at North Creek, N. Y., 1907–
Hudson River at Thurman, N. Y., 1907–
Hudson River at Fort Edward, N. Y., 1895–1908.
Hudson River at Corinth, N. Y., 1904–
Hudson River at Mechanicville, N. Y., 1888–
Hudson River at Spier Falls, N. Y., 1912–
Cedar River near Indian Lake, N. Y., 1910–
Indian Lake Reservoir at Indian Lake, N. Y., 1900–
Indian River below Indian Lake, N. Y., 1912–
Schroon Lake (head of Schroon River) at Pottersville, N. Y., 1908–1910.
Schroon River at Riverbank, N. Y., 1907–
Schroon River at Warrensburg, N. Y., 1895–1902.
Sacandaga River at Wells, N. Y., 1907–1911.
Sacandaga River at Northville, N. Y., 1907–1910.
Sacandaga River near Hope, N. Y., 1911–

Hudson River tributaries—Continued.
Sacandaga River near Hadley, N. Y., 1907–1910.
Sacandaga River (at cable) near Hadley, N. Y., 1910–
Sacandaga River at Union Bag & Paper Co.'s mill at Hadley, N. Y., 1909–1911.
Sacandaga River, West Branch, at Whitehouse, N. Y., 1910–11.
Sacandaga River, West Branch, near Blackbridge, N. Y., 1911–
Battenkill River at Battenville, N. Y., 1908.
Fish Creek at Burgoyne, N. Y., 1904–5; 1908.
Hoosic River above Eagle Bridge, N. Y., 1910–
Hoosic River at Buskirk, N. Y., 1903–1909.
Mohawk River at Ridge Mills near Rome, N. Y., 1898–1900.
Mohawk River at Utica, N. Y., 1901–1903.
Mohawk River at Little Falls, N. Y., 1898–
Mohawk River at Rocky Rift dam near Indian Castle, N. Y., 1901.
Mohawk River at Schenectady, N. Y., 1899–1901.
Mohawk River at Rexford Flats, N. Y., 1898–1901.
Mohawk River at Dunsbach Ferry, N. Y., 1898–
Ninemile Creek at Stittville, N. Y., 1898–9.
Oriskany Creek at Coleman, N. Y., 1904–1906.
Oriskany Creek at Wood Road Bridge, near Oriskany, N. Y., 1901–1904.
Oriskany Creek at Oriskany State dam near Oriskany, N. Y., 1898–1906.
Saquoit Creek at New York Mills, N. Y., 1898–1900.
Nail Creek at Utica, N. Y., 1904.
Reels Creek at Deerfield, N. Y., 1901–1904.
Reels Creek at Utica, N. Y., 1901–2.
Johnson Brook at Deerfield, N. Y., 1903–1905.
Starch Factory Creek at New Hartford, N. Y., 1903–1906.
Graefenberg Creek at New Hartford, N. Y., 1903–1906.
Sylvan Glen Creek at New Hartford, N. Y., 1900–1906.
West Canada Creek at Twin Rock Bridge, near Trenton Falls, N. Y., 1900–
West Canada Creek at Middleville, N. Y., 1898–1901.
West Canada Creek at Kast Bridge, N. Y., 1905–
East Canada Creek at Dolgeville, N. Y., 1898–
Garoga Creek 3 miles above junction with Mohawk River, 1898–99.
Cayadutta Creek at Johnstown, N. Y., 1899–1901.
Schoharie Creek at Prattsville, N. Y., 1902–
Schoharie Creek at Schoharie Falls above Mill Point, 1900–1901.
Schoharie Creek at Mill Point, N. Y., 1900–1903.
Schoharie Creek at Fort Hunter, 1898–1901.
Schoharie Creek at Erie Canal aqueduct, below Fort Hunter, N. Y., 1900.
Quackenkill Creek at Quackenkill, N. Y., 1894.
Normanskill Creek at Frenchs Mill, N. Y., 1891.
Kinderhook Creek at Wilsons Dam near Garfield, N. Y., 1893–94.
Kinderhook Creek at East Nassau, N. Y., 1892–1894.
Kinderhook Creek at Rossman, N. Y., 1906–
Catskill Creek at South Cairo, N. Y., 1901–1907.
Esopus Creek at Olivebridge, N. Y., 1903–4.
Esopus Creek near Olivebridge, N. Y. (weir station), 1906–
Esopus Creek at Kingston, N. Y., 1901–1909.
Esopus Creek at Mount Marion, N. Y., 1907–
Rondout Creek at Rosendale, N. Y., 1901–1903; 1905–
Diversion to Delaware and Hudson Canal at Rosendale, 1901–1907.
Wallkill River at Newpaltz, N. Y., 1901–1903.
Wappinger Creek at Wappinger Falls, N. Y., 1903–1905.

Hudson River tributaries—Continued.
Fishkill Creek at Glenham, N. Y., 1901–1903.
Foundry Brook at Coldspring, N. Y., 1902–3.
Croton River at Croton dam, near Croton Lake, N. Y., 1868–1899.

PASSAIC RIVER BASIN.

Passaic River at Millington, N. J., 1903–1906.
Passaic River near Chatham, N. J., 1902–
Passaic River at Two Bridges (Mountain View), N. J., 1901–1903.
Rockaway River at Boonton, N. J., 1903–4.
Pompton River at Pompton Plains, N. J., 1903–4.
Pompton River at Two Bridges (Mountain View), N. J., 1901–1903.
Ramapo River near Mahwah, N. J., 1903–1908.
Wanaque River at Wanaque, N. J., 1903–1905.

RARITAN RIVER BASIN.

Raritan River at Stanton, N. J., 1903–1906.
Raritan River at Finderne, N. J., 1903–1907.
Raritan River at Boundbrook, N. J., 1903–1909.
Raritan River, North Branch, at Pluckemin, N. J., 1903–1906.
Millstone River at Millstone, N. J., 1903–4.

DELAWARE RIVER BASIN.

Delaware River, East Branch (head of Delaware River), at Hancock, N. Y., 1902–
Delaware River, East Branch, at Fish's Eddy, N. Y., 1912–
Delaware River at Port Jervis, N. Y., 1904–
Delaware River at Riegelsville, N. J., 1906–
Delaware River at Lambertville, N. J., 1897–1908.
Delaware River, West Branch, at Hancock, N. Y., 1902–
Delaware River, West Branch, at Hales Eddy, N. Y., 1912–
Mongaup River near Rio, N. Y., 1909–
Neversink River at Godeffroy, N. Y., 1903; 1909–10; 1911–
Neversink River at Port Jervis, N. Y., 1902–3.
Paulins Kill at Columbia, N. J., 1908–9.
Lehigh River at South Bethlehem, Pa., 1902–1905; 1909–
Lehigh River at Easton, Pa., 1909.
Musconetcong River at Asbury, N. J., 1903.
Musconetcong River near Bloomsbury, N. J., 1903–1907.
Tohickon Creek at Point Pleasant, Pa., 1883–
Neshaminy Creek below Forks, Pa., 1884–
Schuylkill River near Philadelphia, Pa., 1898–
Perkiomen Creek near Frederick, Pa., 1884–
Wissahickon Creek at Philadelphia, Pa., 1897–1906.

SUSQUEHANNA RIVER BASIN.

Susquehanna River at Colliersville, N. Y., 1907–8.
Susquehanna River at Binghampton, N. Y., 1901–1912.
Susquehanna River at Conklin, N. Y., 1912–
Susquehanna River at Wysox, Pa., 1908–9.
Susquehanna River at Wilkes-Barre, Pa., 1899–
Susquehanna River at Danville, Pa., 1899–
Susquehanna River at Harrisburg, Pa., 1891–

Susquehanna River at McCalls Ferry, Pa., 1902–1909.
Chenango River at South Oxford, N. Y., 1903.
Chenango River near Greene, N. Y., 1908.
Chenango River at Binghampton, N. Y., 1901–1912.
Chenango River at Chenango Forks, N. Y., 1912–
Eaton Brook, Madison County, N. Y., 1835.
Madison Brook, Madison County, N. Y., 1835.
Tioughnioga River at Chenango Forks, N. Y., 1903.
Cayuta Creek at Waverly, N. Y., 1898–1902 (data in Water Supply Paper 109 only).
Chemung River at Chemung, N. Y., 1903–
Susquehanna River, West Branch, at Williamsport, Pa., 1895–
Susquehanna River, West Branch, at Allenwood, Pa., 1899–1902.
Juniata River at Newport, Pa., 1899–
Broad Creek at Mill Green, Md., 1904–1909.
Octoraro Creek at Rowlandsville, Md., 1896–1899.
Deer Creek near Churchville, Md., 1904–1909.

GUNPOWDER RIVER BASIN.

Gunpowder Falls at Glencoe, Md., 1904–1909.
Little Gunpowder Falls near Belair, Md., 1904–1909.

PATAPSCO RIVER BASIN.

Patapsco River at Woodstock, Md., 1896–1909.

PATUXENT RIVER BASIN.

Patuxent River at Laurel, Md., 1896–1898.

POTOMAC RIVER BASIN.

Potomac River, North Branch (head of Potomac), at Piedmont, W. Va., 1899–1906.
Potomac River, North Branch, at Cumberland, Md., 1894–1897.
Potomac River at Great Cacapon, W. Va., 1894–1896.
Potomac River at Point of Rocks, Md., 1895–
Potomac River at Chain Bridge, near Washington, D. C., 1891–1895.
Savage River at Bloomington, Md., 1905–6.
Georges Creek at Westernport, Md., 1905–6.
Wills Creek near Cumberland, Md., 1905–6.
Potomac River, South Branch, near Springfield, W. Va., 1894–1896; 1899–1906.
Opequan Creek near Martinsburg, W. Va., 1905–6.
Tuscarora Creek at Martinsburg, W. Va., 1905.
Antietam Creek near Sharpsburg, Md., 1897–1905.
South River at Basic City, Va., 1905–6.
South River at Port Republic, Va., 1895–1899.
Shenandoah River, South Fork (head of Shenandoah River), near Front Royal, Va., 1899–1906.
Shenandoah River at Millville, W. Va., 1895–1909.
North River at Port Republic, Va., 1895–1899.
Lewis Creek near Staunton, Va., 1905–6.
Cooks Creek at Mount Crawford, Va., 1905–6.
Elk Run at Elkton, Va., 1905–6.
Hawksbill Creek near Luray, Va., 1905–6.
Shenandoah River, North Fork, near Riverton, Va., 1899–1906.
Passage Creek at Buckton, Va., 1905–6.

Potomac River tributaries—Continued.
Monocacy River near Frederick, Md., 1896–
Goose Creek near Leesburg, Va., 1909–
Rock Creek at Zoological Park, District of Columbia, 1897–1900.
Rock Creek at Lyons Mill, District of Columbia, 1892–1894.
Occoquan Creek near Occoquan, Va., 1913–

RAPPAHANNOCK RIVER BASIN.

Rappahannock River near Fredericksburg, Va., 1907–

REPORTS ON WATER RESOURCES OF NORTH ATLANTIC COAST.[1]

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.

*24. Water resources of the State of New York, Part I, by G. W. Rafter, 1899, 99 pp., 13 pls.
Describes the principal rivers of New York and their more important tributaries, and gives data on temperature, precipitation, evaporation, and stream flow.

*25. Water resources of the State of New York, Part II, by G. W. Rafter, 1899, 100 pp., 12 pls.
Contains discussion of water storage projects on Genessee and Hudson rivers, power development at Niagara Falls, descriptions and early history of State canals, and a chapter on the use and value of the water powers of the streams and canals; also brief discussion of the water yield of land areas of Long Island.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls.
Gives elevations and distances along rivers of the United States, also brief descriptions of many of the streams, including St. Criox, Penobscot, Kennebec, Androscoggin, Saco, Merrimac Connecticut, Housatonic, Hudson, Mohawk, Delaware, Lehigh, Schuylkill, Susquehanna, Juniata, Potomac, and James rivers. 15c.

*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" give 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.).

*69. Water powers of the State of Maine, by H. A. Pressey. 1902. 124 pp., 14 pls. 20c.
Discusses briefly the geology and forests of Maine and in somewhat greater detail the drainage areas, lake storage, and water powers of the St. Croix, Penobscot, Kennebec, Androscoggin, Presumpscot, Saco, and St. John rivers, and the minor coastal streams; mentions also developed, tidal powers.

*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 water of Raritan, Passaic, and Hudson rivers and their tributaries and the damage resulting from pollution.

[1] For stream-measurement reports see tables on pages 3–4.

*76. Observations on the flow of rivers in the vicintiy of New York City, by H. A. Pressey. 1903. 108 pp., 13 pls. 15c.

Describes methods of measuring stream flow in open channels and under ice, and the quality of the river waters as determined by tests of turbidity, color, alkalinity, and permanent hardness. The streams considered are Catskill, Esopus, Rondout, and Fishkill creeks, and Wallkill, Tenmile, and Housatonic rivers.

*79. Normal and polluted waters in northeastern United States, by M. O. Leighton, 1903. 192 pp. 10c.

Defines essential qualities of water for various uses, the impurities in rain, surface, and underground waters, the meaning and importance of sanitary analyses, and the principal sources of pollution; chiefly "a review of the more readily available records" of examination of water supplies derived from streams in the Merrimac, Connecticut, Housatonic, Delaware, and Ohio River basins; contains many analyses.

88. The Passaic flood of 1902, by G. B. Hollister and M. O. Leighton. 1903. 56 pp., 15 pls. 15c.

Describes the topography of the area drained by the Passaic and its principal tributaries, discusses flood-flow and losses caused by the floods, and makes comparison with previous floods; suggests construction of dam at Mountain View to control flood flow. (See also No. 92.)

*92. The Passaic flood of 1903, by M. O. Leighton. 1904. 48 pp., 7 pls. 5 c.

Discusses flood damages and preventive measures. (See No. 88.)

*102. Contributions to the hydrology of eastern United States, 1903; M. L. Fuller, geologist in charge. 1904. 522 pp. 30c.

Contains brief reports on the wells and springs of the New England States and New York. The reports comprise tabulated well records giving information as to location, owner, depth, yield, head, etc., supplemented by notes as to elevation above sea, material penetrated, temperature, use, and quality; many miscellaneous analyses.

*106. Water resources of the Philadelphia district, by Florence Bascom. 1904. 75 pp., 4 pls. 5c.

Describes the physiography, stratigraphic geology, rainfall, streams, ponds, springs, deep and artesian wells, and public water supplies of the area mapped on the Germantown, Norristown, Philadelphia, and Chester atlas sheets of the United States Geological Survey; compares quality of Delaware and Schuylkill River waters.

*108. Quality of water in the Susquehanna River drainage basin, by M. O. Leighton, with an introductory chapter on physiographic features, by G. B. Hollister. 1904. 76 pp., 4 pls. 15c.

*109. Hydrography of the Susquehanna River drainage basin, by J. C. Hoyt and R. H. Anderson. 1905. 215 pp., 29 pls. 25c.

The scope of No. 108 is sufficiently indicated by its title. No. 109 describes the physical features of the area drained by the Susquehanna and its tributaries, contains the results of measurements of flow at the gaging stations, and discusses precipitation, floods, low water, and water powers.

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

Contains brief reports on water resources, surface and underground, of districts in the North Atlantic coast drainage basins, as shown by the following list:

Drilled wells of the Triassic area of the Connecticut Valley, by W. H. C. Pynchon.

Triassic rocks of the Connecticut Valley as a source of water supply, by M. L. Fuller. Scope indicated by title.

Water resources of the Taconic quadrangle, New York, Massachusetts, and Vermont, by F. B. Taylor. Discusses rainfall, drainage, water powers, lakes and ponds, underground waters, and mineral springs; also quality of spring water as indicated by chemical and sanitary analyses of Sand Spring, near Williamstown.

Water resources of the Watkins Glen quadrangle, New York, by Ralph S. Tarr. Discusses the use of the surface and underground waters for municipal supplies and their quality as indicated by examination of Sixmile and Fall creeks, and sanitary analyses of well water at Ithaca.

Water resources of the central and southwestern highlands of New Jersey, by Laŭrence La Forge. Treats of population, industries, climate, and soils, lakes, ponds, swamps and rivers, mineral springs (with analyses), water power, the Morris Canal; present and prospective sources and quality of municipal supplies.

110. Contributions to the hydrology of eastern United States, 1904—Continued.

Water resources of the Chambersburg and Mercersburg quadrangles, Pennsylvania, by George W. Stose. Describes streams and springs.

Water resources of the Curwensville, Patton, Ebensburg, and Barnesboro quadrangles, Pennsylvania, by F. G. Clapp. Treats briefly of surface and underground waters and their use for municipal supplies; gives analyses of waters at Cresson Springs.

Water resources of the Elders Ridge quadrangle, Pennsylvania, by Ralph W. Stone. Water resources of the Waynesburg quadrangle, Pennsylvania, by Ralph W. Stone. Water resources of the Accident and Grantsville quadrangles, Maryland, by G. C. Martin. Water resources of the Frostburg and Flintstone quadrangles, Maryland and West Virginia, by G. C. Martin. Four short reports describing the relief, drainage, streams, springs, and artesian water supplies of units of the geologic atlas of the United States.

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

Contains brief reports on water supplies of the North Atlantic States as follows:
Maine, by W. S. Bayley.
New Hampshire, by M. L. Fuller.
Vermont, by G. H. Perkins.
Massachusetts and Rhode Island, by W. O. Crosby.
Connecticut, by H. E. Gregory.
New York, by F. B. Weeks.
New Jersey, by G. N. Knapp.
Pennsylvania, by M. L. Fuller.
Delaware, by N. H. Darton.
Maryland, by N. H. Darton and M. L. Fuller.
District of Columbia, by N. H. Darton and M. L. Fuller.
Virginia, by N. H. Darton and M. L. Fuller.

Each of these reports discusses the resources of the public and private water supplies and related subjects, and gives list of pertinent publications; mineral springs are listed and sales of mineral water are reported.

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

Contains chapter on measurement of rate of underflow on Long Island, N. Y.

*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 several brief reports relating chiefly to areas in the North Atlantic coast drainage basins, as follows:

Water resources of the Portsmouth-York region, New Hampshire and Maine, by George Otis Smith. Gives results of investigations made for the War Department to determine water supplies available for forts at mouth of harbor.

Water supply from glacial gravels near Augusta, Maine, by George Otis Smith. Describes the Silver Lake system of ponds near Augusta and the series of springs at the head of Spring Brook.

Water resources of the Pawpaw and Hancock quadrangles, West Virginia, Maryland, and Pennsylvania, by George W. Stose and George C. Martin. Describes rocks, springs, and streams in the area at the northernmost bend of the Potomac; discusses history of development, character of water (with analysis), flow, and origin of Berkeley Springs.

Water of a gravel-filled valley near Tully, N. Y., by George B. Hollister. Describes character of the sands and gravels, the volume of the springs issuing from them, deposits of tufa, the waters of the lakes, and the composition of the spring and lake waters; analyses.

*147. Destructive floods in United States in 1904, by E. C. Murphy. 15c.

Describes floods on Susquehanna and Mohawk rivers and near Johnstown, Pa.

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 and 61; mentions also principal publications relating to deep borings.

*155, Fluctuations of the water level in wells, with special reference to Long Island, New York, 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.

*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.

Contains accounts of floods in North Atlantic coast drainage basins as follows: Flood on Poquonnock River, Connecticut, by T. W. Norcross; flood on the Unadilla and Chenango rivers, New York, by R. E. Horton and C. C. Covert; also estimates of flood discharge and frequency on Kennebec, Androscoggin, Merrimac, Connecticut, Hudson, Passaic, Raritan, Delaware, Susquehanna, and Potomac Rivers; gives index to literature on floods on American streams.

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.

*192. The Potomac River basin (Geographic history; Rainfall and stream flow; Pollution, typhoid fever, and character of water; Relation of soils and forest cover to quality and quantity of surface water; Effect of industrial wastes on fishes), by H. N. Parker, Bailey Willis, R. H. Bolster, W. W. Ashe, and M. C. Marsh. 1907. 364 pp., 10 pls. 60c.

Scope indicated by title.

*198. Water resources of the Kennebec River basin, by H. K. Barrows, with a section on the quality of Kennebec River water, by G. C. Whipple. 1907. 235 pp. 7 pls. 30c.

Describes physical characteristics and geology of the basin, the flow of the streams, evaporation, floods, developed and undeveloped water powers, water storage, log driving, and lumbering; under quality of water discusses effect of tides, pollution, and the epidemic of typhoid fever in 1902–3; contains gazetteer of rivers, lakes, and ponds.

223. Underground waters of southern Maine, by F. G. Clapp, with records of deep wells, by W. S. Bayley. 1908. 268 pp., 24 pls. 55c.

Describes physiography, rivers, water-bearing rocks, amount, source, and temperature of the ground waters, recovery of waters by springs, collection galleries and tunnels, and wells; discusses well-drilling methods, municipal water supplies, and the chemical composition of the ground waters; gives details for each county.

232. Underground water resources of Connecticut, by H. E. Gregory, with a study of the occurrence of water in crystalline rocks, by E. E. Ellis. 1909. 200 pp., 5 pls. 20c.

Describes physiographic features, drainage, forests, climate, streams, lakes, population and industries, rocks; circulation, amount, temperature and contamination of ground water; discusses the ground waters of the crystalline rocks, the Triassic sandstones and traps, and the glacial drift; the quality of the ground waters (with analyses); well construction; temperature, volume, character, uses, and production of spring waters.

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; gives results of analyses of waters of Androscoggin, Hudson, Raritan, Delaware, Susquehanna, Lehigh, Potomac, and Shenandoah rivers.

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*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 four brief reports pertaining especially to districts in the North Atlantic coast drainage area:

Occurrence and composition of well waters in the slates of Maine, by F. G. Clapp. Analyses.

Occurrence and composition of well waters in the granites of New England, by F. G. Clapp. Discusses proportion of successful wells, and water supply and depth. Analyses.

Composition of mineral springs in Maine, by F. G. Clapp.

Saline artesian waters of the Atlantic Coastal Plain, by Samuel Sanford.

Underground waters near Manassas, Va., by F. G. Clapp.

*279. Water resources of the Penobscot River basin, Maine, by H. K. Barrows and C. C. Babb. 1912. 285 pp., 19 pls. 65c.

Describes the topography, drainage, geology, forests, population, industries, transportation lines, and precipitation in the basin; gives results of investigations of stream flow at gaging stations; discusses relation of run-off to precipitation, evaporation, floods, low water, developed and undeveloped water powers, storage, log driving, and lumbering; contains gazetteer of rivers, lakes, and ponds.

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.

*Sixth Annual Report of the United States Geological Survey, 1884–85, J. W. Powell, Director. 1885. xxix, 570 pp., 65 pls. Cloth $2.00. Contains:

Seacoast swamps of the eastern United States, by N. S. Shaler. pp. 353–398. Describes the coast swamps of New England; discusses economic problems connected with marine swamps; gives a detailed account of selected areas of salt marsh lands, and a list of the principal areas of salt marshes between the Hudson River and Portland, Maine.

Tenth Annual Report of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. Pt. I. Geology, xv, 774 pp., 98 pls. Cloth $2.35. Contains:

General account of the fresh-water morasses of the United States, with a description of the Dismal Swamp district of Virginia and North Carolina, by N. S. Shaler, pp. 255–339, Pls. VI to XIX. Scope indicated by title.

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, xx, 597 pp., 73 pls. Cloth $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.

PROFESSIONAL PAPERS.

Professional 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 with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

*44. Underground water resources of Long Island, N. Y., by A. C. Veatch, C. S. Slichter, Isaiah Bowman, W. O. Crosby, and R. E. Horton. 1906. 394 pp., 34 pls. $1.25.

Describes the geologic formations, the source of the ground waters, and requisite conditions for flowing wells; the springs, streams, ponds, and lakes; artesian and deep wells; fluctuation of ground water table; blowing wells and water works; discusses measurements of velocity of underflow, the results of sizing and filtration tests, and the utilization of stream waters; gives well records and notes (with chemical analyses) concerning representative wells.

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.

*138. Artesian-well prospects in the Atlantic Coastal Plain region, by N. H. Darton. 1896. 232 pp., 19 pls. 20c.

Describes the general geologic structure of the Atlantic Coastal Plain region and summarizes the conditions affecting subterranean water in the Coastal Plain; discusses the general geologic relations in New York, southern New Jersey, Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, and eastern Georgia; gives for each of the States a list of the deep wells and discusses well prospects. The notes on the wells that follow the tabulated lists contain many well sections and analyses of the waters.

*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 the geologist; describes the general methods of work; gives tabulated records of wells in Connecticut, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, and District of Columbia, and detailed records of wells at Pleasantville and Atlantic Highlands, N. J., Tully, N. Y., and in Greene and Warren counties, Pa. These wells were selected because they give definite stratigraphic information.

*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 Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia, and detailed records of wells in Newcastle County, Del.; Cumberland County, Maine; Anne Arundel, St. Mary, and Talbot counties, Maryland; Hampshire County, Massachusetts; Monmouth County, New Jersey; Saratoga County, New York; and Somerset County, Pennsylvania. The wells of which detailed sections are given were selected because they afford 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.[1] 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 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

[1] Index maps showing areas in the North Atlantic States covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

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 sells 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 sells 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.

An asterisk (*) indicates that the stock of the folio is exhausted.

13. Fredericksburg, Virginia-Maryland, 1894. 5c.
23. Nomini, Maryland-Virginia, 1896. 5c.
*70. Washington, District of Columbia-Maryland-Virginia, 1900.
80. Norfolk, Virginia-North Carolina, 1902. 5c.

Describes the plains, Dismal Swamp, and the tidal marshes; discusses the reclamation of swamp lands and gives an account of the underground waters; gives sections of wells near Norfolk and at Fort Monroe, and analyses of waters from the test boring at Norfolk and the boring at Lambert Point.

*83. New York City (Paterson, Harlem, Staten Island, and Brooklyn quadrangles), New York-New Jersey, 1902.

Discusses the present and future water supply of New York City.

136. St. Marys, Maryland-Virginia, 1906. 5c

Discusses artesian wells.

137. Dover, Delaware-Maryland-New Jersey, 1906. 5c.

Describes the shallow and deep wells used as sources of water supply; gives section of well at Middletown, Del.

149. Penobscot Bay, Maine, 1907. 5c.

Describes the wells and springs; gives analyses of spring water from North Bluehill.

152. Patuxent, Maryland-District of Columbia, 1907. 5c.

Discusses the springs, shallow wells, and artesian wells.

*157. Passaic, New Jersey-New York, 1908.

Discusses the underground water of the quadrangle, including the cities of Newark, Hoboken, Jersey City, Paterson, Elizabeth, Passaic, Plainfield, Rahway, and Perth Amboy, and a portion of the city of New York; gives a list of the deep borings in the New Jersey portion of the quadrangle, and notes concerning wells on Staten Island, Long Island, Hoffman Island, and Governors Island.

158. Rockland, Maine, 1908. 5c.

Describes the water supply in Knox County, Maine, of which Rockland is the principal city; discusses the water obtained from wells drilled in limestone and granite, and the city water supply of Camden, Rockport, Rockland, and Thomaston.

160. Accident-Grantsville, Maryland-Pennsylvania-West Virginia, 1908. 5c.

Describes two quadrangles lying chiefly in Garrett County, Md.; the waters of the Accident quadrangle pass north and west to rivers that join the Ohio; those of the Grantsville quadrangle are about equally divided between tributaries of the Ohio and of Savage River and Georges Creek which flow into the Potomac; under "Mineral Resources" the folio describes Youghiogheny and Castleman rivers, Savage River, and Georges Creek, and the spring waters; notes possibility of obtaining artesian water.

161. Franklin Furnace, New Jersey, 1908. 5c.

Describes the streams, water powers, and ground waters of a district in northwestern New Jersey, mainly in Sussex County but including also a small part of Morris County; gives tabulated list of water powers and of bored wells.

*162. Philadelphia (Norristown, Germantown, Chester, and Philadelphia quadrangles), Pennsylvania-New Jersey-Delaware, 1909.

Describes the tributaries of the Delaware that traverse the area, the underground waters of the Piedmont Plateau and the Coastal Plain, and gives a tabulated list of wells; discusses the water supply of Philadelphia and Camden, also suburban towns; gives analyses of filtered water of Pickering Creek.

167. Trenton, New Jersey-Pennsylvania, 1909. 5c.

Describes streams tributary to Raritan and Delaware rivers (including estimates of capacity with and without storage) and the springs and wells; discusses also the public water supply of Trenton and suburban towns.

169. Watkins Glen-Catatonk, New York, 1909. 5c.

Describes the rivers which include tributaries of the Susquehanna and the St. Lawrence, the lakes and swamps, and, under "Economic geology," springs and shallow and deep wells; discusses also water supply at Ithaca.

170. Mercersburg-Chambersburg, Pennsylvania, 1909. 5c.

Describes two quadrangles which are drained almost wholly into Potomac River chiefly through Conococheague Creek and its tributaries; describes the underground waters, including limestone springs, sandstone springs, and wells, and mentions briefly the sources of the water supplies of the principal towns.

182. Choptank, Maryland, 1912. 5c.

The Choptank quadrangle includes the entire width of Chesapeake Bay and portions of many large estuaries.

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 North Atlantic States are the reports of the Maine State Water Storage Commission (Augusta), the New Hampshire Forestry Commission (Concord), the Metropolitan Water and Sewerage Board (Boston, Mass.), the New York State Water Supply Commission (Albany), the New York State Conservation Commission (Albany), the New York State engineer and surveyor (Albany), the various commissions on water supply of New York City, the Geological Survey of New Jersey (Trenton), State boards of health, and the Tenth Census (vol. 16).

The following reports deserve special mention:

Water power of Maine, by Walter Wells, Augusta, 1869.

Hydrology of the State of New York, by G. W. Rafter; New York State Museum Bull. 85, 1905.

Hydrography of Virginia, by N. C. Grover and R. H. Bolster: Virginia Geol. Survey Bull. 3, 1906.

Underground waters of the Coastal Plain province of Virginia, by Samuel Sanford: Virginia Geol. Survey Bull. 5, 1913.

Many of these reports can be obtained by applying to the several commissions, and most of them can be consulted in the public libraries of the larger cities.

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 résumé 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. 15c.

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.

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. 15c.

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. 10c.

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.

*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 formations, recovery of water by springs, wells and pumps, essential condition of artesian flows, and general conditions affecting underground waters in eastern United States.

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 valley, 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. 5c.

Scope indicated by title.

*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.

*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.

*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, New York, 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. 10c.

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 pipelines 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. Parker.

*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 and 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 water works 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 gazetteer and a glossary of Hawaiian words in common use.

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 (in press March 1, 1914).

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. 363–561, 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 sub-irrigation.

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 groundwater, 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 of maps with Pt. V. Pt. IV, Hydrography, vii, 660 pp., 75 plates. $1.85. 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, exaporation, 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, and rainfall and evaporation tables at various points.

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.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; GF=Geologic folio. For titles see preceding pages.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.