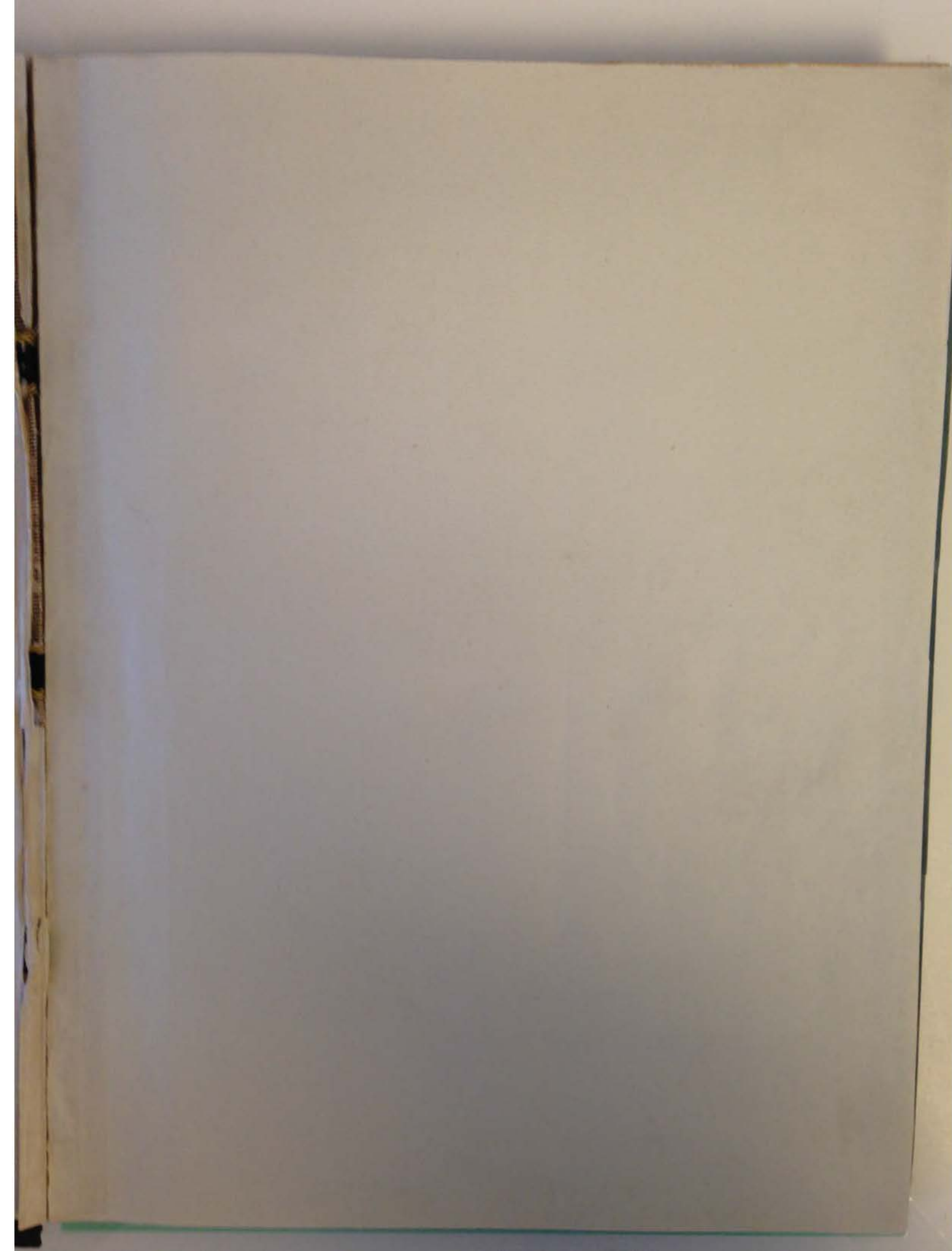


HYDROMETRIC WORK
ON
UPPER BOISE RIVER, IDAHO
1916



RECEIVED
NOV 1 1914
OFFICE OF STATE ENGINEER

Boise, Idaho, November 6, 1916.

Mr. D. W. Cole,
Senior Engineer, U.S.R.S.,
Boise, Idaho.

Dear Sir:-

I take pleasure in transmitting herewith the final report of Mr. A. W. Harrington, Junior Engineer, U.S.G.S., summarizing his work on upper Boise River during the season of 1916.

This report has been prepared in compliance with your verbal request and supersedes all preliminary data heretofore furnished.

In general, the work has been carried on in accordance with our memorandum agreement dated March 24, 1916, copy of which is included herein. By mutual agreement, however, Mr. Harrington's field work was terminated on October 3 and he reported at Boise on the following day and began immediately the final preparation of the field data obtained. On this account and because of the very slight drop in the level of the water in Arrowrock Reservoir between October 1 and 15, it has been thought best to terminate all computations contained in this report at the end of September. Supplementary computations can be made covering the period from October 1 to 15 and submitted at a later date if desirable.

The work, both in the field and in the office, has been carried on under my general supervision, but except for the general plans and for later checking and revision of data, Mr. Harrington is primarily responsible for the data presented and he should be given most of the credit for the results obtained. In company with Mr. A. C. Price of your office, I made one field inspection trip during the early part of the season and, in addition, I have at all times been in close touch with the work through the medium of telephone conversation, correspondence, field records, and the review of preliminary computations. The results as presented herein by Mr. Harrington, as well as the methods followed in deriving them, are believed to be fully explained but it seems desirable to call your attention particularly to the following:

1. As the work was originally planned, it was not intended to attempt to compute capacities from data obtained on the rising stage of the reservoir, but this was later done in order to afford a check and comparison with the results obtained on the falling stage, during which the conditions pertaining in the field were much more favorable for securing accurate records. This comparison has proved especially valuable because of the additional information afforded concerning the ground storage or loss.

2. No data were obtained by Mr. Harrington which would furnish any check on the capacities of the Arrowrock Reservoir below elevation 3130 and, consequently, the capacity of 99,000 acre-feet at this elevation which was used as the initial point for all computations is based upon data compiled during 1915 by Messrs. Steward and Price of your office.

3. On account of the importance of determining just what storage capacity can be relied upon for the future, special emphasis should be placed upon the desirability of securing similar data next year and perhaps also during succeeding years in order to determine the variation in loss and return flow attributable to ground storage.

Acknowledgment is made to the United States Weather Bureau for gage heights at the station on Cottonwood Creek during the period covered by this investigation. A number of current meter measurements were also secured and made available by Messrs. Steward, Price, and others connected with your office.

Complete copies of this report are being furnished to the following:

Mr. J. H. Smith, State Engineer, Boise, Idaho;
Chief Hydraulic Engineer, U. S. Geological
Survey, Washington, D. C.;
District Office, U. S. Geological Survey,
Boise, Idaho;
Mr. A. W. Harrington, author, U.S.G.S.,
Boise, Idaho.

Additional copies can be furnished upon request for the nominal expense of duplication.

Respectfully yours,

G. Clyde Baldwin
District Engineer.

Boise, Idaho, November 3, 1916.

Mr. G. Clyde Baldwin,
District Engineer, U.S.G.S.,
Boise, Idaho.

Dear Sir:-

I am pleased to submit herewith my report covering the special hydrometric work carried on by me in the upper Boise River drainage during the past season.

Headquarters were established at Arrowrock on April 1 and maintained until October 4, when field operations were terminated, and I returned to Boise.

The work was conducted as far as possible in accordance with the terms of the memorandum agreement dated March 24, 1916, and the results of the investigation are believed to cover fully the points outlined therein.

Yours respectfully,

Arthur W. Harrington

Junior Engineer.

UNITED STATES GEOLOGICAL SURVEY

WATER RESOURCES BRANCH

HYDROMETRIC WORK

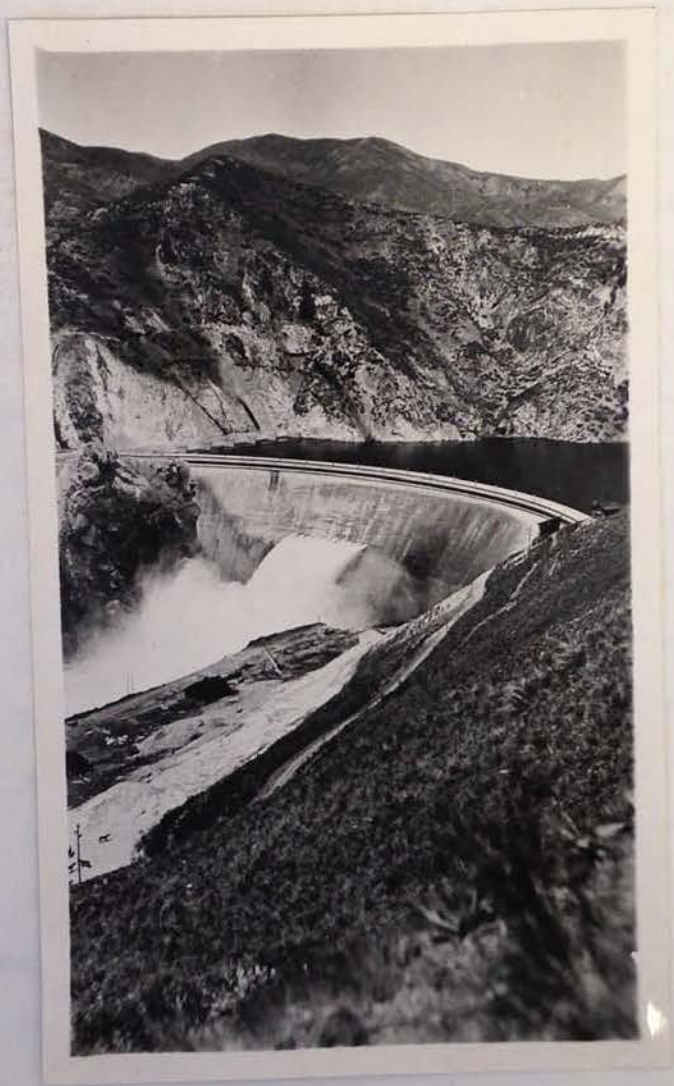
ON

UPPER BOISE RIVER, IDAHO

1916

BY

ARTHUR W. HARRINGTON



Arrowrock Dam.

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different water levels.

3. To make readily available to the State Engineer and to the United States Reclamation Service, daily throughout the season for which period, or much of this information as may be required to determine (first) the total flow of the river below the mouth of Moore Creek and (second) to aggregate this quantity correctly between normal flow and

OUTLINE OF SPECIAL BOISE RIVER WORK AS AGREED UPON.

MARCH 20, 1916, BY J. H. SMITH, STATE ENGINEER, F. H.

WILKIE, DEPUTY STATE ENGINEER, D. W. COLE, PROJECT

MANAGER, U.S.R.S., AND G. C. BALDWIN, DISTRICT ENGINEER,

U.S.G.S.

Period of Field Work.

April 1, 1916, to October 15, 1916.

Object of Work.

1. To continue the maintenance of the following regular gaging-stations in the Boise drainage basin which are now being operated by either the United States Reclamation Service or the United States Geological Survey. The stations are:

Boise River near Twin Springs
Boise River at Dowling
Boise River below Moore Creek
Boise River, South Fork, near Lenox
Moore Creek near Arrowrock
Cottonwood Creek near Arrowrock
Smith Creek near Lenox
Long Gulch Creek near Lenox
Rattlesnake Creek near Lenox
Willow Creek near Lenox.

2. To obtain such additional hydrometric data concerning flow of the small streams entering the river or reservoir between the main river stations as may be necessary in order to check reservoir capacities at different water levels.

3. To make readily available to the State Engineer and to the United States Reclamation Service, daily throughout the summer low water period, so much of this information as may be required to determine (first) the total flow of the river below the mouth of Moore Creek and (second) to segregate this quantity correctly between normal flow and

stored water. Records, and other data are to be open to inspection at any time and the finally computed records of stream flow will be

Personnel.

Mr. A. W. Harrington, Junior Engineer, U.S.G.S., will be in active charge of the above outlined work under the supervision of the local District Engineer, U.S.G.S. The employment of local gage readers, laborers, and other assistants, is authorized if necessary to accomplish the above outlined objects, but except in the case of an emergency, any increase in expenditures of this character over and above present amounts, must first be approved by the Project Manager for the Boise Project of the U. S. Reclamation Service.

Methods.

The standard methods to be followed will be those adopted by the United States Geological Survey for carrying on hydrometric work.

Records.

Mr. Harrington will establish field headquarters at Arrowrock.

A telephone will be installed for Mr. Harrington and connected with the Government line in order to facilitate communication with local gage readers, and with the offices in Boise. All records will be received, computed, and recorded, first by Mr. Harrington at his field headquarters, after which they will be forwarded to the Boise office of the United States Geological Survey, by mail, where all computations will be checked. Gage heights and other current information will be phoned daily to the State Engineer and to the Boise office of the Reclamation Service, and those observers who do not have direct telephone connection will be instructed to send weekly reports of gage readings direct to these offices, when desired.

1

All notes, records, and other data are to be open to inspection at any time and the finally computed records of stream flow will be published in the Water-Supply Papers of the United States Geological Survey.

Cost.

It is understood that the cost of this work will be paid by the United States Reclamation Service by transfer of funds to the United States Geological Survey upon the presentation of approved claims in accordance with the inter-bureau system heretofore effective.

Memorandum prepared March 24, 1916, by

Res. Stations. Of the ten gaging-stations maintained during the period of the investigation, seven are above and three below Arrowrock Reservoir.

(sgd.) G. CLYDE BALDWIN

The seven upper stations consisted of District Engineer, U.S.G.S. Ivy, Ottoburn Creek, and the South Fork of Snake River with its tributaries Smith, Long Gulch, Kettlecreek, and Willow creeks. These stations give a record of practically the entire surface flow entering Arrowrock Reservoir.

Below the reservoir and station was located on Snake River at leading's ranch about four miles below Arrowrock was on Snake Creek, and one and a half miles below Snake Creek was on the Highland stream. There is practically no inflow between Arrowrock Reservoir and the leading station, as Snake Creek is the only tributary stream which enters the river between the leading and Highland stations.

Photographs of some of the different stations are shown on plates 1 to 5.

Measuring Instruments. During the course of the work, 2 1/2 current meter measurements were made at regular stations, and four measurements at other points. At each station, an effort was made to secure not only frequent measurements, but also measurements at varying stages of the stream, so that first class ratings might be prepared for all stages of flow.

OBJECT OF THE INVESTIGATION

The object of this investigation was understood to be threefold, as follows:

First, to continue the maintenance of ten stream-gaging stations on Boise River and tributaries heretofore operated by either the United States Reclamation Service or the United States Geological Survey.

Second, to secure information concerning the capacity of Arrowrock Reservoir at different levels, from a study of inflow and outflow data.

Third, to furnish during part of the season such daily information as stage heights, etc., as might be required to segregate the total flow of the river below Arrowrock Dam between normal stream-flow and stored water.

These subjects will be considered in their order.

1. MAINTENANCE OF GAGING-STATIONS

The Stations. Of the ten gaging-stations maintained during the period of the investigation, seven are above and three below Arrowrock Reservoir.

The seven upper stations consisted of Boise River with one tributary, Cottonwood Creek, and the South Fork of Boise River with four tributaries: Blith, Long Gulch, Rattlesnake, and Willow creeks. These stations give a record of practically the entire surface flow entering Arrowrock Reservoir.

Below the reservoir one station was located on Boise River at Dowling's ranch about four miles below Arrowrock; one on Moore Creek, and one on Boise River below Moore Creek commonly called the Highland station. There is practically no inflow between Arrowrock Dam and the Dowling station, and Moore Creek is the only tributary stream which enters the river between the Dowling and Highland stations.

Photographs of some of the different stations are shown on plates 1 to 5.

Measurements. During the course of the work, 194 current meter measurements were made at regular stations, and four measurements at other points. At each station, an effort was made to secure not only frequent measurements, but also measurements at varying stages of the streams, so that first class ratings might be prepared for all stages of flow.



Gaging Station on Boise River at Dowling's.



Gaging Station on Boise River below Moore Creek, looking
downstream.



Gaging Station on Boise River near Twin Springs.



Willow Creek near Lenox, looking downstream. Gage is on large boulder near center of picture.

Transportation. Since the upper stations are at considerable distances from Arrowrock, much time was necessarily expended in travel. The station on the South Fork is distant about 23 miles from Arrowrock by the most direct route and the upper Boise River station near Twin Springs is about 19 miles away. The use of a motor boat belonging to the United States Reclamation Service greatly facilitated visiting the upper stations, it being possible to travel by boat nearly 17 miles from Arrowrock to backwater on either the main river or the South Fork when the reservoir was full. A saddle horse was used when practicable to supplement the boat in reaching the most distant stations. In visiting the stations below the reservoir, a hand speeder was used to advantage on the tracks of the Arrowrock Railroad.

Records of Gage Height and Discharge. Gage height records at all four main river stations were secured from Fries water stage recorders which are permanently installed at these points. These recorders are in charge of competent observers, and received also considerable personal attention from the writer. Most excellent gage height records were secured at these stations, and the discharge records are considered correspondingly good.

Staff gage readings were made twice daily on Cottonwood Creek by a reliable observer, and as permanent rating conditions are assured at this station by a concrete artificial control, this record, also, is a first class one.

The gage height record on Rattlesnake Creek was furnished jointly by two observers, and staff gage readings were made during the season about five times per week. A large number of discharge measurements were made at this station, and the record is considered good.

On account of their inaccessible location, it was not considered feasible to make staff gage readings on Smith, Long Gulch, and Willow creeks oftener than about three times per week. The local observer was fairly reliable, but as these streams are more or less subject to sudden changes of stage, the records of flow secured can at best be considered only fair.

Daily gage readings were made at the station on Moore Creek during most of the period, and a large number of current meter measurements were secured. This record may be classed as good.

In Appendix "A" are presented records of daily discharge at each of the ten stations, together with monthly summaries of flow, and, where practicable, data on run-off from drainage areas are given.

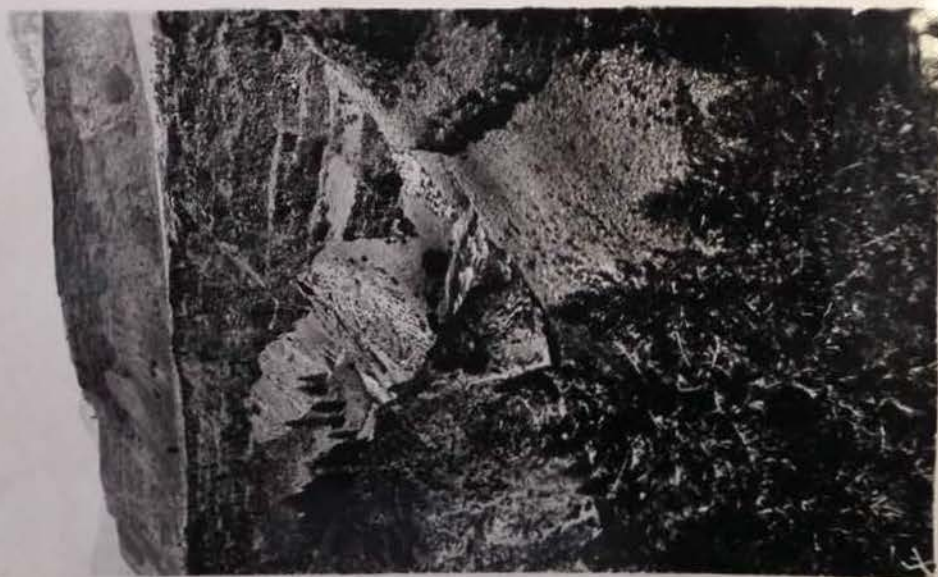
Table "A" shows the run-off of Boise River at the Twin Springs station and of the South Fork for the last five years for which United States Geological Survey records are available. It will be noted that the run-off for 1916 was the highest during the period.

TABLE A
RUNOFF OF BOISE RIVER ABOVE ARROWROCK RESERVOIR

YEAR ENDING SEPT. 30	BOISE R. NEAR TWIN SPRINGS		S. FORK BOISE R. NEAR LENOX	
	Runoff (acre feet)	Depth in inches on drainage area	Runoff (acre feet)	Depth in inches on drainage area
1912	1,030,000	23.27	871,000	15.01
1913	918,000	20.74	752,000	12.94
1914	924,000	20.87	869,000	14.95
1915	541,000	12.22	469,000	8.08
1916	1,110,000	25.06	1,000,000	17.25
5 Year Means	905,000	20.43	792,000	13.65



Gaging Station on Long Gulch Creek near Lenox.



Canyon of South Fork of Boise River looking downstream from road just above mouth of Smith Creek.

2. CAPACITY OF ARROWROCK RESERVOIR

General Statement. One very important object of this investigation was to secure information on the capacity of Arrowrock Reservoir by using the figures for inflow and outflow from the regular stream-flow records, and by obtaining such further data on evaporation losses, reservoir gage heights, and miscellaneous inflow as might be required. It was thought that it would be of interest to compare the capacity figures derived in this way with those based on the topographical survey of the reservoir site made during the construction period by engineers of the United States Reclamation Service.

Table 1 has been prepared to cover the period during which the elevation of the reservoir surface was raised from 3130.0 feet on April 15 to 3212.6 feet on July 8. Table 2 covers the period from July 8 to September 30, during which the reservoir was drawn down to 3130.0 feet. It is a coincidence that both periods were of the same duration, 84 days. The change in level in the reservoir is the same for both, 82.6 feet. An excellent opportunity is thus afforded for studying the behavior of the reservoir under exactly opposite conditions. The methods of computation can best be followed by reference to the tables, which will now be considered.

Inflow into Reservoir. In columns 2 to 7, tables 1 and 2, is given the daily flow into the reservoir from the principal tributary streams in second-feet, beginning April 15. These figures are taken directly from the daily discharge records in Appendix "A".

It was necessary, however, to estimate the amount of water entering the reservoir from the numerous small streams and waterways on which no gages could be maintained, and these estimates are shown in column 8. The actual base data from which this estimate was made, are somewhat meager, and depend largely on the intimate acquaintance of the writer with all of these streams. During the rising period, these figures may be somewhat in error, but the amount of inflow from these sources diminished rapidly as the season progressed, and during the period of reservoir subsidence their total discharge was so small that accurate estimates were easily possible. On Plate 7 are shown results of estimates of this unmeasured flow, stream by stream, for several different days, which estimates are believed to be reasonably accurate. The assumption was made that the flow in these small streams varied in general from day to day in about the same manner as Cottonwood Creek, since the characteristics of the smaller watersheds resemble closely conditions in the Cottonwood Creek drainage. Plate 7 presents a hydrograph of Cottonwood Creek from April 15 to July 8, together with a graph derived therefrom upon which the data in column 8 are based.

Practically no water entered the South Fork from Long Gulch Creek subsequent to May 14 when the flow of the stream was entirely diverted,

Office of U.S. Geological Survey

Boise, Idaho

Oct. 17, 1916

ARROWROCK

Computed from water measurements

R.N.M.

1 DATE 1916	INFLOW INTO RESERVOIR IN SECOND- FEET									10 OUTFLOW	11	12
	2 Boise River	3 S. Fork Boise R.	4 Little Snake Creek	5 Smith Creek	6 Cotton- Wood Creek	7 Wil- low Cr.	7A Long Swamp Cr.	8 Misc.	9 TOTAL	BOISE R. AT DOWLING'S [Sec. feet]	DIFFERENCE BETWEEN 9 AND 10 [Sec. feet]	EVAP. LOSS [Acres]
15	3550	3990	128	213	99	126	24	99	8230	6090	2140	17
16	3460	3990	122	202	89	124	23	98	8110	6090	2020	18
17	3200	3840	116	192	89	113	22	97	7670	6520	1150	18
18	3020	3990	110	181	75	102	20	96	7590	6810	780	18
19	2690	3400	114	168	66	91	18	95	6640	6520	120	19
20	2360	2870	119	156	68	88	16	95	5770	6230	-460	18
21	2360	2940	92	143	69	85	14	94	5800	6230	-430	18
22	2440	3130	99	156	72	81	14	93	6080	6230	-150	18
23	2520	3260	106	169	77	78	13	92	6320	6230	90	18
24	3280	3840	112	182	101	70	12	92	7690	6230	1460	18
25	4260	4640	119	195	101	62	11	91	9480	6370	3110	19
26	5270	5510	119	239	107	55	11	91	11400	6370	5030	20
27	6030	6240	119	232	123	53	11	90	12900	6660	6240	21
28	5460	5880	119	224	121	51	10	90	11960	6950	5010	22
29	4540	4990	117	205	92	50	10	89	10090	7100	2990	23
30	3900	4310	114	187	92	48	10	89	8750	7250	1500	23
MAY 1	3810	4150	112	168	89	45	9	88	8470	7420	1050	28
2	4170	4310	110	168	82	41	8	87	8980	7420	1560	28
3	4720	4640	113	168	85	37	8	86	9860	7570	2290	29
4	5650	5510	116	168	85	33	7	85	11650	7730	3920	29
5	6410	6240	119	168	89	31	7	83	13150	8050	5100	30
6	6800	6620	117	175	94	29	6	81	13920	8210	5710	31
7	7390	7180	114	182	89	29	6	74	15060	8540	6520	33
8	6220	6430	112	188	79	29	4	67	13130	8870	4260	34
9	5650	5880	110	195	69	26	4	65	12000	9040	2960	34
10	4720	4990	98	170	69	24	4	65	10140	9040	1100	35
11	3990	4310	86	146	71	23	3	64	8690	9040	-350	35
12	3370	3690	74	121	69	22	3	58	7410	9040	-1630	35
13	2940	3260	56	111	63	20	2	52	6500	8870	-2370	34
14	2600	2940	59	105	53	20	2	50	5830	8870	-3040	34

RESERVOIR CAPACITY

and records of inflow, outflow and evaporation.

Table 1
Rising Reservoir
Sheet 1-5

13 NET STORAGE (Acres-feet)	RESERVOIR GAGE HT.		RESERVOIR VOLUME- ACRE FEET			RESERVOIR AREA- ACRES			AREA CAPACITY TABLE		
	14 8:30 A.M. [Corrected]	15 INTERMEDIATE NOON	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]	1 RESERVOIR ELEVATION	2 AREA IN ACRES	3 VOLUME IN ACRE FEET
7	4220	3129.0	3129.4	98,060	80,090	17,970	1700	1390	310	3213	320,400
8	3982	3131.8	3132.1	102,160	83,930	18,230	1800	1440	340	3212	316,000
8	2259	3133.7	3133.8	105,280	86,410	18,870	1800	1470	330	3211	311,700
8	1526	3134.5	3134.55	107,170	87,530	19,640	1800	1480	320	3210	307,400
9	219	3134.9	3134.9	108,040	88,050	19,990	1800	1490	310	3209	303,200
18	- 929	3134.8	3134.75	107,690	87,820	19,870	1800	1480	320	3208	299,100
18	- 869	3134.3	3134.25	106,790	87,080	19,710	1800	1470	330	3207	295,100
18	- 315	3134.0	3134.0	106,200	86,710	19,490	1800	1470	330	3206	291,100
18	160	3134.0	3134.05	106,120	86,780	19,340	1800	1470	330	3205	287,200
18	2873	3134.4	3134.7	107,640	87,750	19,890	1800	1480	320	3204	283,400
19	6139	3136.3	3136.9	112,140	91,070	21,070	1900	1520	380	3203	279,700
20	9939	3140.3	3141.2	120,180	97,790	22,390	1900	1590	310	3202	276,000
21	12334	3146.3	3147.1	131,320	107,510	23,810	2100	1690	410	3201	272,300
22	9898	3151.7	3152.3	142,440	116,560	25,880	2200	1770	430	3200	268,700
23	5897	3155.7	3156.0	150,340	123,250	27,090	2300	1830	470	3199	265,100
25	2947	3157.7	3157.85	154,760	126,680	28,080	2300	1860	440	3198	261,700
28	2051	3158.6	3158.75	157,260	128,310	28,950	2400	1870	530	3197	258,500
28	3061	3159.5	3159.7	159,810	130,150	29,660	2400	1890	510	3196	255,400
29	4505	3160.7	3161.05	163,600	133,110	30,490	2400	1910	490	3195	252,400
29	7733	3163.0	3163.5	169,710	137,460	32,250	2400	1950	450	3194	249,400
30	10068	3166.3	3167.0	178,610	144,400	34,210	2400	2000	400	3193	246,500
31	11275	3170.95	3171.75	189,290	154,150	35,140	2500	2080	420	3192	243,600
33	12877	3176.35	3176.95	201,360	165,760	35,600	2600	2170	430	3191	240,700
34	8401	3180.55	3180.95	212,000	174,160	37,840	2600	2260	340	3190	237,800
34	5827	3183.35	3183.6	219,120	180,220	38,900	2800	2300	500	3189	234,900
35	2143	3185.05	3185.1	223,100	183,710	39,390	2800	2340	460	3188	232,000
35	- 728	3185.25	3185.15	223,810	183,830	39,980	2800	2340	460	3187	229,200
35	- 3263	3184.65	3184.45	221,810	182,190	39,620	2800	2320	480	3186	226,400
34	- 4727	3183.15	3182.9	217,820	178,600	39,220	2800	2300	500	3185	223,600
34	- 6053	3181.25	3180.95	212,430	174,160	38,270	2600	2260	340	3184	220,800

Office of U.S. Geological Survey
Boise, Idaho
Oct. 17, 1916

ARROWROCK

Computed from water measurements

R.M.H.

1 DATE 1916	INFLOW INTO RESERVOIR IN SECOND - FEET								10 OUTFLOW	11 DIFFERENCE BETWEEN 9 AND 10 [Sec. feet]	12 EVALUATION LOS ANGELES [Acres]
	2 Boise River	3 S. Fork Boise R.	4 Rattle- Snake Creek	5 Smith Creek	6 Cotton- Wood Creek	7 Willow Creek	8 Misc.	9 TOTAL	Boise R. at Downings [Sec. feet]		
May 15	2520	2750	62	99	43	20	46	5540	5710	-3170	31
16	2520	2630	65	93	43	19	40	5420	5540	-3120	32
17	2690	2630	60	93	43	20	44	5580	5370	-2790	32
18	3110	2870	66	110	58	21	42	6280	6820	-540	31
19	3640	3540	65	126	53	22	41	7490	5700	1790	32
20	3810	3540	74	121	50	23	40	7660	6240	1420	32
21	3990	3690	71	116	48	24	39	7980	6820	1160	32
22	3810	3690	68	111	40	25	38	7780	7260	520	32
23	3370	3400	65	106	38	26	37	7040	7750	-690	32
24	3110	3130	62	100	42	27	36	6510	7570	-1060	32
25	2850	3000	59	95	46	26	36	6110	7110	-1000	32
26	2400	2750	56	89	42	24	35	5600	6380	-780	32
27	2440	2570	58	90	38	23	35	5250	5300	-50	32
28	2520	2440	60	92	40	22	35	5230	4500	730	32
29	2690	2520	60	93	40	22	35	5460	4100	1360	32
30	2770	2570	60	94	39	21	35	5590	4100	1490	32
31	5940	2690	60	95	39	18	35	5880	4100	1780	33
June 1	2940	2750	60	97	39	15	35	5940	4210	1730	37
2	2850	2690	60	98	40	15	35	5790	4210	1580	37
3	3200	2810	64	108	40	18	35	6280	4320	1960	38
4	3900	3260	67	118	40	20	35	7440	4770	2670	38
5	4540	3840	70	129	42	18	35	8670	5880	2790	39
6	4810	4150	74	139	42	17	35	9270	6280	2990	39
7	4900	4150	83	149	43	15	35	9380	6410	2970	40
8	5090	4310	83	143	42	14	34	9720	6410	3310	41
9	5660	4640	78	138	43	12	33	10400	6470	3430	42
10	5650	4810	76	136	40	11	33	10760	7550	3210	42
11	5270	4930	74	135	36	11	31	10040	7700	2340	43
12	4720	4150	74	134	33	10	30	9150	7700	1450	44
13	4630	3840	65	132	33	7	28	8740	7700	1040	44

ROCK RESERVOIR CAPACITY

BASE and records of inflow, outflow and evaporation.

Table
Rising Reservoir
Sheet 2 of 2

12 ELEVATION (Feet)	13 NET STORAGE (Acre-feet)	14 RESERVOIR GAGE HT.		15 RESERVOIR VOLUME - ACRE FEET			16 RESERVOIR AREA - ACRES			17 AREA & CAPACITY TABLE		
		14 GAGE HT. (Feet)	15 INTERPOLATED NOON	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]	1 RESERVOIR ELEVATION	2 AREA IN ACRES	3 VOLUME ACRE-FOOT
33	-6310	3179.05	3178.7	206,240	169,120	37,120	2600	2210	390	3163	2800	210
32	-6210	3176.55	3176.2	199,980	163,630	36,350	2600	2160	440	3152	2700	210
32	-5556	3174.05	3173.75	194,100	158,370	35,730	2500	2120	380	3181	2700	210
31	-1100	3171.95	3172.05	190,770	154,780	35,990	2500	2090	410	3180	2600	210
32	3512	3172.55	3172.75	191,980	156,250	35,730	2500	2100	400	3179	2600	207
32	2780	3174.05	3174.2	195,130	159,330	35,800	2500	2130	370	3178	2600	207
32	2245	3175.05	3175.2	197,650	161,470	36,180	2500	2140	360	3177	2600	202
32	998	3176.05	3176.05	199,280	163,300	35,980	2600	2160	440	3176	2600	199
32	-1398	3176.05	3175.95	199,080	163,090	35,990	2500	2150	350	3175	2500	197
32	-2131	3175.45	3175.3	197,310	161,690	35,620	2500	2140	360	3174	2500	194
32	-2012	3174.55	3174.45	195,240	159,860	35,380	2500	2130	370	3173	2500	192
32	-1576	3173.85	3173.8	193,450	158,480	34,970	2500	2120	380	3172	2500	189
32	-131	3173.35	3173.4	192,600	157,630	34,970	2500	2110	390	3171	2500	187
32	1413	3173.55	3173.65	193,240	158,160	35,080	2500	2120	380	3170	2500	184
32	2661	3174.35	3174.5	195,270	159,970	35,300	2500	2130	370	3169	2500	182
32	2918	3175.55	3175.7	198,060	162,550	35,510	2500	2150	350	3168	2400	179
33	3491	3176.75	3176.95	201,270	165,260	36,010	2600	2170	430	3167	2400	177
37	3588	3178.05	3178.2	204,710	168,010	36,700	2600	2200	400	3166	2400	174
37	3091	3179.25	3179.4	207,950	170,670	37,280	2600	2200	400	3165	2400	172
38	3043	3180.45	3180.7	211,420	173,590	37,830	2600	2250	350	3164	2400	170
38	5249	3182.25	3182.5	215,960	177,670	38,290	2700	2280	420	3163	2400	167
39	5485	3184.05	3184.35	221,330	181,940	39,390	2800	2320	480	3162	2400	165
39	5881	3186.1	3186.4	227,010	186,770	40,240	2800	2360	440	3161	2400	162
40	5841	3188.0	3188.3	232,870	191,310	41,560	2900	2400	500	3160	2400	160
41	6513	3190.1	3190.55	239,050	196,780	42,270	2900	2440	460	3159	2400	158
42	6749	3193.1	3193.3	245,680	203,630	42,050	2900	2510	490	3158	2400	155
42	6314	3194.5	3194.8	252,210	207,420	44,790	3000	2530	450	3157	2300	153
43	4590	3196.6	3196.4	257,660	212,580	45,080	3100	2590	510	3156	2300	151
44	3827	3197.8	3197.95	261,370	215,580	45,790	3200	2610	590	3155	2300	148
44	2015	3198.9	3198.9	263,790	218,070	45,720	3400	2630	770	3154	2200	146

RESERVOIR CAPACITY

Effects of inflow, outflow and evaporation.

Table 1
RING RESERVOIR
Sheet (2 of 3)

ELEVATION [ft.]	RESERVOIR GAGE HT.		RESERVOIR VOLUME - ACRES FEET			RESERVOIR AREA - ACRES			WATER CAPACITY TABLE		
	14 8:30 A.M. [Corrected]	15 Interpolated Noon	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]	1 RESERVOIR ELEVATION	2 AREA IN ACRES	3 VOLUME IN ACRES FEET
3179.05	3178.7		206,240	169,120	37,120	2600	2210	390	3183	2800	210,000
3176.55	3176.2		199,980	163,630	36,350	2600	2160	440	3182	2700	210,300
3174.05	3173.75		194,100	158,370	35,730	2500	2120	380	3181	2600	210,800
3171.95	3172.05		190,770	154,780	35,990	2500	2090	410	3180	2500	210,000
3172.55	3172.75		191,980	156,250	35,730	2500	2100	400	3179	2600	210,400
3179.05	3174.2		195,130	159,330	35,800	2500	2130	370	3178	2600	209,800
3175.05	3175.2		197,650	161,470	36,180	2500	2140	360	3177	2600	209,200
3176.05	3176.05		199,280	163,300	35,980	2600	2160	440	3176	2600	199,600
3176.05	3175.95		199,080	163,090	35,990	2500	2150	350	3175	2500	199,100
3175.45	3175.3		197,310	161,690	35,620	2500	2140	360	3174	2500	199,600
3174.55	3174.45		195,240	159,860	35,380	2500	2130	370	3173	2500	199,100
3173.85	3173.8		193,450	158,480	34,970	2500	2120	380	3172	2500	198,600
3173.35	3173.4		192,600	157,630	34,970	2500	2110	390	3171	2500	198,100
3173.55	3173.65		193,240	158,160	35,080	2500	2120	380	3170	2500	198,600
3174.35	3174.5		195,270	159,970	35,300	2500	2130	370	3169	2500	198,100
3175.55	3175.7		198,060	162,550	35,510	2500	2150	350	3168	2400	199,500
3176.75	3176.95		201,270	165,260	36,010	2600	2170	430	3167	2400	199,900
3178.05	3178.2		204,710	168,010	36,700	2600	2200	400	3166	2400	199,900
3179.25	3179.4		207,950	170,670	37,280	2600	2200	400	3165	2400	199,900
3180.45	3180.7		211,420	173,590	37,830	2600	2250	350	3164	2400	199,100
3182.25	3182.5		215,960	177,470	38,490	2700	2280	420	3163	2400	199,900
3184.05	3184.35		221,330	181,960	39,370	2800	2320	480	3162	2400	199,900
3186.1	3186.4		227,010	186,770	40,240	2800	2360	440	3161	2400	199,900
3188.0	3188.3		232,870	191,310	41,560	2900	2400	500	3160	2400	199,900
3190.1	3190.55		239,050	196,780	42,270	2900	2440	460	3159	2400	199,900
3192.1	3192.3		245,680	203,630	42,050	2900	2480	420	3158	2400	199,900
3194.5	3194.8		252,210	207,420	44,790	3000	2520	480	3157	2400	199,900
3196.4	3196.8		257,660	212,580	45,080	3100	2560	540	3156	2400	199,900
3197.8	3197.95		261,370	215,580	45,790	3200	2610	590	3155	2400	199,900
3198.9	3198.9		263,790	218,070	45,720	3300	2630	770	3154	2400	199,900

Oct. 17. 1916

Computed from water measurements

ARROWRO

[illegible]

RESERVOIR CAPACITY

and records of inflow, outflow and evaporation.

Table
Rising Reservoir
Sheet (3 of 3)

12 Date	13 NET STORAGE [Acres-feet]	14 RESERVOIR GAGE HT. 8:30 A.M. [Corrected]		15 RESERVOIR VOLUME- ACRE FEET INTERPOLATED NOON			16 RESERVOIR AREA- ACRES			17 AREA & CAPACITY TABLE		
		14	15	16	17	18	19	20	21	1	2	3
				BY WATER MEASUREMENT	BY SURVEY	DIFF. [16-17]	BY WATER MEAS.	BY SURVEY	DIFF. [19-20]	RESERVOIR ELEVATION	AREA IN ACRES	VOLUME IN ACRES
44	2946	3199.0	3199.05	266,270	218,480	47,790	3600	2640	960	3153	2200	1443
44	4728	3199.5	3199.8	270,110	220,470	49,640	3600	2650	950	3152	2200	142,1
45	6568	3201.7	3201.95	275,760	226,240	49,520	3700	2690	1010	3151	2200	139,9
46	8131	3203.5	3204.45	283,110	233,060	50,050	3800	2750	1050	3150	2200	137,70
46	5359	3206.35	3206.65	289,850	239,180	50,670	4000	2790	1210	3149	2100	135,60
47	2171	3207.68	3207.8	293,620	242,420	51,200	4000	2820	1180	3148	2100	133,50
47	1814	3207.75	3207.55	295,620	241,710	53,910	4000	2810	1190	3147	2100	131,40
47	2725	3208.6	3208.75	297,890	245,110	52,780	4100	2840	1260	3146	2100	129,30
40	- 337	3208.9	3208.8	299,080	245,260	53,820	4100	2840	1260	3145	2000	127,30
49	- 2267	3208.27	3208.05	297,780	243,120	54,660	4100	2820	1280	3144	2000	125,300
49	- 1059	3207.42	3207.35	296,120	241,150	54,970	4000	2810	1190	3143	2000	123,300
58	21	3206.95	3206.95	295,600	240,020	55,580	4000	2800	1200	3142	2000	121,300
47	2784	3207.05	3207.2	297,000	240,720	56,280	4000	2800	1200	3141	2000	119,300
59	5287	3208.1	3208.45	301,030	244,260	56,770	4100	2830	1270	3140	1900	117,400
72	5670	3209.7	3210.0	306,510	248,690	57,820	4300	2860	1440	3139	1900	115,500
53	3204	3211.1	3211.2	310,450	252,150	58,300	4300	2890	1410	3138	1900	113,600
46	- 581	3211.2	3211.1	311,260	251,860	59,400	4300	2890	1410	3137	1900	111,700
60	237	3210.7	3210.7	311,090	250,710	60,380	4300	2880	1420	3136	1800	109,800
12	2542	3211.0	3211.1	312,480	251,860	60,620	4300	2890	1410	3135	1800	108,000
44	669	3211.5	3211.5	314,080	253,030	61,050	4300	2900	1400	3134	1800	106,200
53	- 231	3211.5	3211.45	314,300	252,880	61,420	4300	2900	1400	3133	1800	104,400
60	594	3211.3	3211.35	314,490	252,590	61,900	4300	2890	1410	3132	1800	102,600
65	2353	3211.5	3211.6	315,960	253,320	62,640	4300	2900	1400	3131	1800	100,800
51	1988	3212.1	3212.2	318,130	255,070	63,060	4400	2910	1490	3130	1700	99,000
78	595	3212.6	3212.6	319,420	256,240	63,180	4400	2920	1480	3129		97,300

RESERVOIR CAPACITY

Records of inflow, outflow and evaporation.

Table 1
Rising Reservoir
Sheet 3 of 3

STATION PAGE [feet]	RESERVOIR GAGE HT.		RESERVOIR VOLUME - ACRE FEET			RESERVOIR AREA - ACRES			AREA & CAPACITY TABLE		
	14 8:30 A.M. (Corrected)	15 INTERPOLATED NOON	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]	1 RESERVOIR ELEVATION	2 AREA IN ACRES	3 VOLUME IN ACRE FEET
946	3199.0	3199.05	266,270	218,480	47,790	3600	2640	960	3153	2200	144,300
128	3199.5	3199.8	270,110	220,470	49,640	3600	2650	950	3152	2200	142,100
568	3201.7	3201.95	275,760	226,240	49,520	3700	2690	1010	3151	2200	139,900
131	3203.5	3204.45	283,110	233,060	50,050	3800	2750	1050	3150	2200	137,700
359	3206.35	3206.65	289,850	239,180	50,670	4000	2790	1210	3149	2100	135,600
171	3207.68	3207.8	293,620	242,420	51,200	4000	2820	1180	3148	2100	133,300
1814	3207.75	3207.55	295,620	241,710	53,910	4000	2810	1190	3147	2100	131,400
2725	3208.6	3208.75	297,890	245,110	52,780	4100	2840	1260	3146	2000	129,380
337	3208.9	3208.8	299,080	245,260	53,820	4100	2840	1260	3145	2000	127,300
2267	3208.27	3208.05	297,780	243,120	54,660	4100	2820	1280	3144	2000	125,300
1059	3207.42	3207.35	296,120	241,150	54,970	4000	2810	1190	3143	2000	123,300
21	3206.95	3206.95	295,600	240,020	55,580	4000	2800	1200	3142	2000	121,300
2784	3207.05	3207.2	297,000	240,720	56,280	4000	2800	1200	3141	2000	119,300
5287	3208.1	3208.45	301,030	244,260	56,770	4100	2830	1270	3140	1900	117,400
5670	3209.7	3210.0	306,510	248,690	57,820	4300	2860	1440	3139	1900	115,500
2204	3211.1	3211.2	310,450	252,150	58,300	4300	2890	1410	3138	1900	113,600
- 581	3211.2	3211.1	311,260	251,860	59,400	4300	2890	1410	3137	1900	111,700
237	3210.7	3210.7	311,090	250,710	60,380	4300	2880	1420	3136	1800	109,800
2542	3211.0	3211.1	312,480	251,860	60,620	4300	2890	1410	3135	1800	108,000
669	3211.5	3211.5	314,080	253,030	61,050	4300	2900	1400	3134	1800	106,200
- 231	3211.5	3211.45	314,300	252,880	61,420	4300	2900	1410	3133	1800	104,400
594	3211.3	3211.35	314,490	252,590	61,900	4300	2900	1400	3132	1800	102,600
2353	3211.5	3211.6	315,960	253,320	62,640	4300	2910	1490	3131	1800	100,800
1988	3212.1	3212.2	318,130	255,070	63,060	4400	2910	1490	3130	1700	99,000
595	3212.6	3212.6	319,420	256,240	63,180	4400	2920	1480	3129		97,300

Office of U.S. Geological Survey
Boise, Idaho.
Oct. 11, 1916

ARROWROCK
Computed from water measurements

DATE 1916	INFLOW INTO RESERVOIR IN SECOND- FEET								10 OUTFLOW	11	12
	2 Boise River	3 S Fork Boise R.	4 Rattle- snake Creek	5 Smith Creek	6 Cotton- wood Creek	7 Willow Creek	8 Misc.	9 TOTAL	BOISE R. AT LOWLING'S [Sec. feet]	DIFFERENCE BETWEEN 9 AND 10 [Sec. feet]	EVAP. LOSS [Inch.]
JULY											
8	4350	2520	52	81	12	8	6	7029	6690	-339	78
9	4440	2570	46	75	12	4	6	7153	7400	247	63
10	3900	2350	48	69	8	5	5	6385	6690	305	70
11	3460	2140	50	63	7	6	5	5731	5500	-231	70
12	3370	2000	45	57	7	6	5	5490	5250	-240	65
13	3280	1900	41	51	7	5	5	5289	5130	-159	114
14	3110	1770	36	48	7	3	5	4979	4890	-89	77
15	2850	1650	35	45	7	4	5	4596	4540	-56	102
16	2600	1560	35	41	7	5	5	4253	4210	-43	60
17	2770	1600	34	38	7	4	5	4458	4210	-248	67
18	2280	1440	32	33	7	4	5	3803	4100	297	55
19	1980	1330	31	33	7	4	5	3390	3580	-190	70
20	1770	1220	29	31	6	4	4	3064	3380	316	77
21	1710	1150	28	29	6	3	4	2930	3680	750	84
22	1580	1080	28	28	6	2	4	2728	3990	1262	79
23	1470	1010	28	26	6	2	4	2546	3890	1344	76
24	1400	980	25	25	6	2	4	2442	3780	1338	80
25	1350	916	24	22	6	3	4	2325	3780	1455	72
26	1320	916	24	19	6	3	4	2292	3680	1388	72
27	1250	855	24	16	6	3	4	2158	3680	1522	67
28	1170	826	25	14	5	3	3	2046	3580	1534	68
29	1100	790	22	12	5	2	3	1934	3580	1646	77
30	1040	745	22	11	5	2	3	1828	3580	1752	78
31	1010	707	21	6	4	2	3	1763	3480	1717	82
AUG											
1	980	680	20	4	3	2	2	1691	3290	1599	79
2	943	665	19	3	2	2	2	1636	3290	1654	67
3	908	634	20	4	3	2	2	1573	3190	1617	69
4	882	619	20	5	3	2	2	1533	3190	1657	68
5	847	610	19	5	3	2	2	1488	3190	1702	61
6	805	605	19	4	2	2	2	1439	3100	1661	61

PROWROCK RESERVOIR CAPACITY

Measurements and records of inflow, outflow and evaporation.

Fall

11 DIFFERENCE BETWEEN 9 AND 10 [Sec.-feet]	12 EVAP. LOSS [Acre-ft]	13 TOTAL STORED WATER LOSS [Acre-feet]	RESERVOIR GAGE HT.		RESERVOIR VOLUME - ACRE FEET			RESERVOIR AREA - ACRES			1 RESERVOIR ELEVATION
			14 CONSERVED 8:30 AM	15 INTERPOLATED NOON	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]	
-339	78	-593	3212.6	3212.6	280,730	256,240	24,490	3000	2920	80	3213
247	63	552	3212.8	3212.25	280,750	255,210	25,540	3000	2910	90	3212
305	70	674	3212.1	3212.05	280,140	254,630	25,510	3000	2910	90	3211
-231	70	-387	3211.8	3211.8	280,000	253,900	26,100	3000	2900	100	3210
-240	65	-410	3211.9	3211.9	280,400	254,190	26,210	3000	2910	90	3209
-159	114	-201	3211.9	3211.9	280,700	254,190	26,510	3000	2910	90	3208
-89	77	-99	3211.8	3211.8	280,850	253,900	26,950	3000	2900	100	3207
-56	102	-9	3211.65	3211.6	280,910	253,320	27,590	3000	2900	100	3206
-43	60	-25	3211.47	3211.45	280,920	252,880	28,040	3000	2900	100	3205
-248	67	-424	3211.38	3211.35	281,150	252,590	28,560	3000	2890	110	3204
297	55	643	3211.25	3211.2	281,040	252,150	28,890	3000	2890	110	3203
-10	70	50	3211.05	3211.0	280,690	251,570	29,120	3000	2890	110	3202
316	77	703	3210.95	3210.9	280,320	251,280	29,040	3000	2880	120	3201
750	84	1569	3210.5	3210.4	279,180	249,840	29,340	3000	2870	130	3200
1262	79	2578	3209.8	3209.7	277,110	247,830	29,280	3000	2860	140	3199
1344	76	2737	3209.0	3208.95	274,450	245,400	29,050	3000	2840	160	3198
1338	80	2729	3208.1	3207.95	271,720	242,840	28,880	3000	2820	180	3197
1455	72	2953	3207.1	3206.95	268,870	240,020	28,850	2950	2800	150	3196
1388	72	2820	3206.15	3206.0	265,990	237,360	28,630	2950	2780	170	3195
1522	67	3081	3205.17	3205.0	263,040	234,580	28,460	2950	2760	190	3194
1534	68	3105	3204.21	3204.05	259,940	231,960	27,980	2950	2740	210	3193
1646	77	3336	3203.02	3202.85	256,720	228,680	28,040	2900	2710	190	3192
1752	78	3547	3201.83	3201.65	253,280	225,430	27,850	2900	2690	210	3191
1727	82	3501	3200.7	3200.5	249,760	222,340	27,420	2900	2660	240	3190
1599	79	3245	3199.4	3199.2	246,390	218,880	27,510	2900	2640	260	3189
1654	67	3342	3198.2	3198.05	243,090	215,850	27,240	2850	2610	240	3188
1617	69	3271	3197.1	3196.9	239,790	212,840	26,950	2750	2590	160	3187
1657	68	3349	3195.9	3195.7	236,480	209,740	26,740	2750	2560	190	3186
1702	61	3431	3194.7	3194.5	233,090	206,660	26,430	2700	2540	160	3185
1661	61	3350	3193.4	3193.2	229,700	203,380	26,320	2650	2510	140	3184

RESERVOIR CAPACITY.

Effects of inflow, outflow and evaporation.

Table 2
Falling Reservoir
Sheet 1 of 3

NO.	RESERVOIR GAGE HT.		RESERVOIR VOLUME - ACRE FEET			RESERVOIR AREA - ACRES			AREA & CAPACITY TABLE		
	14 OBSERVED 8:30 AM	15 INTERPOLATED NOON	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]	1 RESERVOIR ELEVATION	2 AREA IN ACRES	3 VOLUME IN ACRE- FEET
1	3212.6	3212.6	280,730	256,240	24,490	3000	2920	80	3213		287,000
2	3212.8	3212.25	280,750	255,210	25,540	3000	2910	90	3212	3000	284,000
3	3212.1	3212.05	280,140	254,630	25,510	3000	2910	90	3211	3000	281,000
4	3211.8	3211.8	280,000	253,900	26,100	3000	2900	100	3210	3000	278,000
5	3211.9	3211.9	280,400	254,190	26,210	3000	2910	90	3209	3000	275,000
6	3211.9	3211.9	280,700	254,190	26,510	3000	2910	90	3208	3000	272,000
7	3211.8	3211.8	280,850	253,900	26,950	3000	2900	100	3207	3000	269,000
8	3211.65	3211.6	280,910	253,320	27,590	3000	2900	100	3206	2950	266,050
9	3211.47	3211.45	280,920	252,880	28,040	3000	2900	100	3205	2950	263,100
10	3211.38	3211.35	281,150	252,590	28,560	3000	2890	110	3204	2950	260,150
11	3211.26	3211.2	281,040	252,150	28,890	3000	2890	110	3203	2900	257,250
12	3211.05	3211.0	280,690	251,570	29,120	3000	2890	110	3202	2900	254,350
13	3210.95	3210.9	280,320	251,280	29,040	3000	2880	120	3201	2900	251,450
14	3210.5	3210.4	279,180	249,840	29,340	3000	2870	130	3200	2900	248,550
15	3209.8	3209.7	277,110	247,830	29,280	3000	2860	140	3199	2900	245,650
16	3209.0	3208.85	274,450	245,400	29,050	3000	2840	160	3198	2850	242,800
17	3208.1	3207.95	271,720	242,840	28,880	3000	2820	180	3197	2800	240,000
18	3207.1	3206.95	268,870	240,020	28,850	2950	2800	150	3196	2750	237,250
19	3206.15	3206.0	265,990	237,360	28,630	2950	2780	170	3195	2700	234,500
20	3205.17	3205.0	263,040	234,580	28,460	2950	2760	190	3194	2650	231,800
21	3204.21	3204.05	259,940	231,960	27,980	2950	2740	210	3193	2600	229,150
22	3203.02	3202.85	256,720	228,680	28,040	2900	2710	190	3192	2550	226,650
23	3201.83	3201.65	253,280	225,430	27,850	2900	2690	210	3191	2500	224,000
24	3200.7	3200.5	249,760	222,340	27,420	2900	2660	240	3190	2500	221,500
25	3199.4	3199.2	246,390	219,880	27,510	2900	2640	260	3189	2500	219,000
26	3198.2	3198.05	243,090	215,850	27,240	2850	2610	240	3188	2500	216,500
27	3197.1	3196.9	239,790	212,840	26,950	2750	2590	160	3187	2450	214,000
28	3195.9	3195.7	236,480	209,740	26,740	2750	2560	190	3186	2450	211,550
29	3194.7	3194.5	233,090	206,660	26,430	2700	2540	160	3185	2450	209,100
30	3193.4	3193.2	229,700	203,380	26,320	2650	2510	140	3184	2450	206,650

Office of U.S. Geological Survey

Boise, Idaho

Oct. 11, 1916

ARROWROCK

Computed from water measurements

1 DATE 1916	INFLOW INTO RESERVOIR IN SECOND- FEET								10 OUTFLOW	11	12
	2 Boise River	3 S. Fork Boise R.	4 Rattle- snake Creek	5 Smith Creek	6 Cotton- wood Creek	7 Willow Creek	8 Misc.	9 TOTAL	Boise R. at Downing's [Sec.-feet]	DIFFERENCE BETWEEN 9 AND 10 [Sec. feet]	EVAP. LOSS [Acres-ft]
Aug 7	772	585	19	4	3	2	2	1387	3100	1713	91
8	756	566	19	3	2	2	2	1350	3100	1750	57
9	740	552	18	1	3	2	2	1318	3100	1782	63
10	724	547	18	0	2	2	2	1295	3010	1715	49
11	700	529	17	0	2	2	2	1252	3010	1758	59
12	685	516	17	0	2	2	2	1224	2490	1266	62
13	677	498	17	0	2	2	2	1198	1400	202	54
14	662	489	17	0	2	2	2	1174	1480	306	52
15	646	476	16	0	2	2	2	1144	1900	756	58
16	638	476	15	0	2	2	2	1135	2260	1125	42
17	677	480	18	4	4	2	3	1188	2420	1232	26
18	882	524	21	7	5	3	3	1445	2340	895	26
19	724	524	19	5	4	3	3	1282	2340	1058	26
20	662	502	18	2	3	4	2	1193	2340	1147	39
21	638	485	16	0	3	3	2	1147	2340	1193	40
22	608	472	15	0	3	3	2	1103	2260	1157	47
23	586	451	15	0	2	2	2	1058	2260	1202	54
24	564	427	14	0	2	2	2	1011	2260	1249	71
25	556	415	13	0	2	2	2	990	2260	1270	32
26	535	407	13	0	2	2	2	961	2180	1219	52
27	528	400	14	0	2	2	2	948	2180	1232	52
28	528	396	14	0	2	2	2	944	2180	1236	48
29	521	392	13	0	2	2	2	932	2180	1248	32
30	535	443	12	0	2	2	2	996	2260	1264	44
31	514	423	13	0	2	2	2	956	2260	1304	47
Sept 1	499	400	13	0	2	2	2	918	2260	1342	56
2	485	389	13	0	2	2	2	893	2340	1447	54
3	492	378	13	0	2	2	2	889	2340	1451	36
4	514	385	13	0	2	2	2	918	2340	1422	35
5	499	392	12	0	2	2	2	909	2340	1431	33

RESERVOIR CAPACITY

and records of inflow, outflow and evaporation.

Table 2
Falling Reservoir
Sheet 3 of 3

13 TOTAL STORED WATER LOSS (Acres-Feet)	RESERVOIR GAGE HT.		RESERVOIR VOLUME - ACRES FEET			RESERVOIR AREA - ACRES			AREA & CAPACITY TABLE		
	14 OBSERVED 8:30 AM	15 INTERPOLATED NOON	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]	1 RESERVOIR ELEVATION	2 AREA IN ACRES	3 VOLUME IN ACRES FEET
3483	3192.1	3191.9	226,280	200,120	26,160	2550	2470	80	3183	2450	204,200
3522	3190.6	3190.4	222,780	196,410	26,370	2500	2440	60	3182	2400	201,800
3591	3189.3	3189.1	219,220	193,240	25,980	2500	2420	80	3181	2400	199,400
3444	3187.9	3187.7	215,700	189,870	25,830	2500	2380	120	3180	2400	197,000
3540	3186.5	3186.3	212,210	186,530	25,680	2450	2350	100	3179	2350	194,650
2569	3185.05	3184.9	209,160	183,240	25,920	2450	2340	110	3178	2350	192,300
454	3184.0	3184.05	207,640	181,250	26,390	2450	2300	150	3177	2300	190,000
658	3184.25	3184.2	207,090	181,600	25,490	2450	2310	140	3176	2300	187,700
1555	3183.9	3183.8	205,980	180,690	25,300	2450	2300	150	3175	2250	185,450
2270	3183.15	3183.0	204,070	178,830	25,240	2400	2300	100	3174	2200	183,250
2465	3182.1	3181.95	201,700	176,420	25,280	2400	2260	140	3173	2200	181,050
1798	3181.2	3181.1	199,570	174,490	25,080	2400	2260	140	3172	2150	178,900
2121	3180.4	3180.25	197,610	172,570	25,040	2400	2240	160	3171	2150	176,750
2310	3179.35	3179.2	195,390	170,230	25,160	2350	2220	130	3170	2150	174,600
2402	3178.35	3178.2	193,040	168,010	25,030	2350	2200	150	3169	2150	172,450
2328	3177.45	3177.3	190,670	166,030	24,640	2300	2180	120	3168	2150	170,300
2434	3176.4	3176.2	188,280	163,630	24,650	2300	2160	140	3167	2150	168,150
2544	3175.2	3175.05	185,790	161,150	24,640	2250	2140	110	3166	2150	166,000
2547	3174.15	3174.0	183,250	158,900	24,350	2200	2120	80	3165	2100	163,850
2466	3173.0	3172.85	180,740	156,460	24,280	2150	2100	50	3164	2100	161,750
2491	3171.9	3171.75	178,260	154,150	24,110	2150	2080	70	3163	2100	159,650
2495	3170.82	3170.65	175,770	151,860	23,910	2150	2060	90	3162	2050	157,550
2503	3169.6	3169.4	173,270	149,280	23,990	2150	2040	110	3161	2050	155,500
2547	3168.4	3168.25	170,750	146,940	23,810	2150	2030	120	3160	2050	153,450
2629	3167.25	3167.05	168,160	144,500	23,660	2150	2010	140	3159	2000	151,400
2713	3166.0	3165.75	165,490	141,900	23,590	2150	1980	170	3158	2000	149,400
2919	3164.45	3164.25	162,670	138,930	23,740	2100	1960	140	3157	2000	147,400
2909	3163.2	3163.0	159,760	136,490	23,270	2100	1940	160	3156	2000	145,400
2851	3161.9	3161.7	156,830	133,970	22,860	2050	1920	130	3155	1950	143,400
2866	3160.55	3160.35	154,020	131,390	22,630	2050	1900	150	3154	1950	141,450

RESERVOIR CAPACITY

LESS SEepage, outflow and evaporation.

Table 2
Filling Reservoir
Sheet 3 of 3

ELEVATION FEET	RESERVOIR DUNE Ht.		RESERVOIR VOLUME - ACRES FEET			RESERVOIR AREA - ACRES			AREA & CAPACITY TABLE		
	16 ELEVATION FEET	17 ELEVATION FEET	18 BY WATER MEASUREMENT	19 BY SURVEY	20 DIFF. (18-19)	21 BY WATER MEAS.	22 BY SURVEY	23 DIFF. (21-22)	24 RESERVOIR ELEVATION	25 AREA IN ACRES	26 VOLUME IN ACRES FEET
1	3182.1	3182.4	226,280	220,120	26,160	2330	2470	80	3183	2130	204,200
2	3182.2	3182.4	226,780	196,410	26,370	2300	2440	60	3182	2400	201,800
3	3182.3	3182.4	219,220	193,240	25,980	2300	2420	80	3181	2400	199,400
4	3182.4	3182.7	215,700	189,870	25,830	2300	2380	120	3180	2350	197,000
5	3182.5	3182.3	212,210	186,530	25,680	2450	2350	100	3179	2350	194,650
6	3182.6	3182.4	209,160	183,240	25,920	2450	2340	110	3178	2300	192,300
7	3182.7	3182.15	207,640	181,250	26,390	2450	2300	150	3177	2300	190,000
8	3182.8	3182.2	207,090	181,600	25,490	2450	2310	140	3176	2250	187,700
9	3182.9	3182.8	205,980	180,680	25,300	2450	2300	150	3175	2200	185,450
10	3183.15	3183.0	204,070	178,830	25,240	2400	2300	100	3174	2200	183,250
11	3183.1	3183.45	201,700	176,420	25,280	2400	2260	140	3173	2150	181,050
12	3183.2	3183.7	199,570	174,490	25,080	2400	2260	140	3172	2150	178,900
13	3183.4	3183.25	197,610	172,570	25,040	2400	2240	160	3171	2150	176,750
14	3183.5	3183.2	195,590	170,230	25,360	2350	2220	130	3170	2150	174,600
15	3183.5	3183.2	193,040	168,010	25,030	2350	2200	150	3169	2150	172,450
16	3183.5	3183.3	190,670	166,030	24,640	2300	2180	120	3168	2150	170,300
17	3183.7	3183.2	188,280	163,630	24,650	2300	2160	140	3167	2150	168,150
18	3183.7	3183.05	185,790	161,150	24,640	2250	2140	110	3166	2150	166,000
19	3183.15	3183.0	183,250	158,900	24,350	2200	2120	80	3165	2100	163,850
20	3183.0	3182.85	180,740	156,460	24,280	2150	2100	50	3164	2100	161,750
21	3182.9	3182.75	178,260	154,150	24,110	2150	2080	70	3163	2100	159,650
22	3182.85	3182.65	175,770	151,860	23,910	2150	2060	90	3162	2050	157,550
23	3182.8	3182.4	173,270	149,280	23,990	2150	2040	110	3161	2050	155,500
24	3182.8	3182.25	170,750	146,940	23,810	2150	2030	120	3160	2050	153,450
25	3182.8	3182.05	168,180	144,500	23,680	2150	2010	140	3159	2000	151,400
26	3182.8	3182.05	165,490	141,900	23,590	2150	1980	170	3158	2000	149,400
27	3182.85	3182.05	162,670	138,930	23,740	2100	1960	140	3157	2000	147,400
28	3182.8	3182.0	159,780	136,490	23,290	2100	1940	160	3156	2000	145,400
29	3182.8	3182.0	156,880	133,470	23,410	2050	1920	130	3155	1950	143,400
30	3182.85	3182.05	154,020	131,390	22,630	2050	1900	150	3154	1950	141,450

Office of U.S. Geological Survey
Boise, Idaho
Oct. 11, 1916

ARROWROCK
Computed from water measurements and

1 DATE 1916	INFLOW INTO RESERVOIR IN SECOND- FEET								10 OUTFLOW	11	12	13
	2 Boise River	3 S. Fork Boise R.	4 Rattle- snake Creek	5 Smith Creek	6 Cotton- wood Creek	7 Willow Creek	8 Misc	9 TOTAL	Boise R. at DOWLING'S [Sec.-feet]	DIFFERENCE BETWEEN 9 AND 10 [Sec.-feet]	EVAP LOSS [Per cent]	STOR- AGE [Per cent]
Sept. 6	492	385	12	0	2	2	2	895	2340	1445	47	
7	485	381	12	0	2	2	2	884	2340	1456	26	
8	471	378	12	0	2	2	2	867	2340	1473	29	
9	485	374	15	0	2	2	2	890	2260	1380	30	
10	535	404	14	0	2	2	2	959	2260	1301	18	
11	506	415	13	0	2	2	2	940	2180	1240	25	
12	492	411	13	0	2	2	2	922	2180	1258	34	
13	478	400	13	0	2	2	2	897	2260	1363	27	
14	464	385	12	0	2	2	2	867	2180	1313	30	
15	464	381	12	0	2	2	2	863	2180	1317	28	
16	458	371	12	0	2	2	2	847	2040	1193	28	23
17	444	364	12	0	2	2	2	826	1970	1144	35	23
18	430	354	12	0	2	2	2	802	1970	1168	27	23
19	424	347	12	0	2	3	2	790	1900	1110	29	22
20	424	347	12	0	2	3	2	790	1830	1040	23	208
21	417	347	12	0	2	3	2	783	1590	807	30	1628
22	417	343	11	0	2	3	2	778	1610	832	22	1669
23	410	340	11	0	2	3	2	768	1600	832	21	1668
24	404	340	11	0	1	3	2	761	1640	879	24	1764
25	404	340	10	0	2	3	2	761	1600	839	17	1678
26	404	340	10	0	2	3	2	761	1560	799	15	1597
27	410	340	10	0	2	3	2	767	1600	833	25	1674
28	397	340	10	1	2	3	2	755	1600	845	17	1690
29	397	340	11	1	2	3	2	756	1640	884	14	1764
30 Oct. 1	404	343	11	1	2	3	2	766	1470	704	9	1403

ARROWROCK RESERVOIR CAPACITY.

from water measurements and records of inflow, outflow and evaporation.

10 OUTFLOW BOISE R. AT DOWLING'S [Sec.-feet]	11 DIFFERENCE BETWEEN 9 AND 10 [Sec.-feet]	12 EVAP LOSS [Ac-ft]	13 TOTAL STORED WATER LOSS [Ac.-feet]	RESERVOIR GAGE HT.		RESERVOIR VOLUME - ACRE FEET			RESERVOIR AREA - ACRE		
				14 OBSERVED 8:30 A.M.	15 INTERPOLATED NOON	16 BY WATER MEASUREMENT	17 BY SURVEY	18 DIFF. [16-17]	19 BY WATER MEAS.	20 BY SURVEY	21 DIFF. [19-20]
2340	1445	47	2908	3159.1	3158.9	151,130	128,440	22,490	2000	1870	130
2340	1456	26	2909	3157.7	3157.5	148,220	126,020	22,200	2000	1850	150
2340	1473	29	2946	3156.25	3156.05	145,300	123,340	21,960	2000	1830	170
2260	1380	30	2762	3154.8	3154.6	142,440	120,700	21,740	1950	1810	140
2260	1301	18	2594	3153.3	3153.1	139,760	117,990	21,770	1950	1790	160
2180	1240	25	2480	3151.9	3151.75	137,230	115,580	21,650	1900	1760	140
2180	1258	34	2525	3150.75	3150.55	134,720	113,470	21,250	1900	1750	150
2260	1363	27	2726	3149.3	3149.1	132,100	110,940	21,160	1850	1720	130
2180	1313	30	2630	3147.95	3147.75	129,420	108,620	20,800	1850	1700	150
2180	1317	28	2636	3146.5	3146.3	126,790	106,160	20,630	1800	1680	120
2040	1193	28	2390	3145.15	3144.95	124,280	103,900	20,380	1800	1650	150
1970	1144	35	2300	3143.75	3143.55	121,930	101,590	20,340	1800	1630	170
1970	1168	27	2340	3142.45	3142.25	119,610	99,470	20,140	1750	1610	140
1900	1110	29	2227	3141.1	3140.9	117,330	97,310	20,020	1750	1590	160
1830	1040	23	2082	3139.8	3139.65	115,170	95,330	19,840	1750	1560	190
1590	807	30	1628	3138.75	3138.6	113,320	93,690	19,630	1750	1550	200
1610	832	22	1669	3137.75	3137.6	111,670	92,140	19,530	1700	1530	170
1600	832	21	1668	3136.8	3136.65	110,000	90,690	19,310	1700	1510	190
1640	879	24	1764	3135.75	3135.6	108,280	89,100	19,180	1700	1500	200
1600	839	17	1678	3134.7	3134.55	106,560	87,530	19,030	1650	1480	170
1560	799	15	1597	3133.6	3133.45	104,930	85,900	19,030	1650	1460	190
1600	833	25	1674	3132.6	3132.45	103,290	84,440	18,850	1650	1440	210
1600	845	17	1690	3131.7	3131.55	101,610	83,140	18,470	1600	1430	170
1640	884	14	1764	3130.7	3130.55	99,880	81,710	18,170	1600	1410	190
1470	704	9	1403	3129.6	3129.45	98,300	80,160	18,140	1550	1400	150
				3128.7							

records of inflow, outflow and evaporation.

Felling Reservoir

[illegible]

just below the gage, by Krall's ditch. Prior to May 14, only a part of the flow of the creek reached the river. The record for this period, given in column 7a, sheet 1, Table 1, is the record at the gaging station less the diversion by Krall's ditch, an approximate record of which was kept by the writer.

Column 9 shows the total inflow which entered the reservoir from all tributary streams.

Outflow from Reservoir. The daily discharge record at the Dowling station, four miles below Arrowrock, is used as a measure of the outflow from the reservoir. The outflow record given in column 10 is the Dowling record unchanged except between April 15 and 30 when the Dowling figures were decreased by 10 second-feet to allow for the mean estimated flow of Deer Creek. Deer Creek enters the river just below Arrowrock Dam.

Column 11 shows the difference between total inflow and total outflow, or vice versa, representing storage in Table 1 and the amount of stored water drawn off in Table 2, evaporation not considered. Attention is called to the fact that in Table 1, negative quantities in column 11 indicate negative storage, or a loss, while in Table 2, the reverse is true, and the negative sign indicates storage.

Evaporation from Reservoir Surface. An effort was made during the course of the work to secure data on the probable loss of stored water due to evaporation. Although the results are to some extent inconclusive, they furnish a very good basis for estimating the amount of this loss.

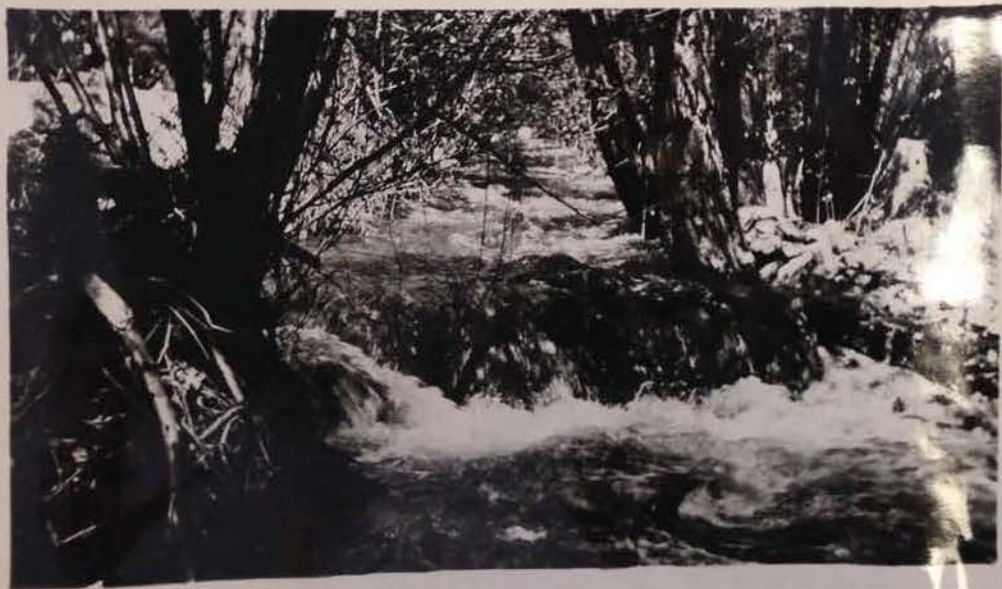
A standard cooperative weather station has been maintained at Arrowrock for several years by the United States Weather Bureau in cooperation with the Reclamation Service. The original station was located at the camp below the dam, and records of precipitation and temperature were made by employees of the Reclamation Service. This work was taken over by me in April and continued until the old station was abandoned in June.

A new station was established about June 15, on the south side of the reservoir, above the dam, and additional equipment for securing a record of evaporation was provided. The station is equipped with maximum and minimum thermometers, rain gage, evaporation pan, and anemometer. (See Plate 6). Here a daily record of evaporation was kept under the writer's supervision during the remainder of the period of investigation.

An attempt was made to secure also a record of evaporation from a floating pan on the reservoir, but this record was of too short duration to be of much value in determining just what coefficients should be applied to the evaporation from the land pan to reduce to the true quantity which would be lost from the surface of the reservoir. This



Artificial control on Cottonwood Creek during low water.



Cottonwood Creek during high water of April, 1916.



Waterfall on Smith Creek about one-half mile below gaging-station.



Arrowrock Reservoir, September 1916, looking downstream from point 1 mile above mouth of South Park.

pan (see Plate 6) was established about August 15, and records were obtained during the latter part of August and part of September. Both evaporation pans were constructed of galvanized sheet iron, 48 inches in diameter and 10 inches deep, and both were kept filled within two or three inches of the top. The lake pan was provided with a number of vertical sheet iron baffles to prevent slopping. Daily readings were made in the land pan with a micrometer hook gage, and readings on the lake pan were taken with a carpenter's rule to sixteenths of inches.

In Table 3 is given a summary of meteorological conditions at Arrowrock during the period of investigation. No attempt to analyze the daily records minutely has been made, but the following conclusions are apparent from a study of the summary.

1. Evaporation from the land pan tended to vary with the mean temperature of the atmosphere. The effect of wind was very slight, as the station is so sheltered that the wind movement at this point is practically negligible.
2. The effect of wind in increasing evaporation seems to be much greater on the surface of the reservoir than at the station on the shore.
3. So far as temperature of the water is a factor, the resultant evaporation during the warmest months is probably considerably greater on shore. In the fall, however, with the coming of colder nights, the temperature of the water in the land pan would be relatively much reduced, and would probably approximate the temperature of the water in the reservoir. A definite relation between the evaporation quantities from the two stations could hardly be established, however, since it is believed that wind will be a very active agent in increasing evaporation from the reservoir, while at the same time of very little effect at the station on shore.
4. From the small amount of data available, it appears that the evaporation figures obtained at the land pan during the past season may be taken direct to indicate the evaporation from the lake throughout the period, or in other words, a coefficient of 1.00 should be used.

Evaporation losses are shown in column 12, in acre-feet. These losses are figured from the daily evaporation record, where available. During April a mean daily evaporation of 0.15 inch was assumed; during May 0.18 inch; and during the first half of June 0.20 inch. Reservoir areas for use in figuring total daily evaporation were taken for the proper lake levels from the capacity tables based on the topographic survey, which areas are given in column 20.

Table 3

SUMMARY OF METEOROLOGICAL DATA AT ARROWROCK, IDAHO

MONTH 1916	AIR TEMPERATURE			PRECIPITATION (Inches)	EVAPORATION				WIND MOVEMENT		REMARKS
	Mean Max.	Mean Min.	Mean		LAND PAN		RESERVOIR PAN		Total Miles	Mean per hour	
					Total (Inches)	Daily Mean (Inches)	Total (Inches)	Daily Mean (Inches)			
April	68.3	37.9	53.1	0.50							
May	64.8 [*]	38.5	51.6	1.27							
June	75.7 [*]	46.1	60.9	1.68 [*]	1.90 ^a	0.211 ^a			255 ^d	0.82 ^d	
July	86.6	54.2	70.4	0.83	8.86	.286			74.6	1.00	
August	85.1	53.9	69.5	0.55	8.53	.275	3.30 ^b	0.236 ^b	6.80	0.91	See note below
September	76.7 [*]	46.3	61.5	Trace	6.14	.205	4.13 ^c	0.217 ^c	79.4	1.07	See note below

* Arrowrock record incomplete; figures given have been taken from Boise record.

^a June 22-30 only; 9 days.

^b August 18-31 only; 14 days.

^c September 12-30 only; 19 days.

^d June 18-30 only; 13 days.

NOTE: Evaporation from land pan Aug. 18-31 totaled 3.31 inches or 0.236 inch per day, the same as on the reservoir. (See above.)
Evaporation from land pan Sept. 12-30 totaled 3.56 inches or 0.187 inch per day, as against 0.217 inch on the reservoir (See above.)



Evaporation Station on Arrowrock Reservoir.



Temperature, precipitation, and evaporation station,
1916.

Net Storage and Total Stored Water Loss. The results shown in column 13, tables 1 and 2, are derived from the quantities in columns 11 and 12. Values in column 11 are reduced to acre-feet through the use of the factor 1.98 and evaporation added algebraically. It should be noted that the evaporation quantity always means a reduction in inflow, and hence is of opposite sign. In other words, in Table 1, $\text{Storage} = (\text{Inflow} - \text{Evaporation}) - \text{Outflow}$ or $= \text{Inflow} - \text{Outflow} - \text{Evaporation}$, and in Table 2, $\text{Total Stored Water Loss} = \text{Outflow} - (\text{Inflow} - \text{Evaporation})$ or $= \text{Outflow} - \text{Inflow} + \text{Evaporation}$.

Plate 6 shows hydrographs of total inflow less evaporation and of outflow. The graphs are largely of general interest as showing the relation between the two quantities, and indicating graphically the periods during which water was being stored or released.

The following statement of storage and of stored water delivery summarizes the figures of inflow, outflow, and evaporation:

(A) Rising period April 15-July 8:

Total inflow	1,399,266	acre-feet		
Evaporation	3,038	"	"	"
Net Inflow	1,396,228	"	"	"
Outflow	2,174,673	"	"	"
Storage	221,355	"	"	"

(B) Falling period July 8-September 30:

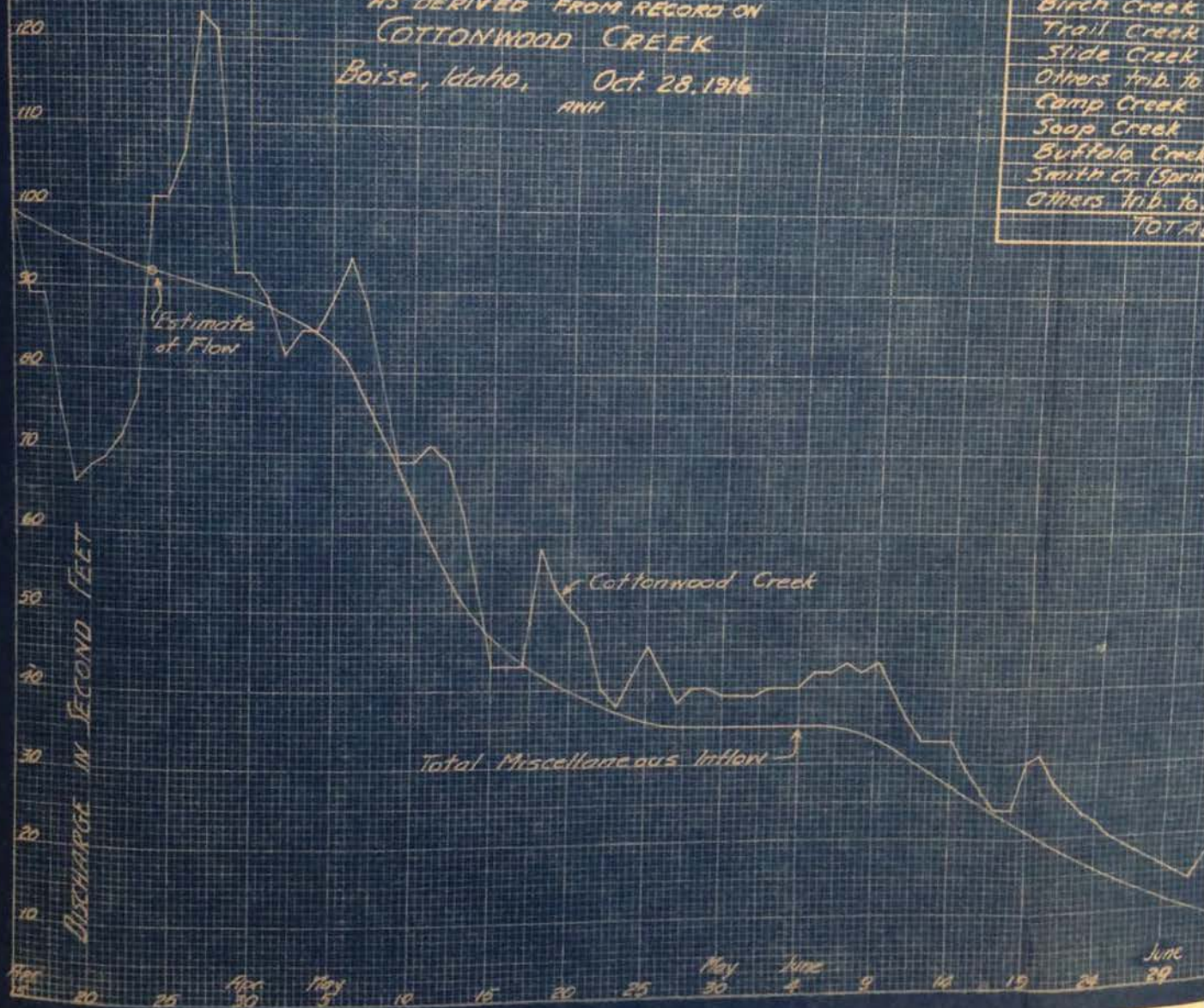
Total inflow	296,818	acre-feet		
Evaporation	4,230	"	"	"
Net inflow	292,588	"	"	"
Outflow	475,022	"	"	"
Stored water released	182,434	"	"	"

Excess of fill over draw, representing loss from reservoir presumably as ground storage or seepage, 38,921 acre-feet.

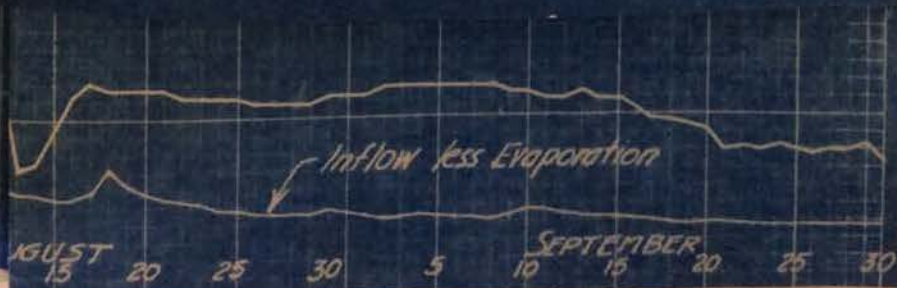
Reservoir Gage Heights. Reservoir gage readings are made by the gate-keeper at Arrowrock Dam every morning at about 8:30 o'clock. In column 14 are given these morning readings, corrected, however, to true datum.

No permanent gages have yet been installed at Arrowrock Dam, and during the past season several different methods of making gage readings have been followed.

PLATE 7
HYDROGRAPH OF MISCELLANEOUS FLOW
INTO
ARROWROCK RESERVOIR
AS DERIVED FROM RECORD ON
COTTONWOOD CREEK
Boise, Idaho, Oct. 28, 1916
ANH



ESTIMATE
STREAM
Lambing Creek
Dutch Loup Creek
Willow Creek
Grouse Creek
Birch Creek
Trail Creek
Slide Creek
Others trib. to
Camp Creek
Soap Creek
Buffalo Creek
Smith Cr. Spring
Others trib. to
TOTAL



Washington
File No.
Field

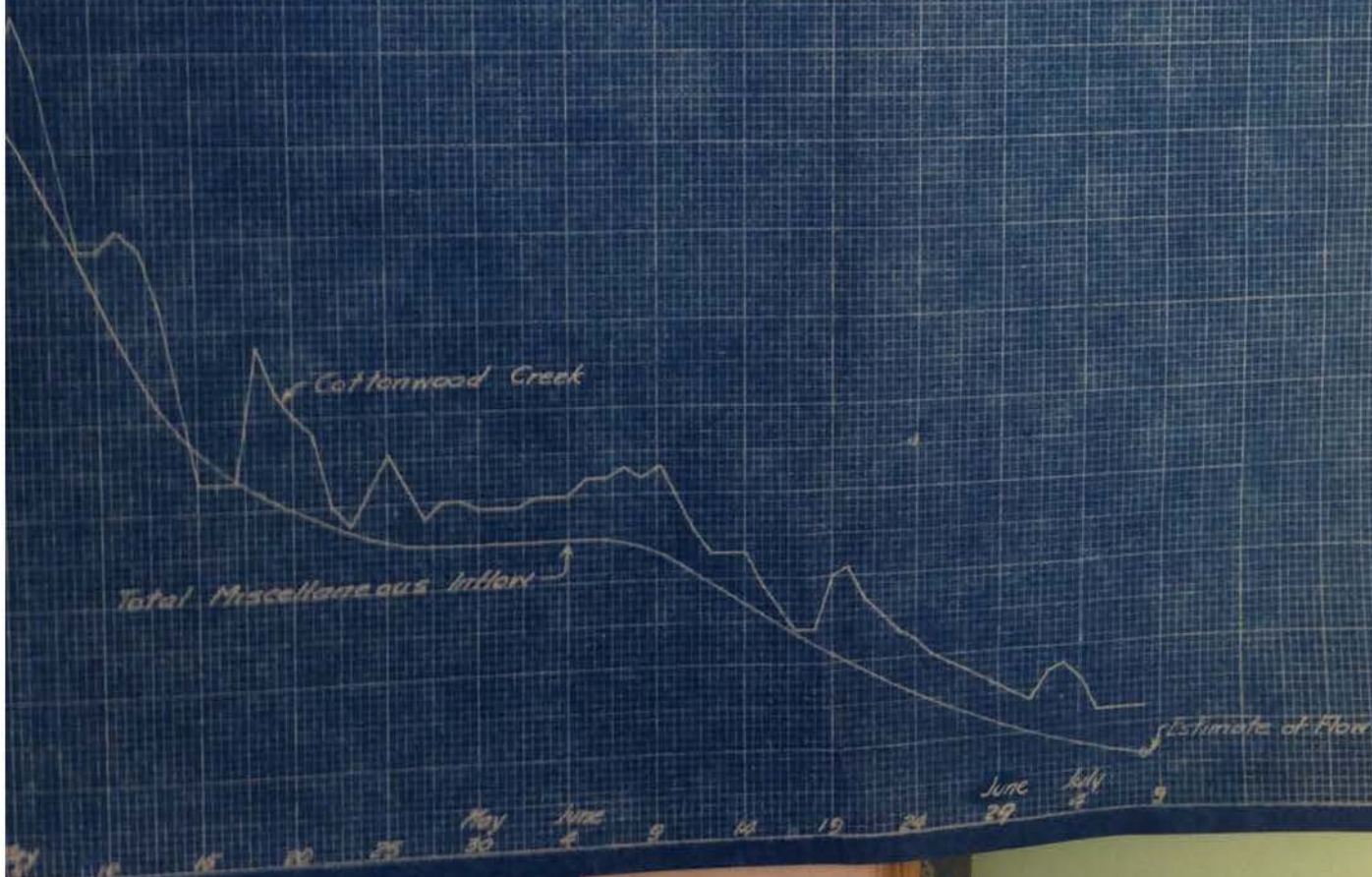
PLATE 7

HYDROGRAPH OF MISCELLANEOUS FLOW INTO ARROWROCK RESERVOIR AS DERIVED FROM RECORD ON COTTONWOOD CREEK

Boise, Idaho, Oct. 28, 1916
ANN

ESTIMATES OF FLOW

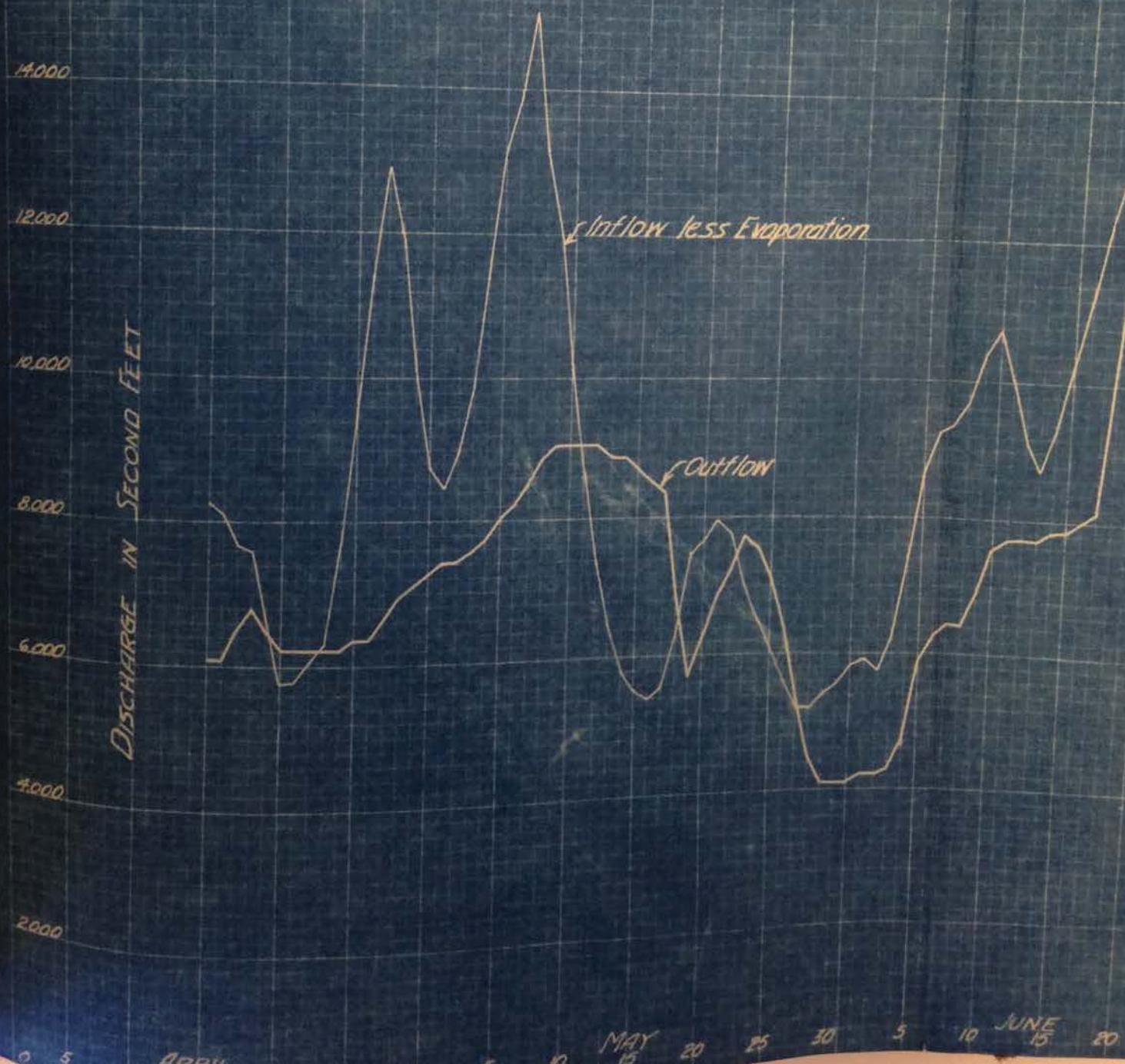
STREAM	APR. 24	JULY 8	SEPT. 30
Lambing Creek	15	0.6	0.3
Dutch Loup Creek	10	.3	-
Willow Creek (N. Fork)	12	-	-
Grouse Creek	15	1.0	.4
Birch Creek	5	.5	.1
Trail Creek	5	.1	-
Slide Creek	5	.2	.1
Others trib. to N. Fork	5	1.0	.5
Camp Creek	2	.2	-
Soop Creek	3	.2	-
Buffalo Creek	5	.2	-
Smith Cr. (Springs)	-	1.0	.5
Others trib. to S. Fork	10	.5	.1
TOTAL	92	5.8	2.0

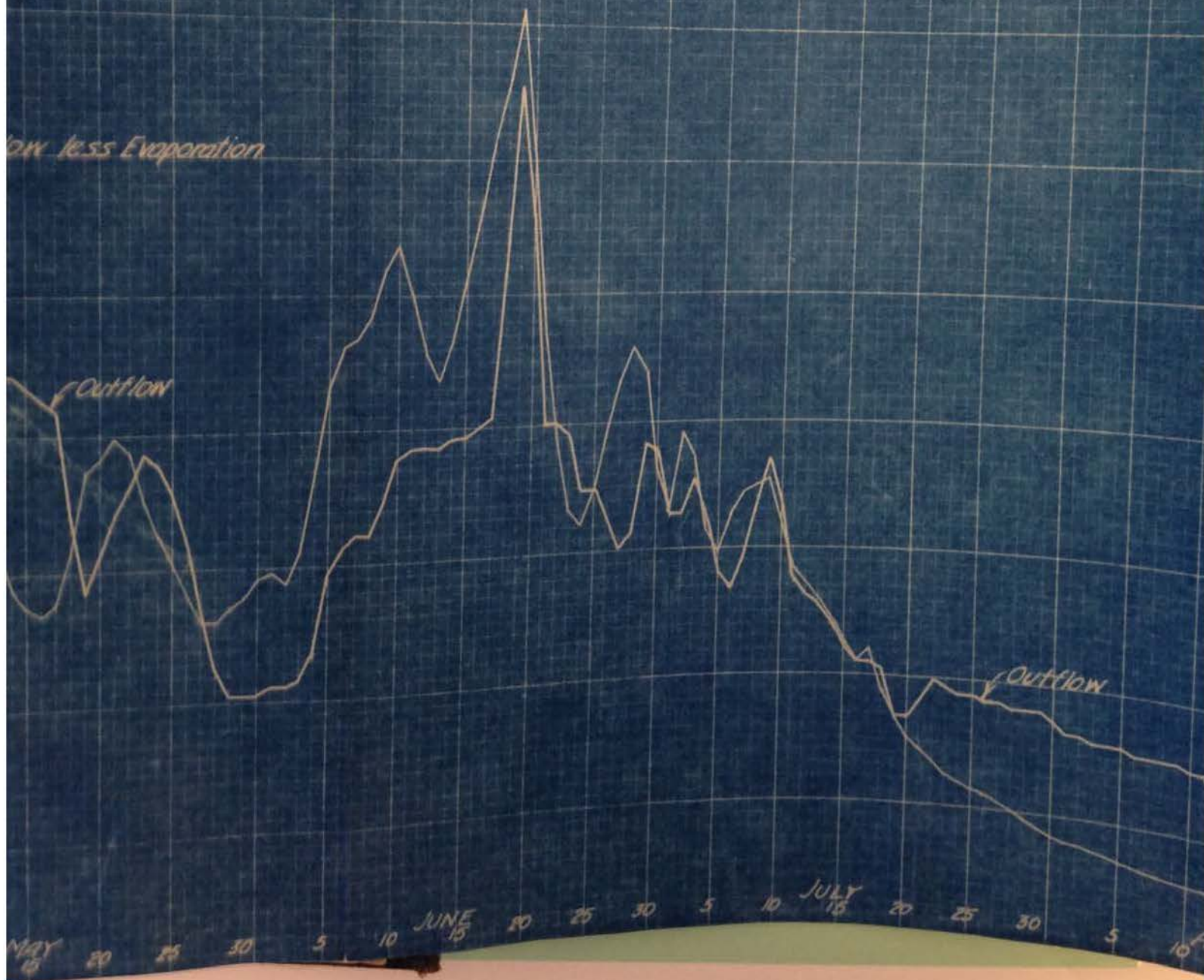


Inflow less Evaporation

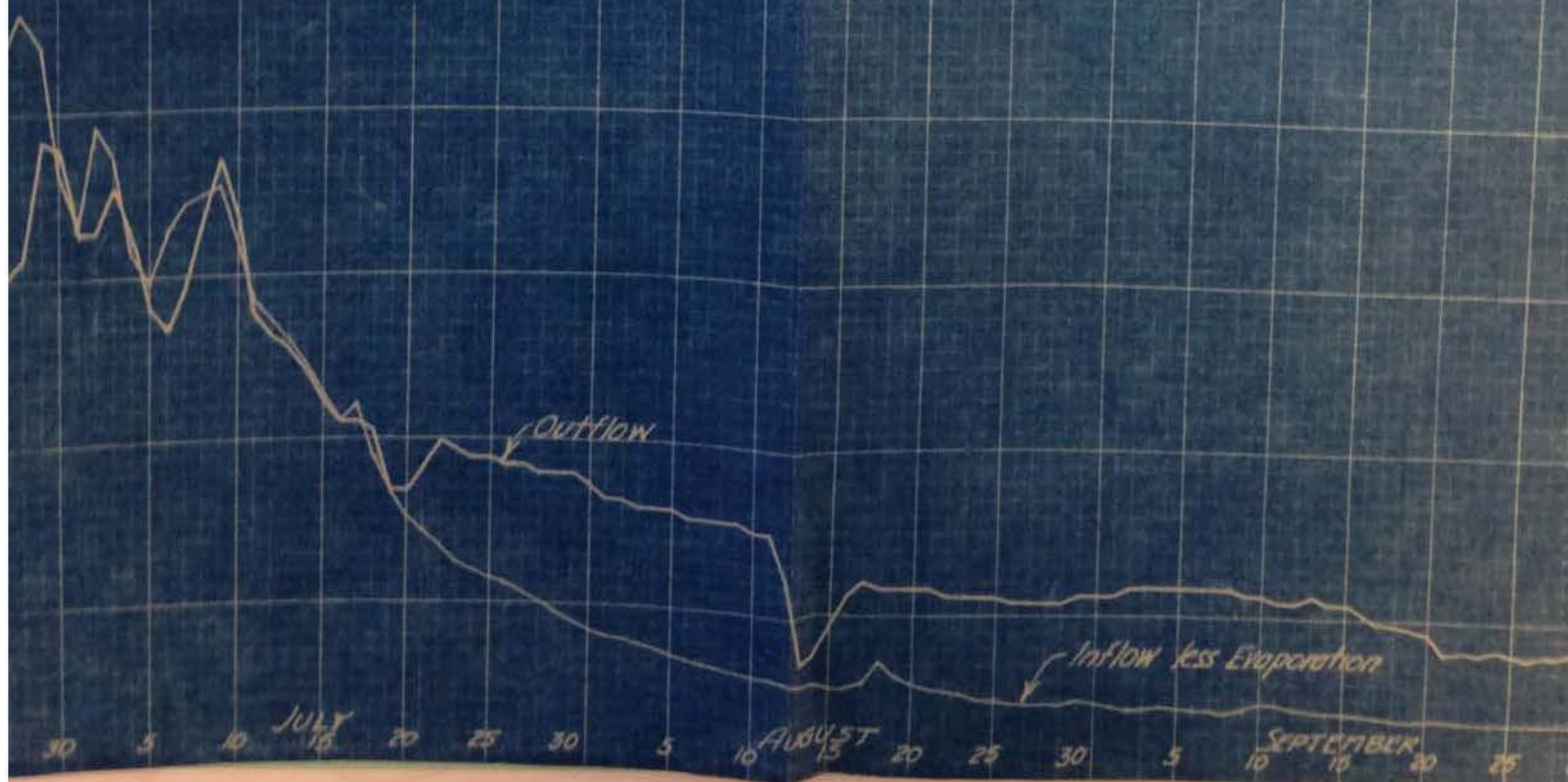
SEPTEMBER

PLATE 8
HYDROGRAPHS
OF
INFLOW AND OUTFLOW
FOR
ARROWROCK RESERVOIR
1916
Boise, Idaho, Oct. 21, 1916
A.W.H.

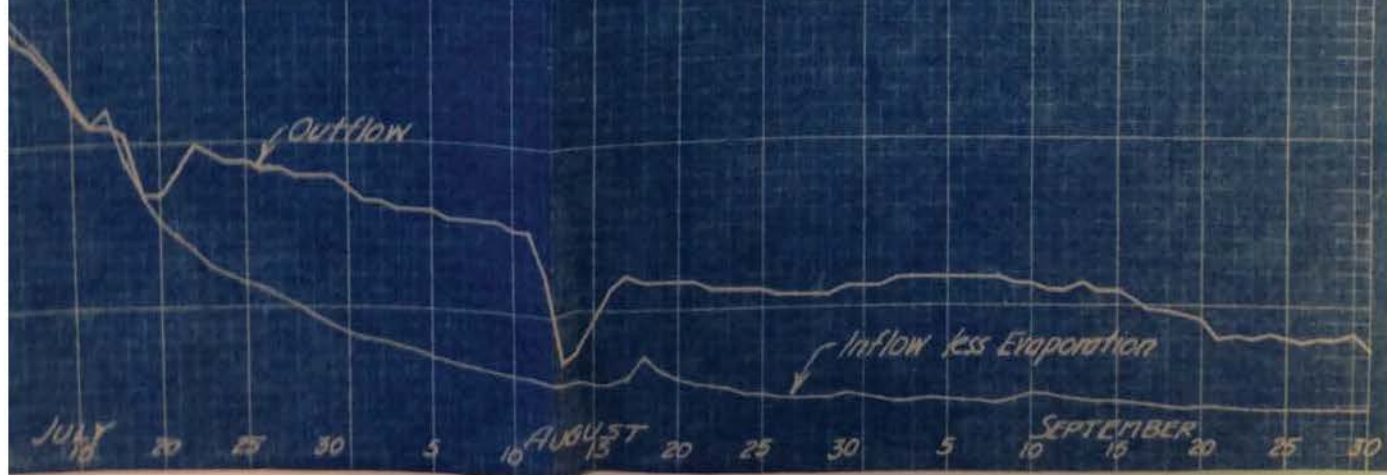




File No. { Washington
Field



File No. { Washington
Field



A series of vertical staff gages is located on the south side of the reservoir a few hundred feet above the dam, and readings were made on these gages during the early part of the period. Between 3130 feet and a full reservoir, it is necessary to read on six different sections of this gage. Levels carried from a bench mark on the dam by the writer on several occasions during the summer showed that all of these gages read incorrectly, giving elevations too low by amounts varying up to 0.30 foot. Gage readings made on these sections have been corrected to true datum from the level notes.

During the period of highest water, reservoir heights were secured by measuring down with a graduated pole to the water surface from a point of known elevation on the parapet wall. Readings during this period probably require no correction.

On August 10, the writer installed a temporary chain gage near the south end of the dam. The chain was provided with a wooden float on one end and a counterweight on the other end, and passed over pulleys at either end of a 20 foot scale attached horizontally to the parapet wall. Index points at intervals of 10 feet were marked on the chain, and the reservoir elevation was read directly on the scale at the point opposite one of the markers. The gage was checked at frequent intervals and consequently no corrections are necessary to gage heights after August 10.

The need for a permanent reservoir gage is very apparent, and until some such provision is made, gage readings on the reservoir can never be entirely satisfactory.

Interpolation has been used to furnish the reservoir elevations of column 15, which apply to noon of each day.

Plate 9 is a hydrograph of elevations of the reservoir surface from April 15 to September 30. It shows graphically variations in the lake level and indicates the period during which water was being discharged through the spillway.

Reservoir Volume. In column 17 are given capacities, in acre-feet, of the reservoir as taken from the tables based on the topographic survey of the reservoir site, heretofore referred to. These figures apply to the noon gage heights in column 15. Areas of reservoir surface are shown in column 20, having been obtained in the same way.

The determination of reservoir capacities by the successive combination of quantities in column 13 required that some starting point be assumed, from which to work. A capacity of 99,000 acre-feet was taken at elevation 3130.0. This figure was taken from a capacity curve derived from 1915 water measurements by engineers of the United States Reclamation Service, and probably serves as well as a place of beginning as any other that could be used.

3215

Top of Parapet Wall

PLATE 9

3210

HYDROGRAPH
SHOWING WATER ELEVATIONS
OF
ARROWROCK RESERVOIR
1916

Boise, Idaho, Oct. 18, 1916
ANN.

3200

3190

3180

3170

3160

3150

3140

3130

RESERVOIR ELEVATIONS IN FEET

APRIL

MAY

JUNE

5

10

15

20

25

30

5

10

15

20

25

30

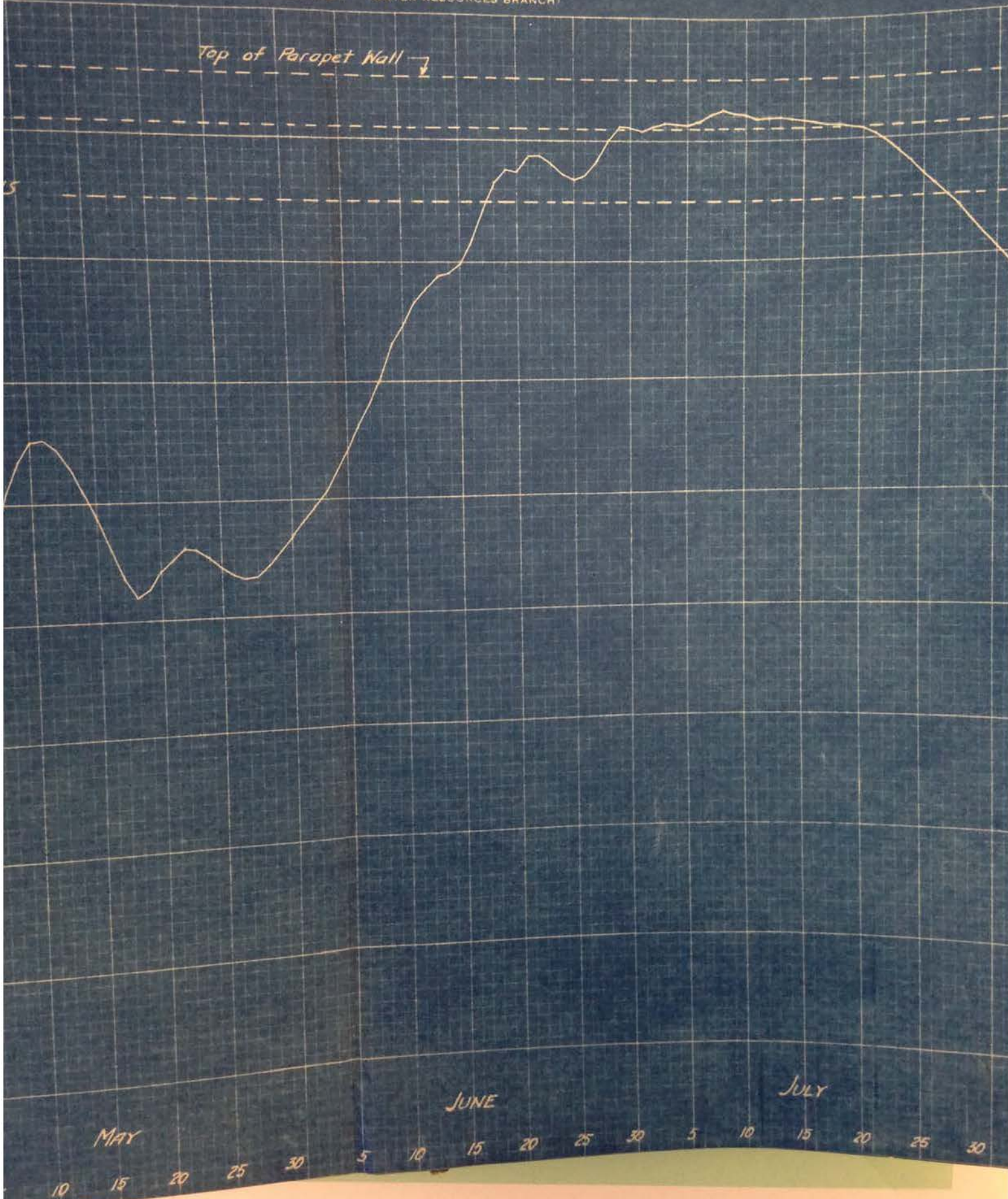
5

10

15

UNITED STATES GEOLOGICAL SURVEY (WATER RESOURCES BRANCH)

Top of Parapet Wall →



Crest of Movable Gates Raised Position →

Crest of Spillway Wall →

JULY

AUGUST

SEPTEMBER

20 25 30 5 10 15 20 25 30 5 10 15 20

File No. } Washington
Field }

Crest of movable gates, raised position -

Crest of spillway wall -

July

AUGUST

SEPTEMBER

10 15 20 25 30 5 10 15 20 25 30 5 10 15 20 25 30

Interpolation shows that the reservoir was at an elevation of 3130.0 feet at 5:20 P. M., April 15, at which point the capacity of the reservoir was assumed at 99,000 acre-feet. Using the figures of column 13, a total capacity of 102,160 acre-feet is indicated at noon on April 16, at a gage height of 3132.1. A capacity of 105,280 acre-feet is obtained at noon on April 17 by adding to 102,160 half of 3982 and half of 2259, or 3120, since these latter figures run from midnight to midnight. Carrying this process through, on July 8, at noon, 319,420 acre-feet of water have been accounted for.

In table 2, 3130.0 feet came at midnight, September 29. The same assumptions were made here as on April 15, and computations carried back in the same way as in Table 1 to July 8, when a capacity of 280,730 acre-feet is indicated.

In Plate 10, three capacity curves are given. Curve "A" gives capacities from the table which was made up from the results of the topographic survey. Curve "B" is an average of plotted points for each day of the period from July 8 to September 30. Noon gage heights are plotted against reservoir volumes in column 16. Curve "C" is a curve similarly constructed from data obtained on the rising stage.

Since the capacity of any reservoir is for all practical purposes no greater than the amount of water that may be drawn therefrom, and since Curve "B" is based on the actual amount of water so drawn off during the period of investigation, this curve may be considered the true capacity curve of the reservoir between 3130.0 and 3212.6 feet. An area and capacity table has been prepared from this curve and is presented in Table 2. This table gives the capacity for each foot of reservoir level, and indicates as reservoir areas the difference between successive capacities at one foot intervals. It will be noted that during the ten days immediately following July 8, the reservoir remained practically stationary, and the points plot eccentrically. It appears probable that a large amount of water was being absorbed, presumably as ground storage, during this period, and was thus not available as stored water.

It is of interest to note that at 3130.0 feet the survey table gives a capacity of 80,930 acre-feet against the assumed value of 99,000 acre-feet, a difference of 18,070 acre-feet. At 3212.6 feet, the survey gives 256,240 acre-feet, and this investigation shows (column 16, sheet 1, table 2) 280,730 acre-feet, a difference of 24,690 acre-feet. This means that at least 6,620 acre-feet more water was available in the reservoir between elevations 3130.0 and 3212.6 than the survey would indicate. The fact that the figured capacity appears to decrease above 3210 feet is perhaps a result of the peculiar conditions which obtained during this period. The record shows that in the aggregate, no stored water left the reservoir while the level was falling from 3212.6 to 3211.0, which consumed a period of 11 days. Very probably if the water had been rapidly lowered immediately after July 8, most of the water impounded

3210

3205

3200

3195

3190

3185

3180

3175

PLATE 10
ARROWROCK RESERVOIR
STORAGE CAPACITY CURVES, SEASON OF 1916

Office of U.S. Geological Survey
Boise, Idaho, Oct. 17, 1916.
A.N.H.

RESERVOIR
ES, SEASON OF 1916

ical Survey
1. 11. 1916.

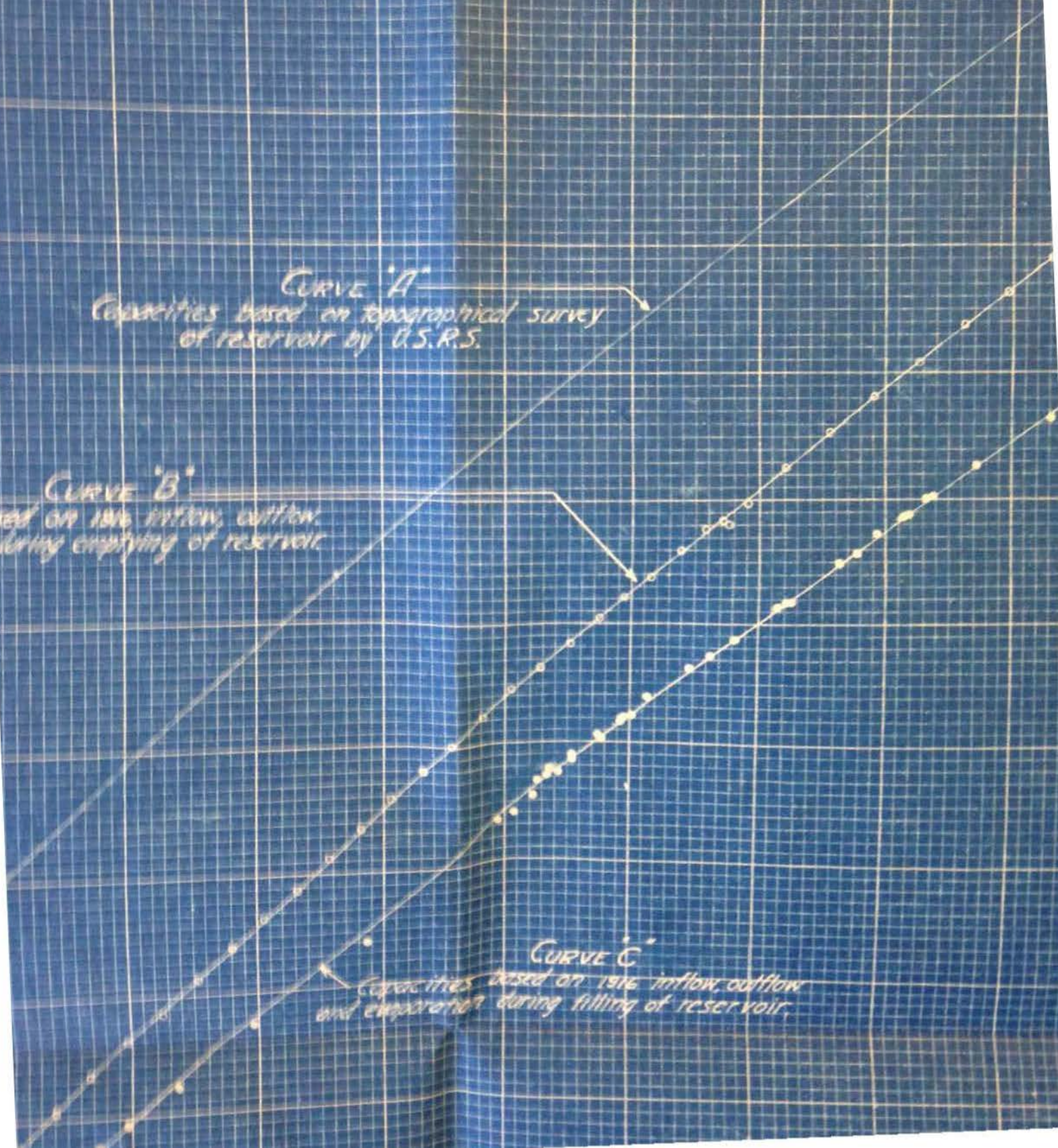
Capacities based
of reservoir

CURVE "B"
Capacities based on 1916 inflow, outflow
and evaporation during emptying of reservoir

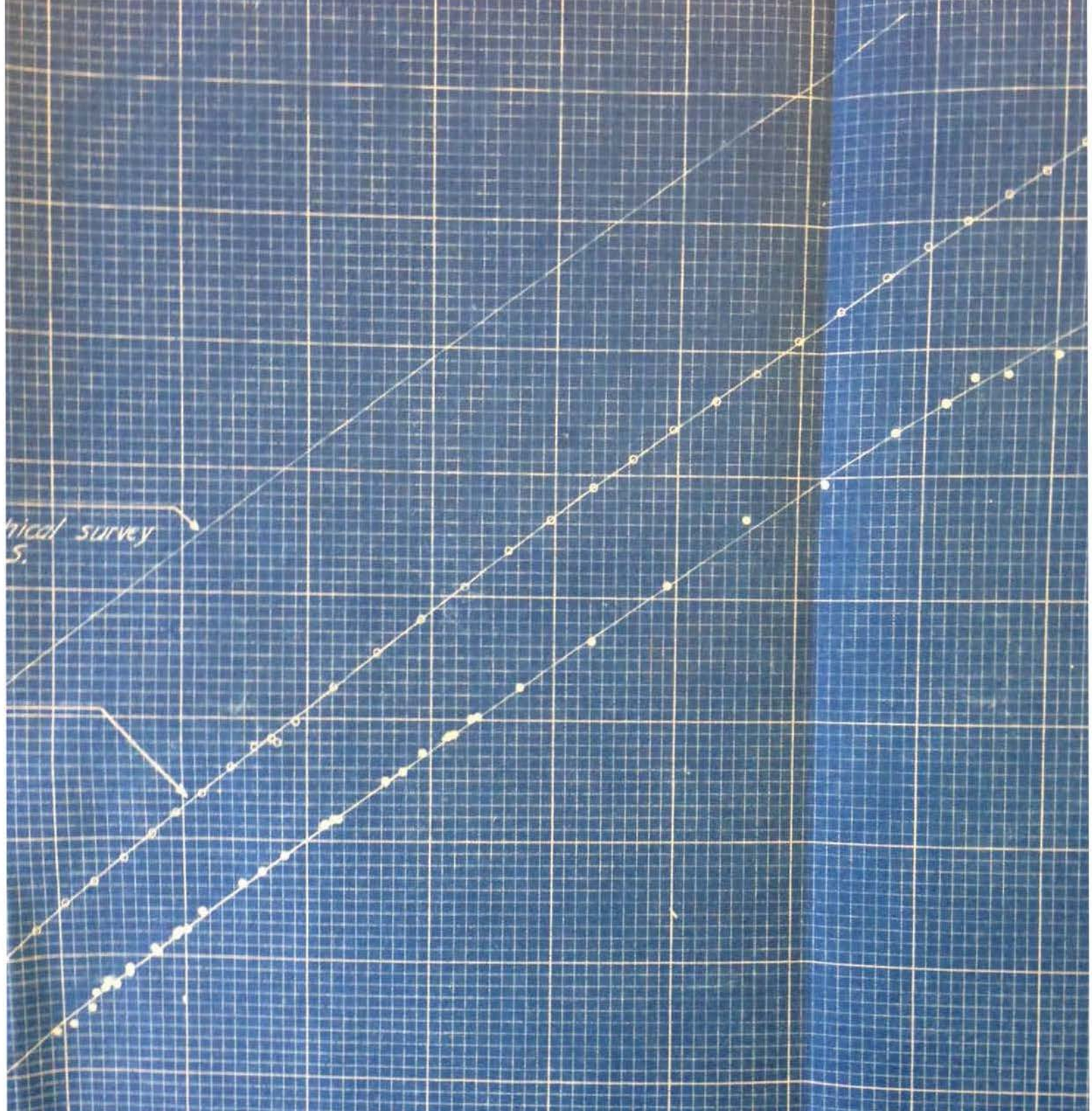
CURVE 'A'
Capacities based on topographical survey
of reservoir by U.S.R.S.

CURVE 'B'
Based on 1916 inflow, outflow,
during emptying of reservoir.

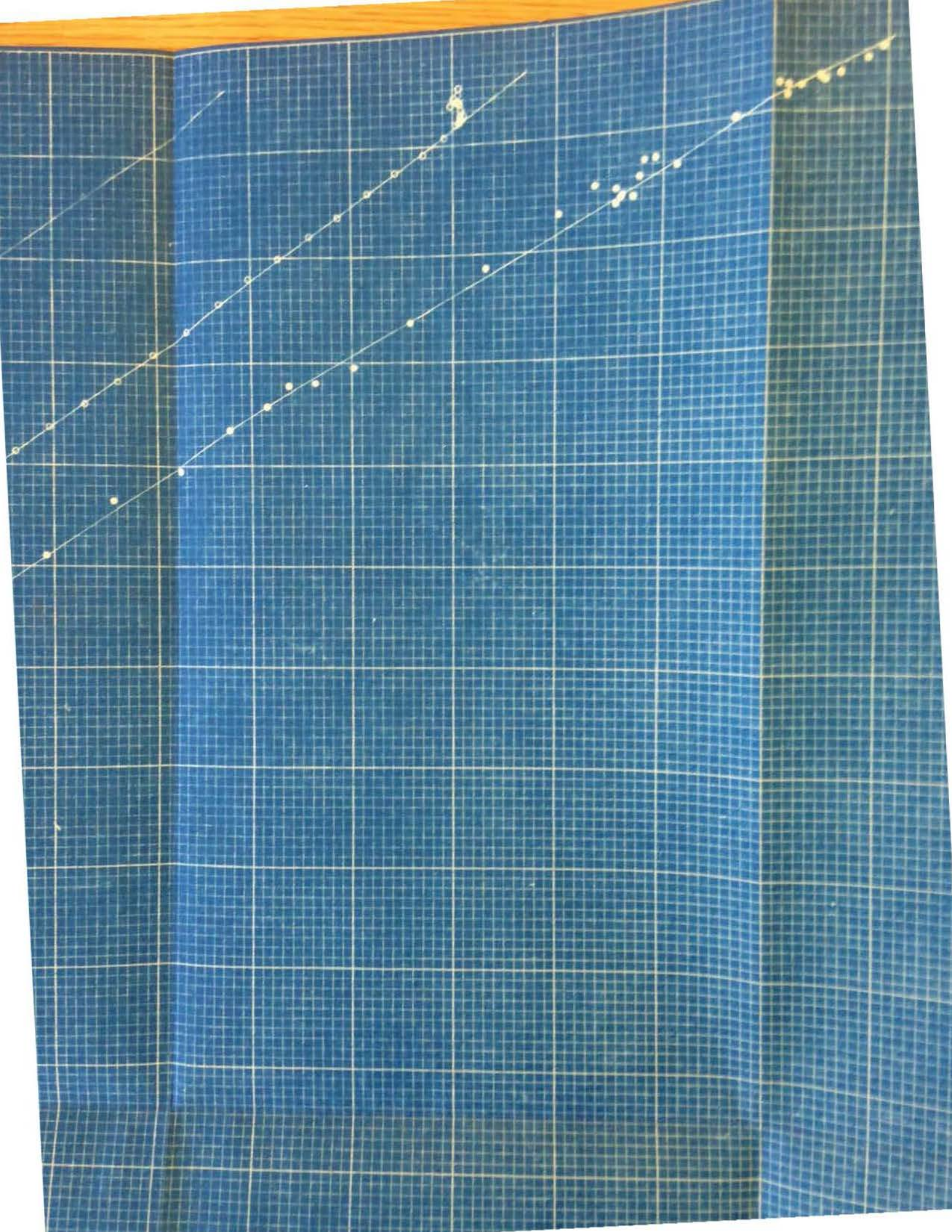
CURVE 'C'
Capacities based on 1916 inflow, outflow
and evaporation during filling of reservoir.

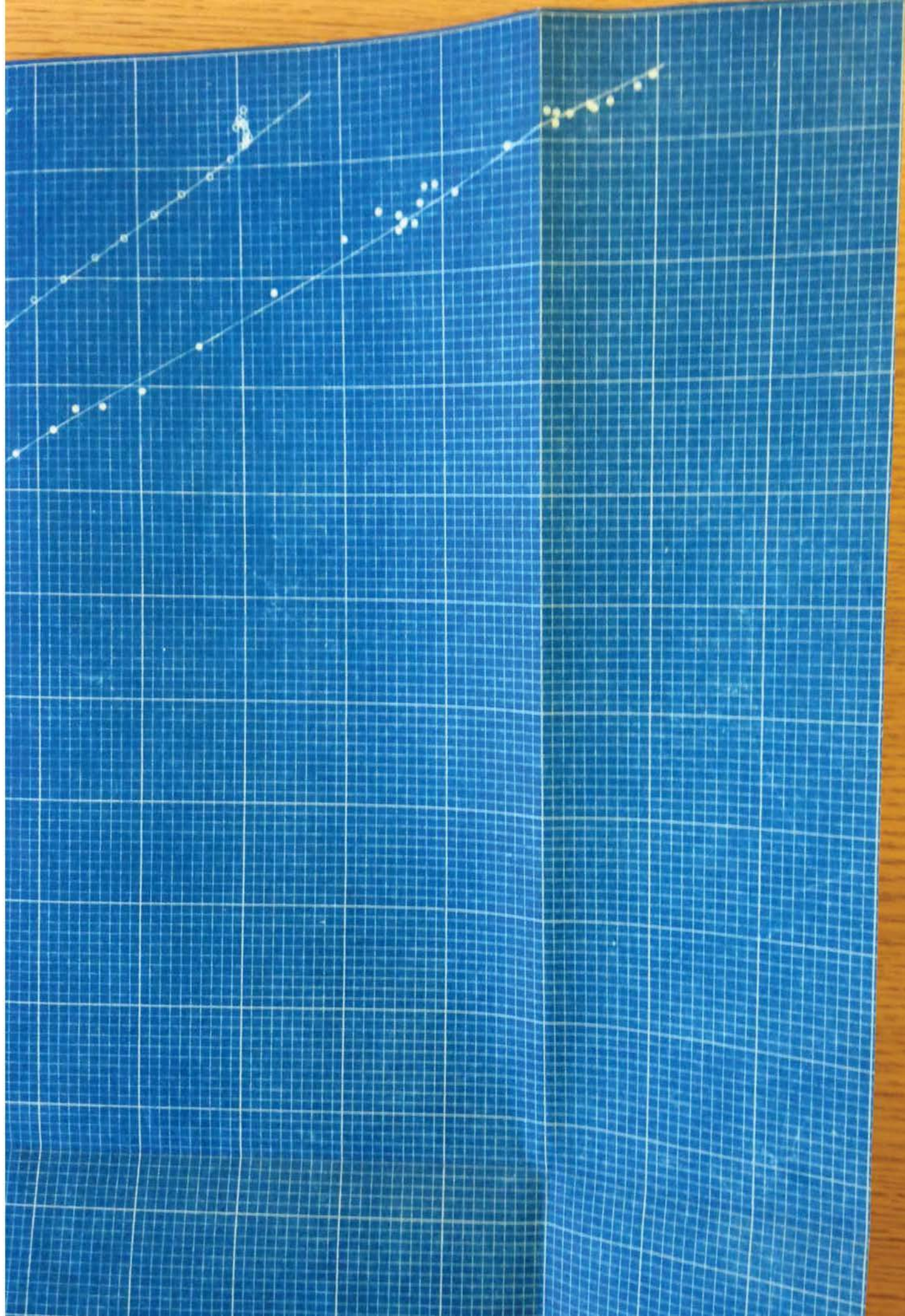


tical survey
S.



CURVE C"
ies based on 1916 inflow, outflow
tion during filling of reservoir.





3175

3170

3165

3160

3155

3150

3145

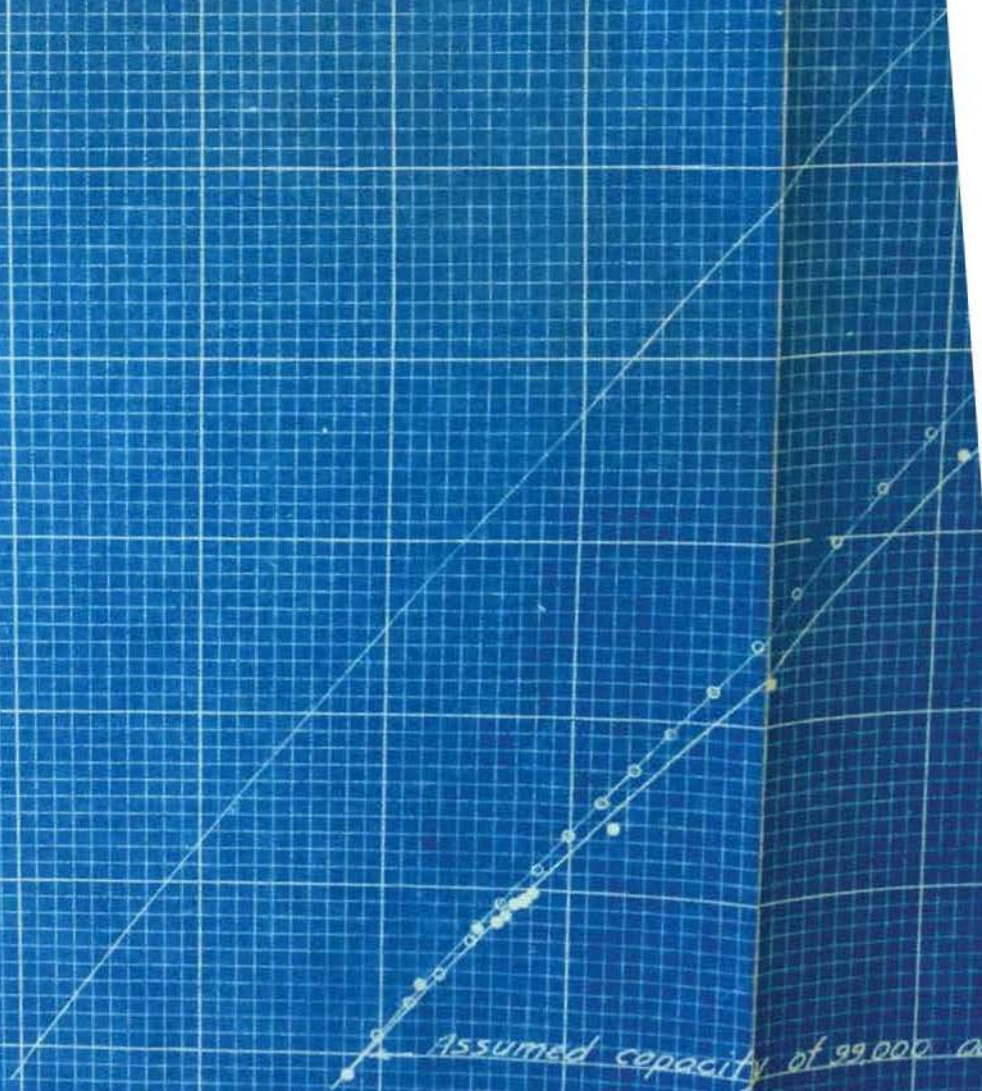
3140

3135

3130

3125

RESERVOIR ELEVATIONS IN FEET



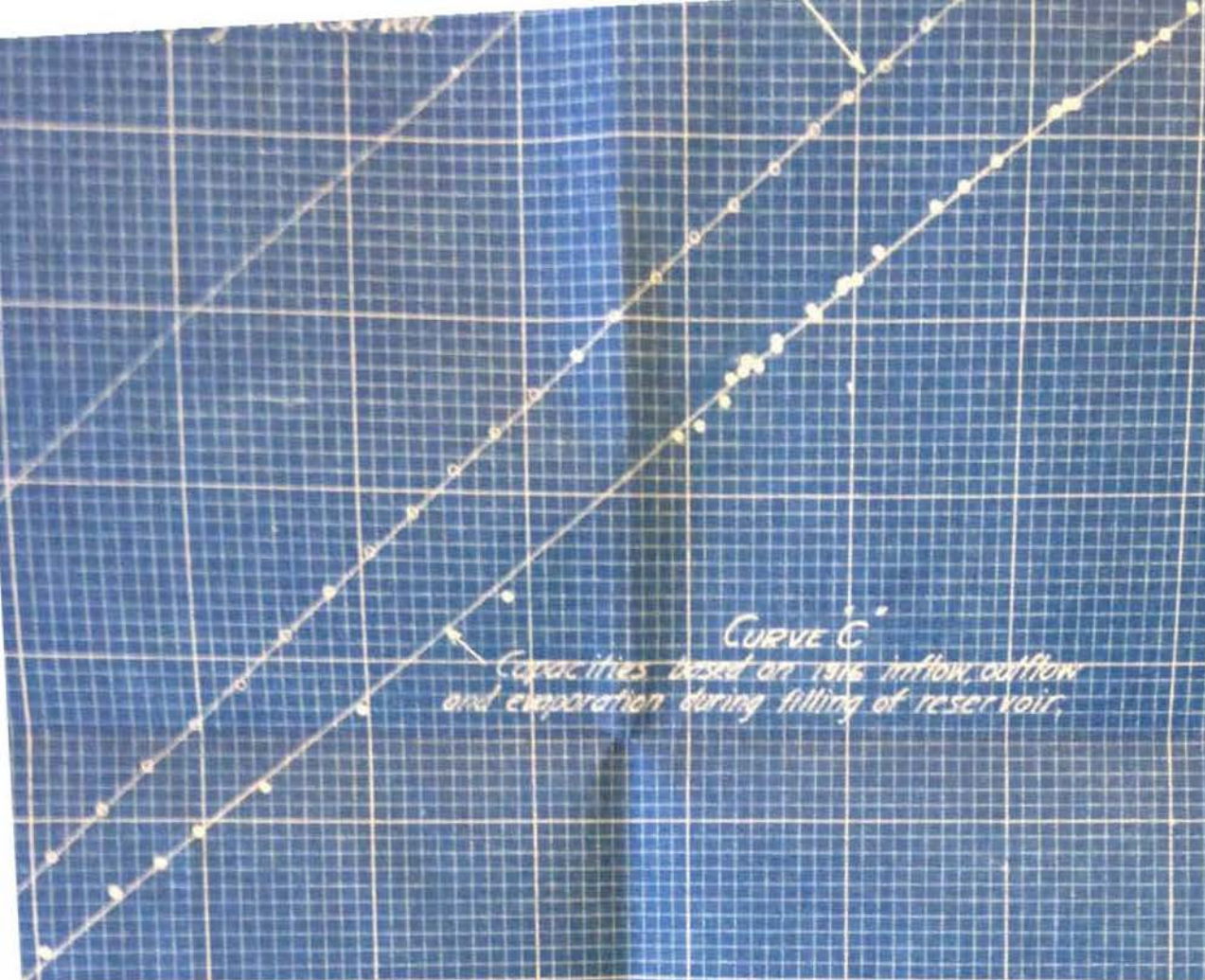
2 Holi
nom
sur

Column
Thanks
Day of the

3

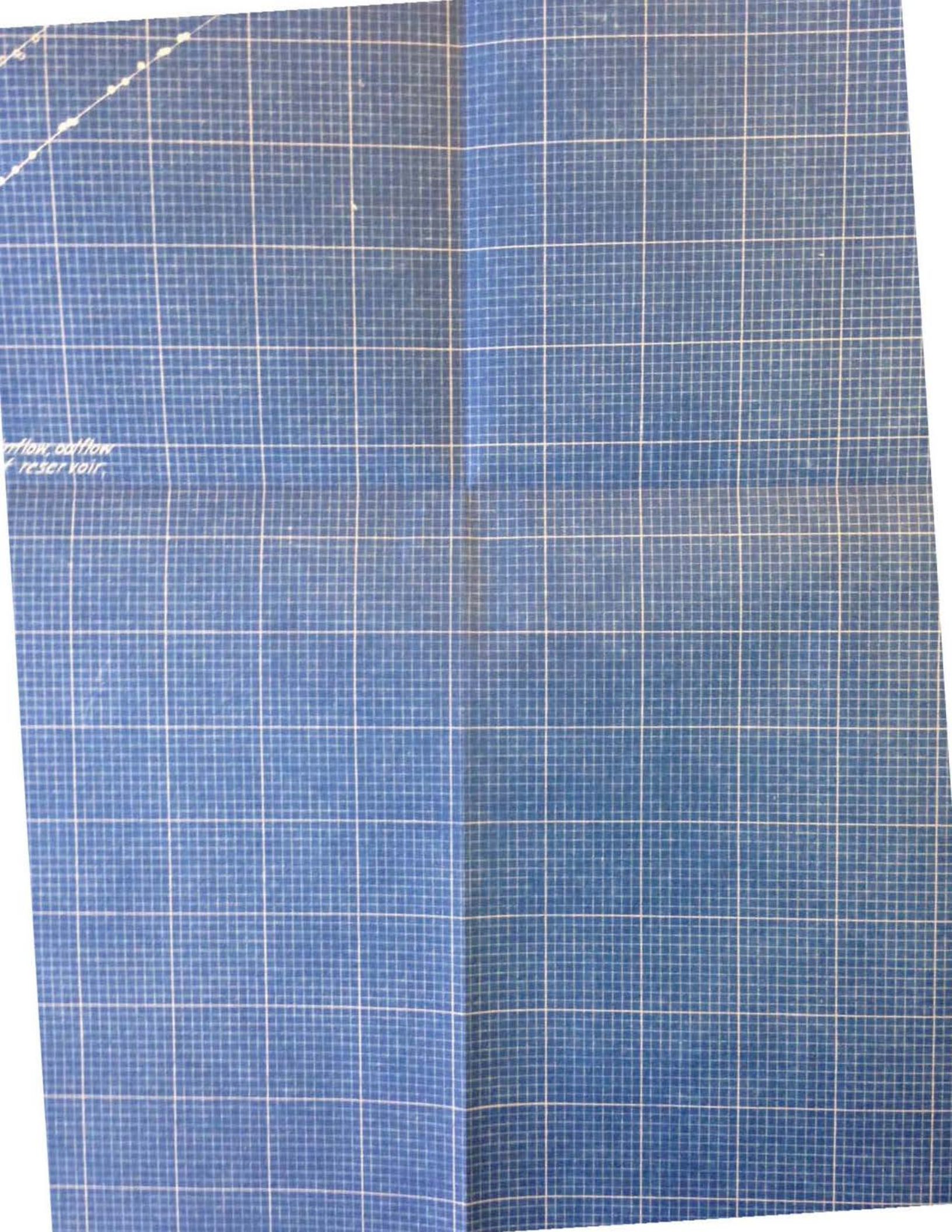
Assumed capacity of 99,000 acre feet at elevation 3150.0

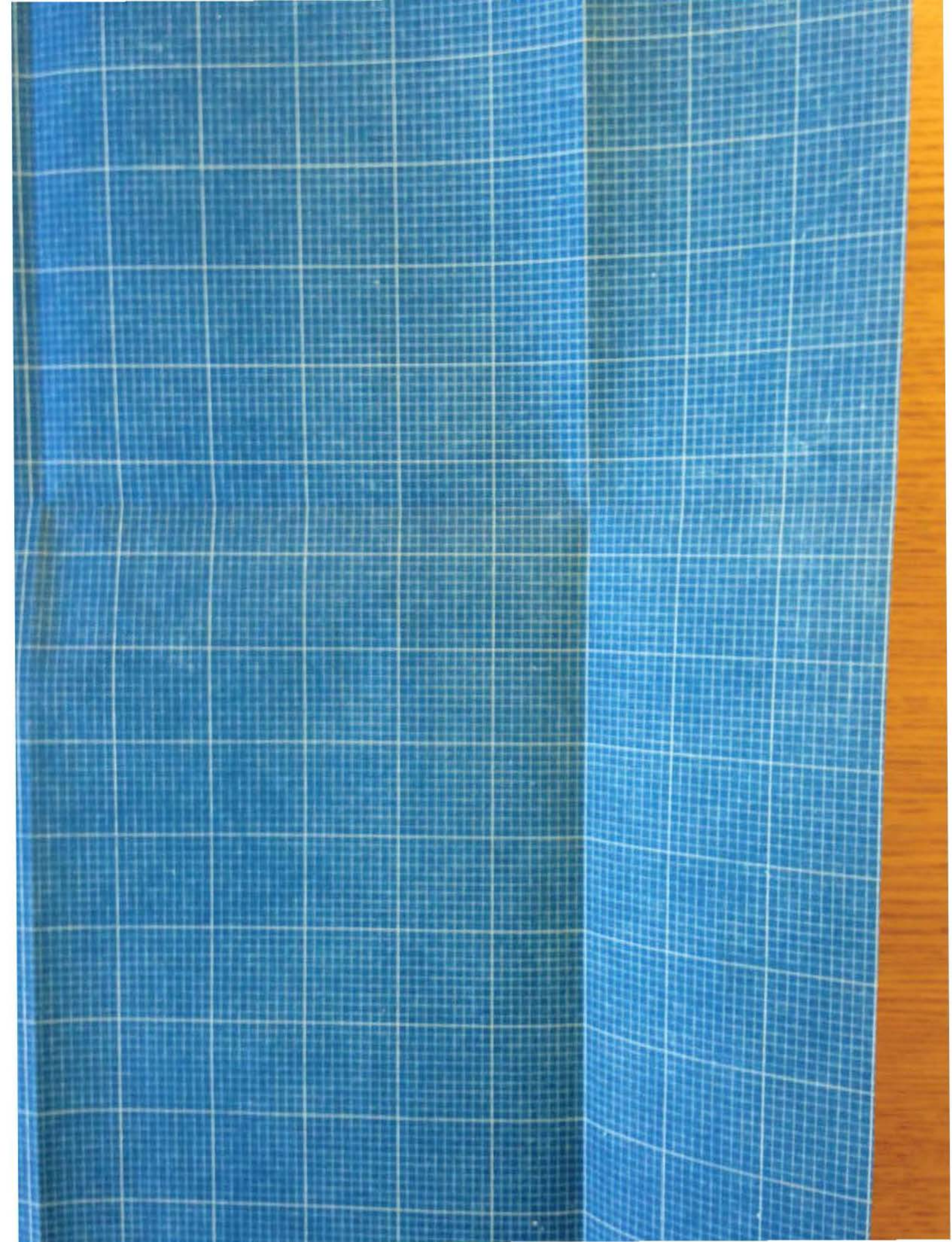
RESERVOIR



CURVE C
Capacities based on 1916 inflow, outflow
and evaporation during filling of reservoir;

levation 3130.0





RESERVOIR ELEVATIONS IN FEET

3170

3165

3160

3155

3150

3145

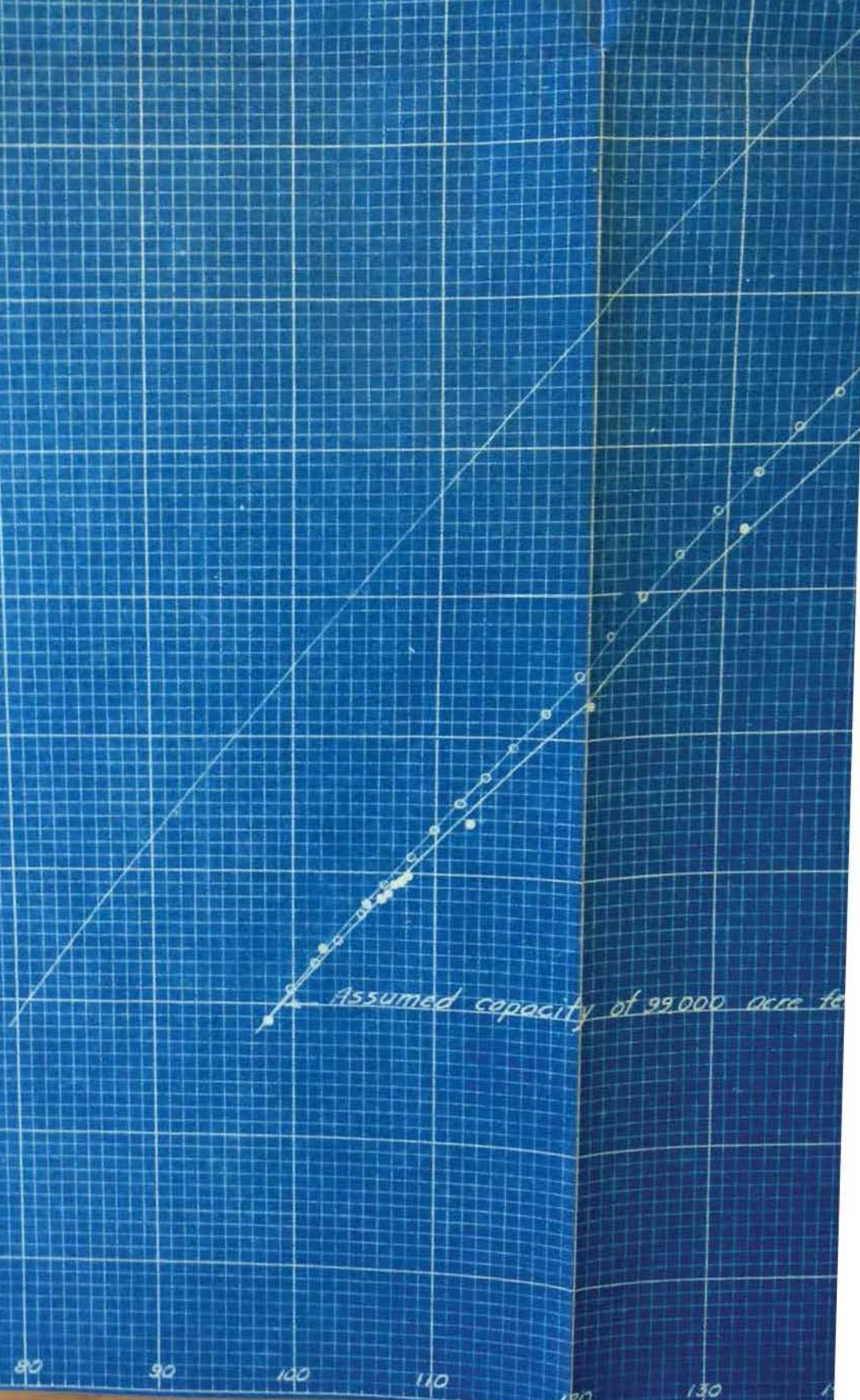
3140

3135

3130

3125

3120



Calculation of

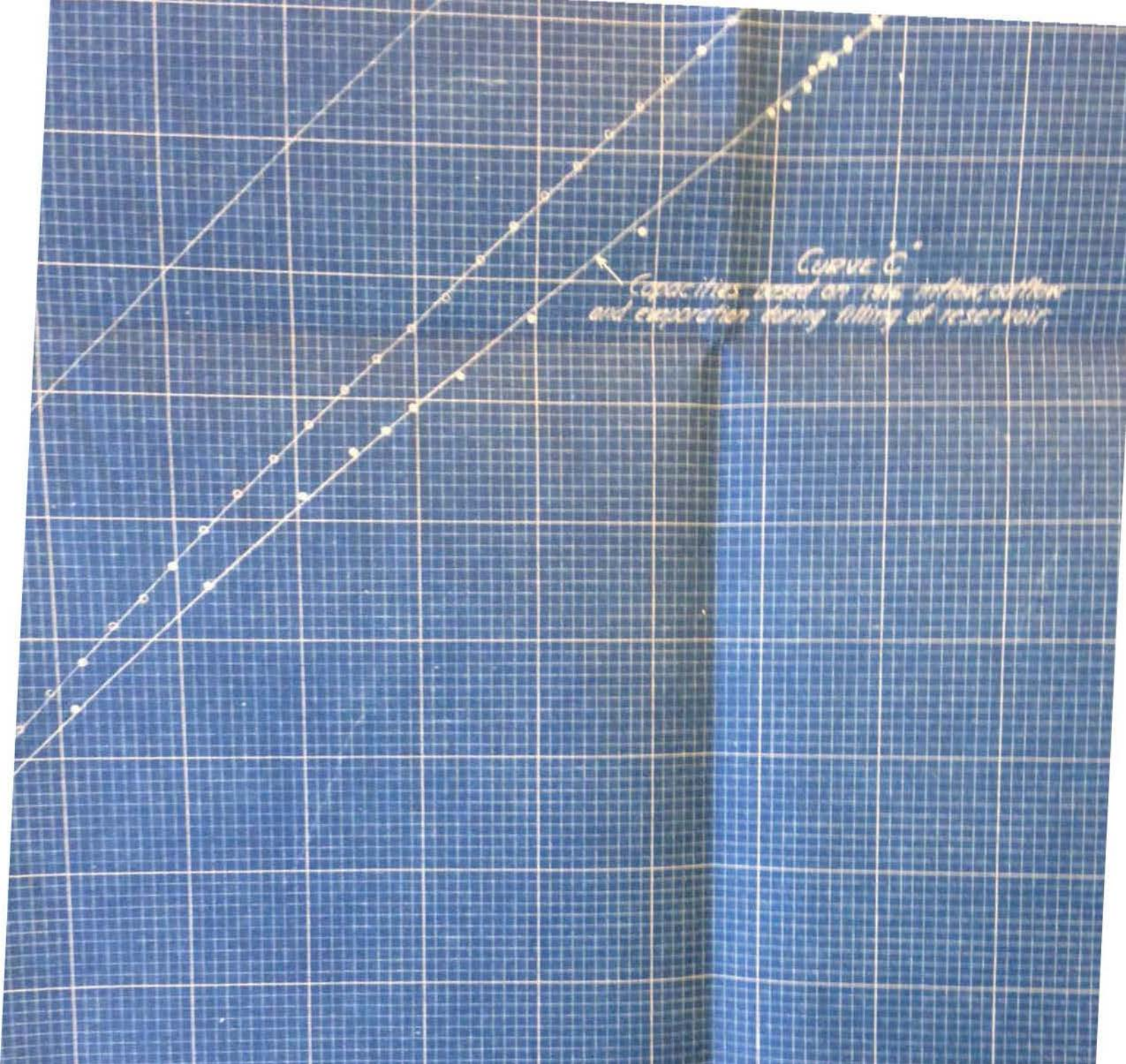
15	0
2	5
3	6
12	11
18	16
25	21

Assumed capacity of 99,000 acre feet at elevation 3130.0

Cap
and elev

RESERVOIR CAPACITIES IN T

90 100 110 120 130 140 150 160 170 180



CURVE C
Capacities based on 1916 inflow, outflow
and evaporation during filling of reservoir.

f 99,000 acre feet at elevation 3130.0

RESERVOIR CAPACITIES IN THOUSANDS OF ACRE FEET

130 140 150 160 170 180 190 200 210

CURVE C"

capacities based on 1916 inflow, outflow
evaporation during filling of reservoir.

IN THOUSANDS OF ACRE FEET

180

190

200

210

220

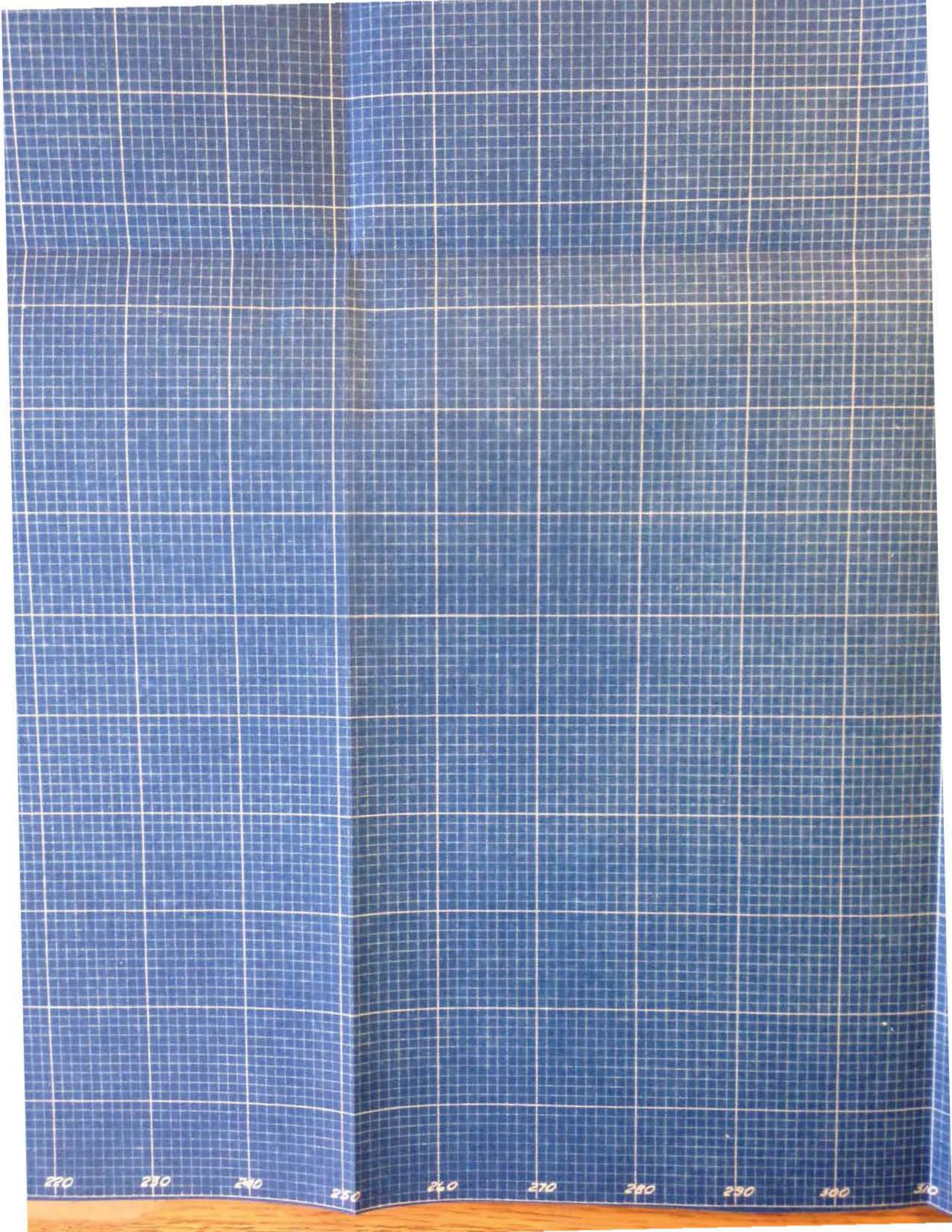
230

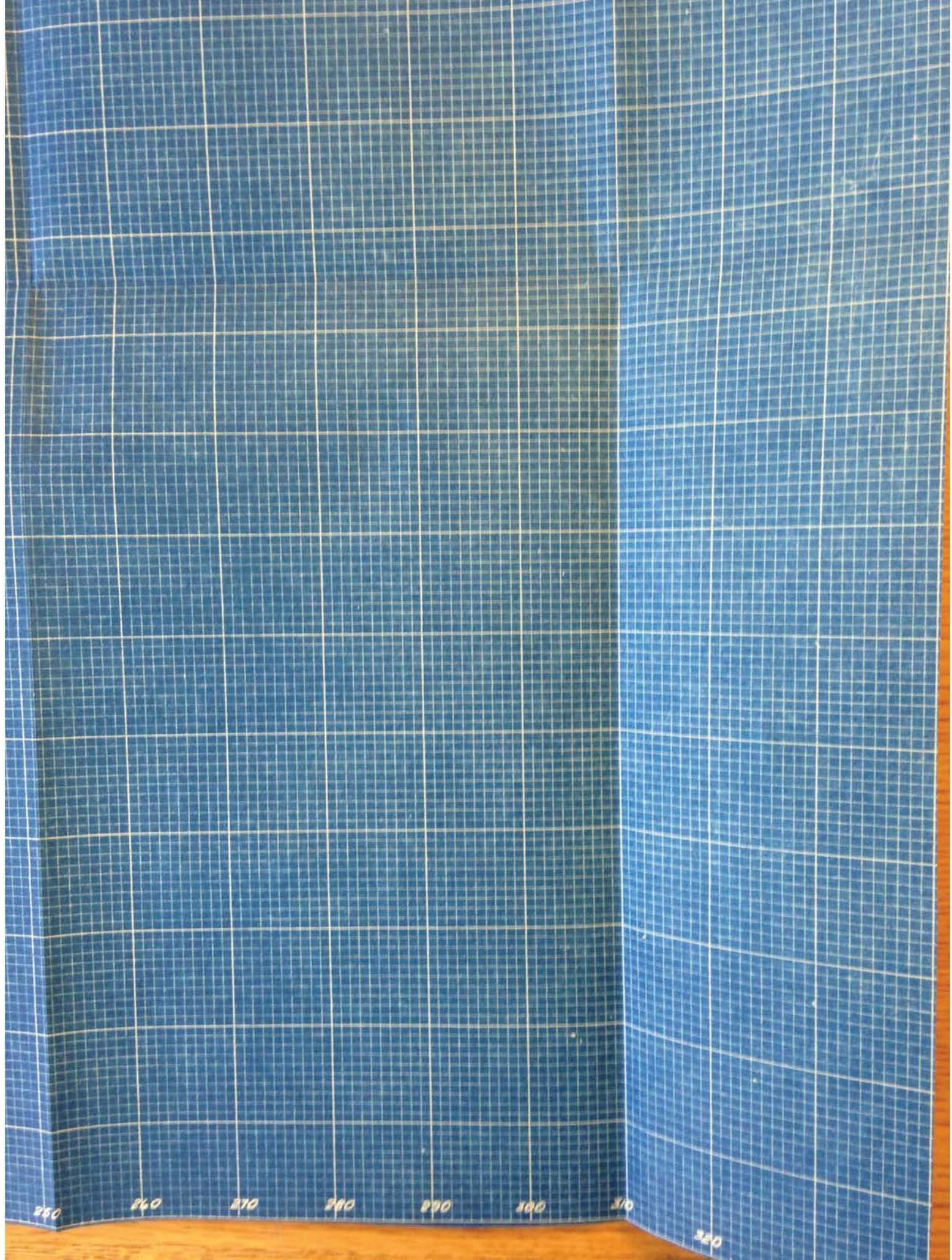
240

250

260

270





250

260

270

280

290

300

310

320

PLATE 10
ARROWROCK RESERVOIR

STORAGE CAPACITY CURVES, SEASON OF 1916

Office of U.S. Geological Survey

Boise, Idaho, Oct. 17, 1916.

A.N.H.

CURVE "A"
Capacities based on topographical
of reservoir by U.S.R.S.

CURVE "B"
Capacities based on 1916 inflow, outflow,
and evaporation during emptying of reservoir

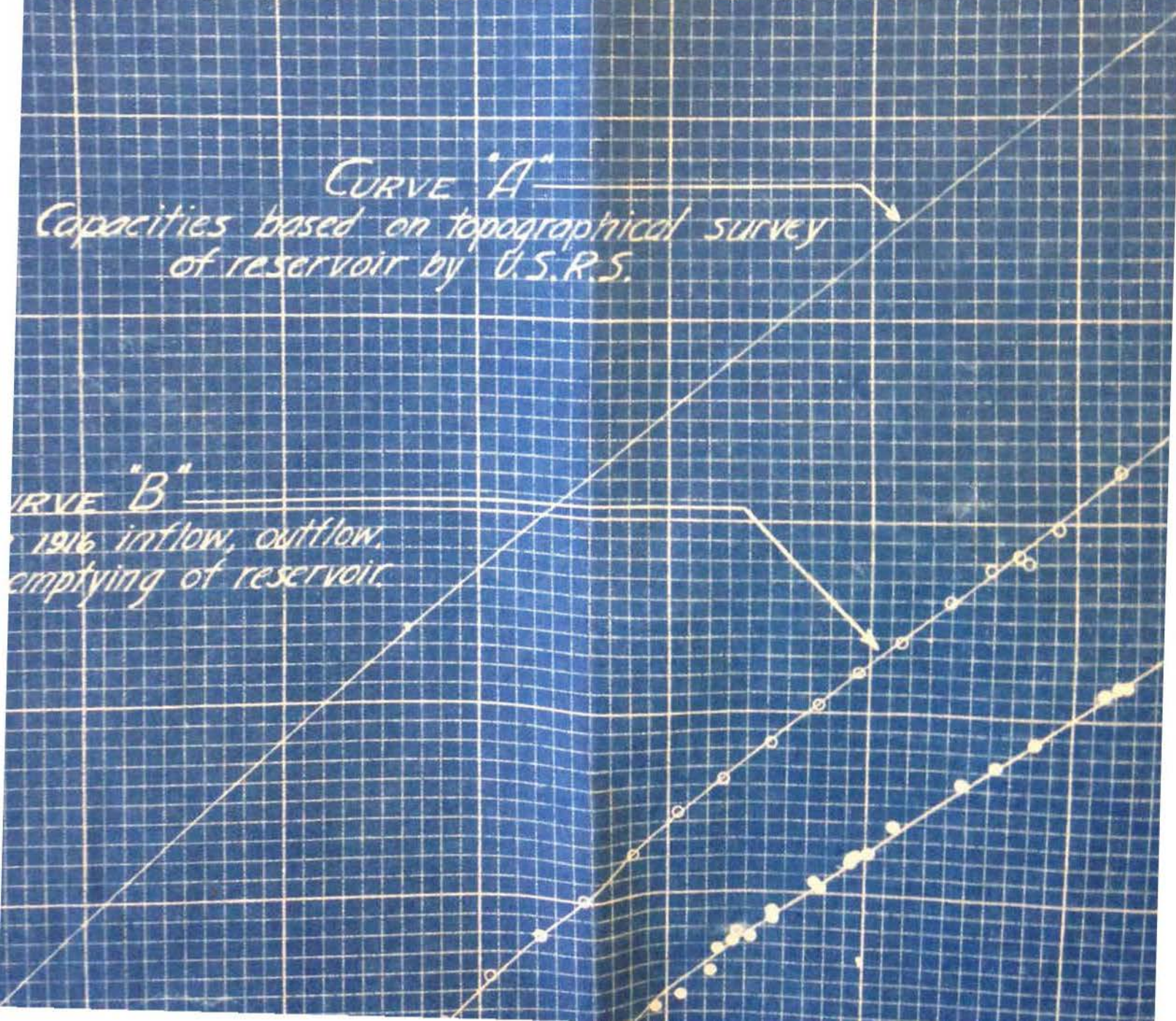


CURVE "A"

Capacities based on topographical survey
of reservoir by U.S.R.S.

CURVE "B"

1916 inflow, outflow,
emptying of reservoir.





CURVE "C"

Capacities based on 1916 inflow, outflow
and evaporation during filling of reservoir,



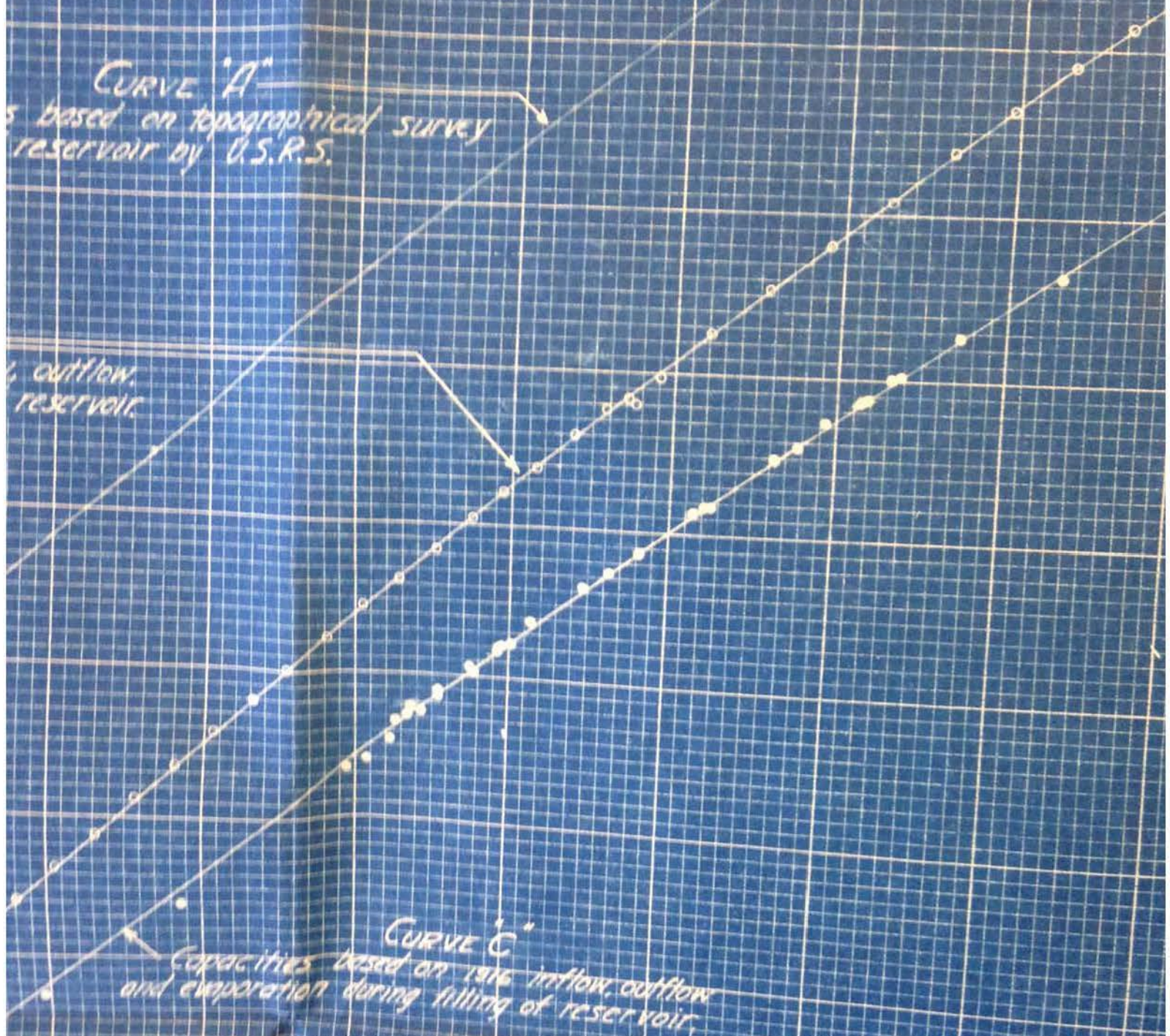
CURVE C'
Capacities based on 1916 inflow, outflow
and evaporation during filling of reservoir.



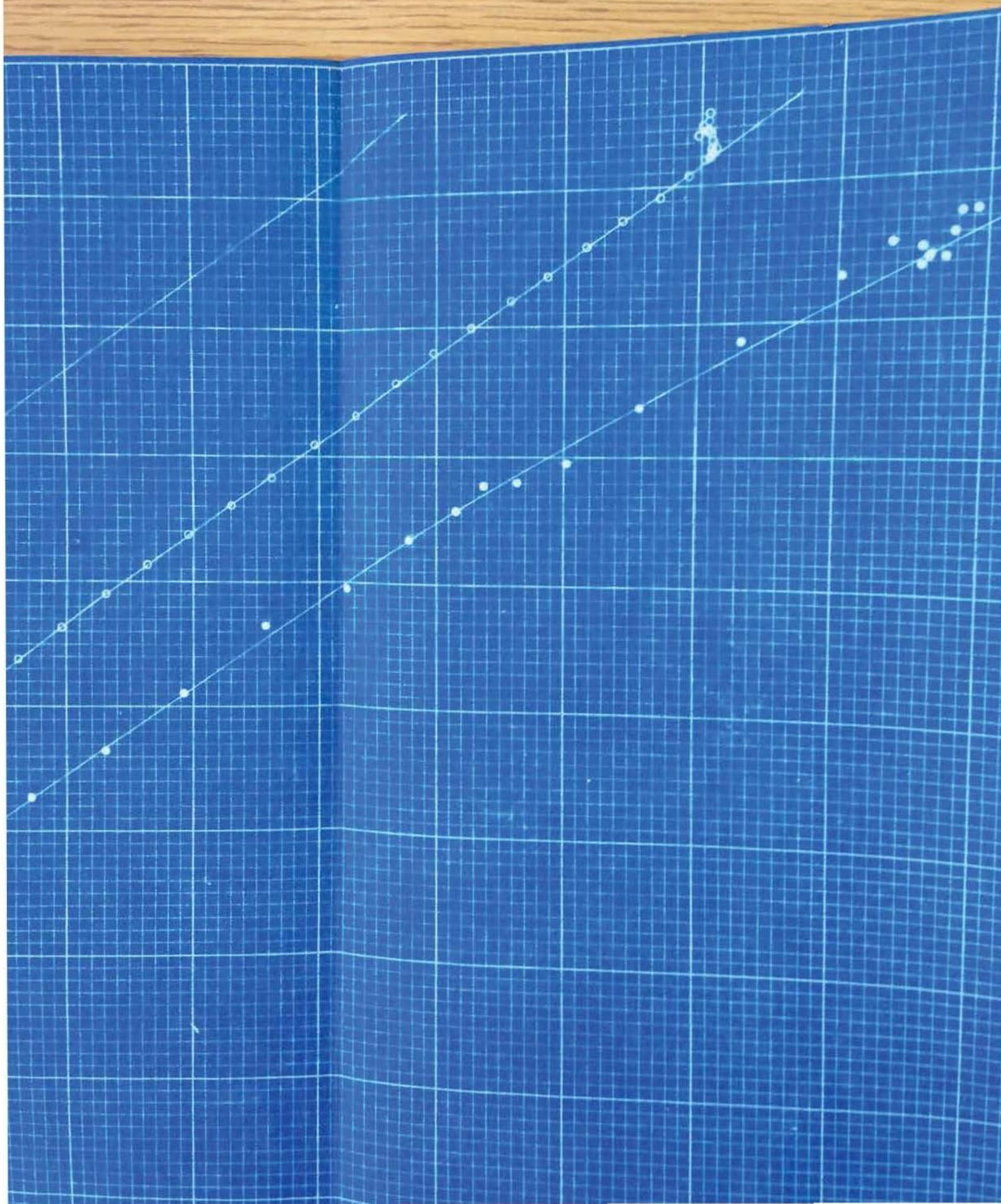


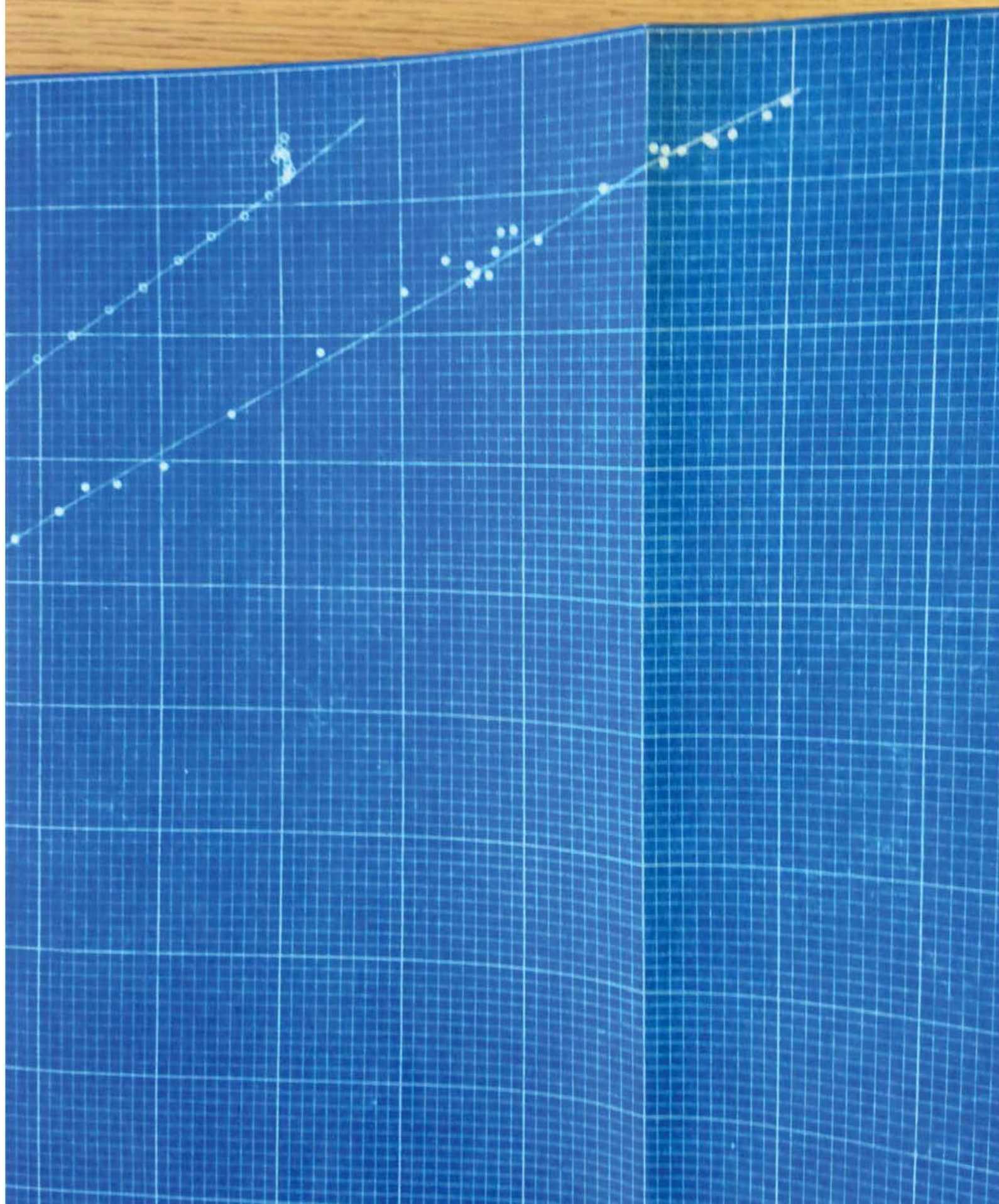
CURVE "A"
is based on topographical survey
reservoir by U.S.R.S.

outflow
reservoir



CURVE "C"
Capacities based on 1916 inflow, outflow
and evaporation during filling of reservoir.





feet at elevation 3130.0

RESERVOIR CAPACITIES IN THOUSAND

140

150

160

170

180

190

IES IN THOUSANDS OF ACRE FEET

170

180

190

200

210

220

PLATE II
 HYDROGRAPH
 SHOWING DISTRIBUTION OF
 GROUND STORAGE
 IN
 ARROWROCK RESERVOIR
 1916

Boise, Idaho Oct. 21, 1916
 ANN

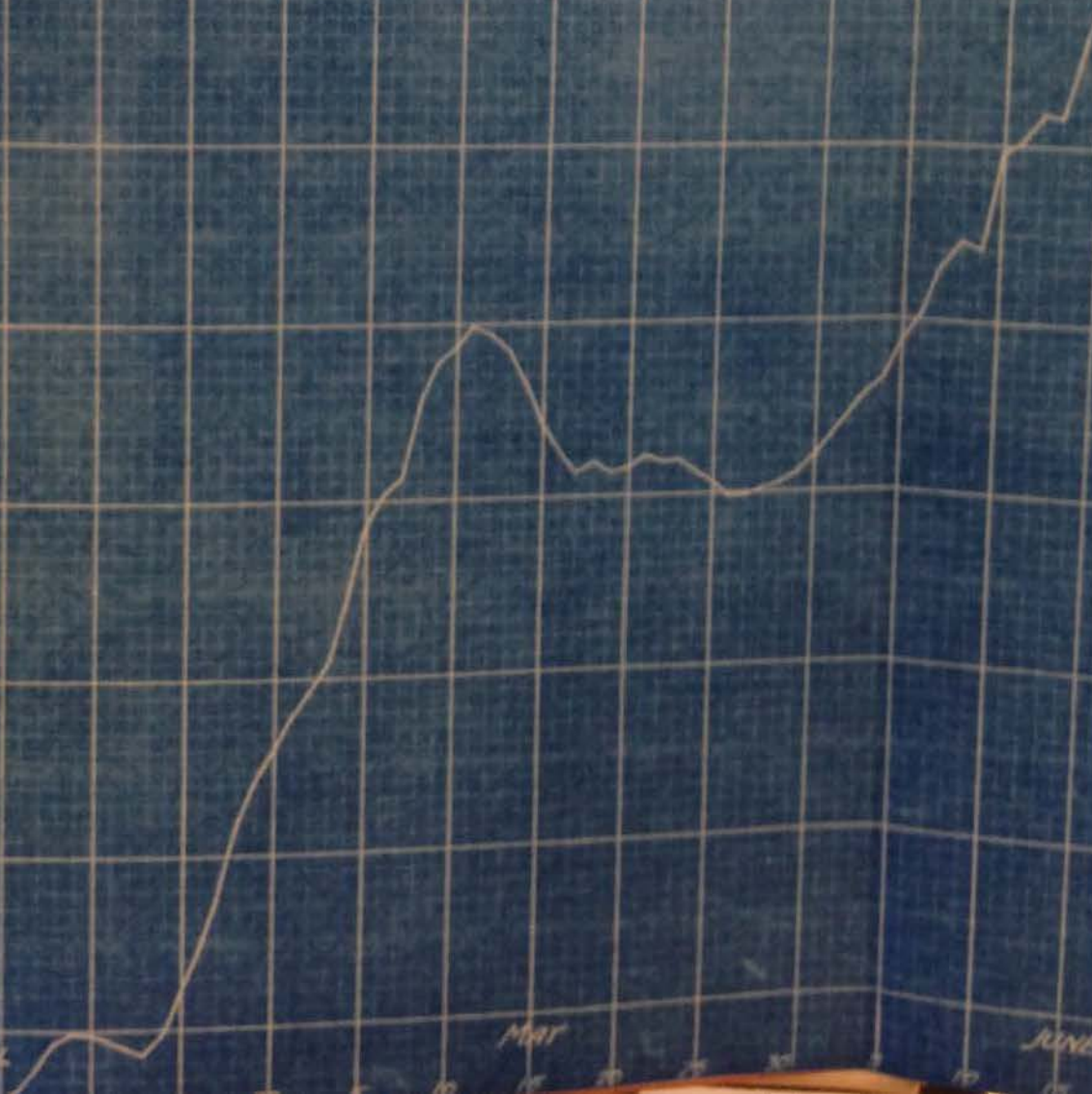
DIFFERENCES IN ALBE FEET BETWEEN RESERVOIR CAPACITIES DERIVED FROM 1906
 WATER MEASUREMENTS AND CAPACITIES FROM U.S.G.S. TOPOGRAPHICAL SURVEY

65000
 60000
 55000
 50000
 45000
 40000
 35000
 30000
 25000
 20000

APRIL

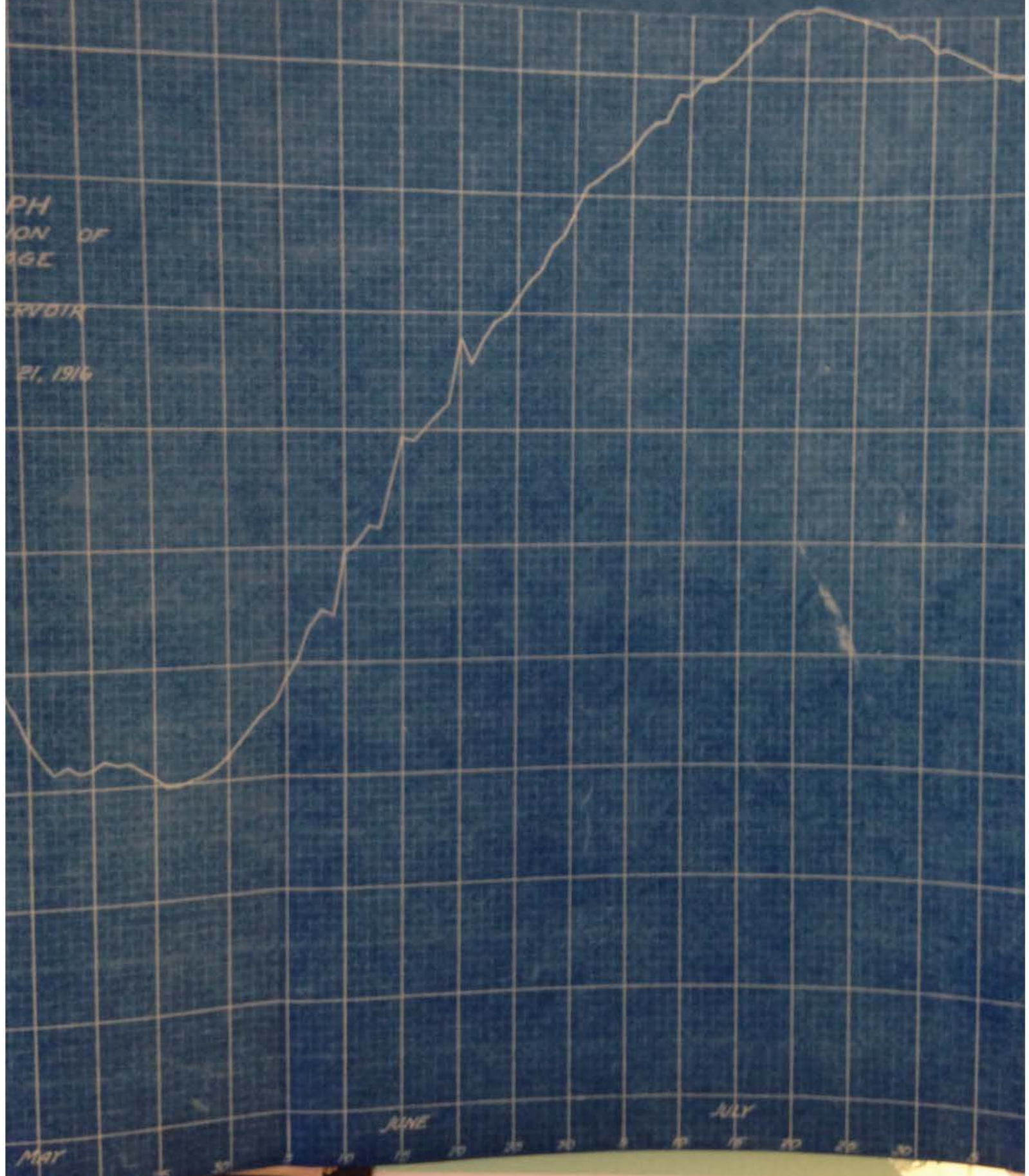
MAY

JUNE

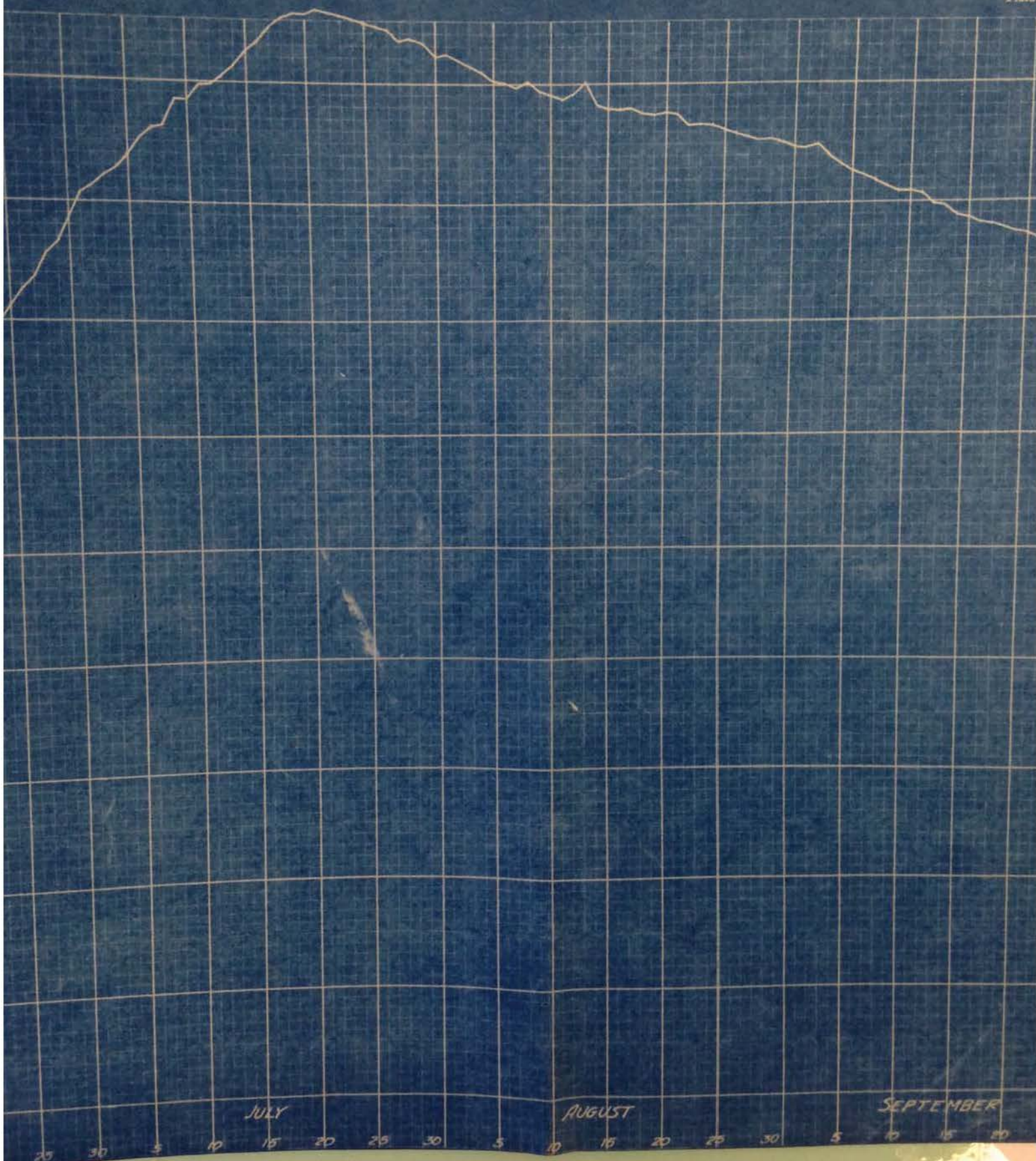


UNITED STATES GEOLOGICAL SURVEY (WATER RESOURCES BRANCH)

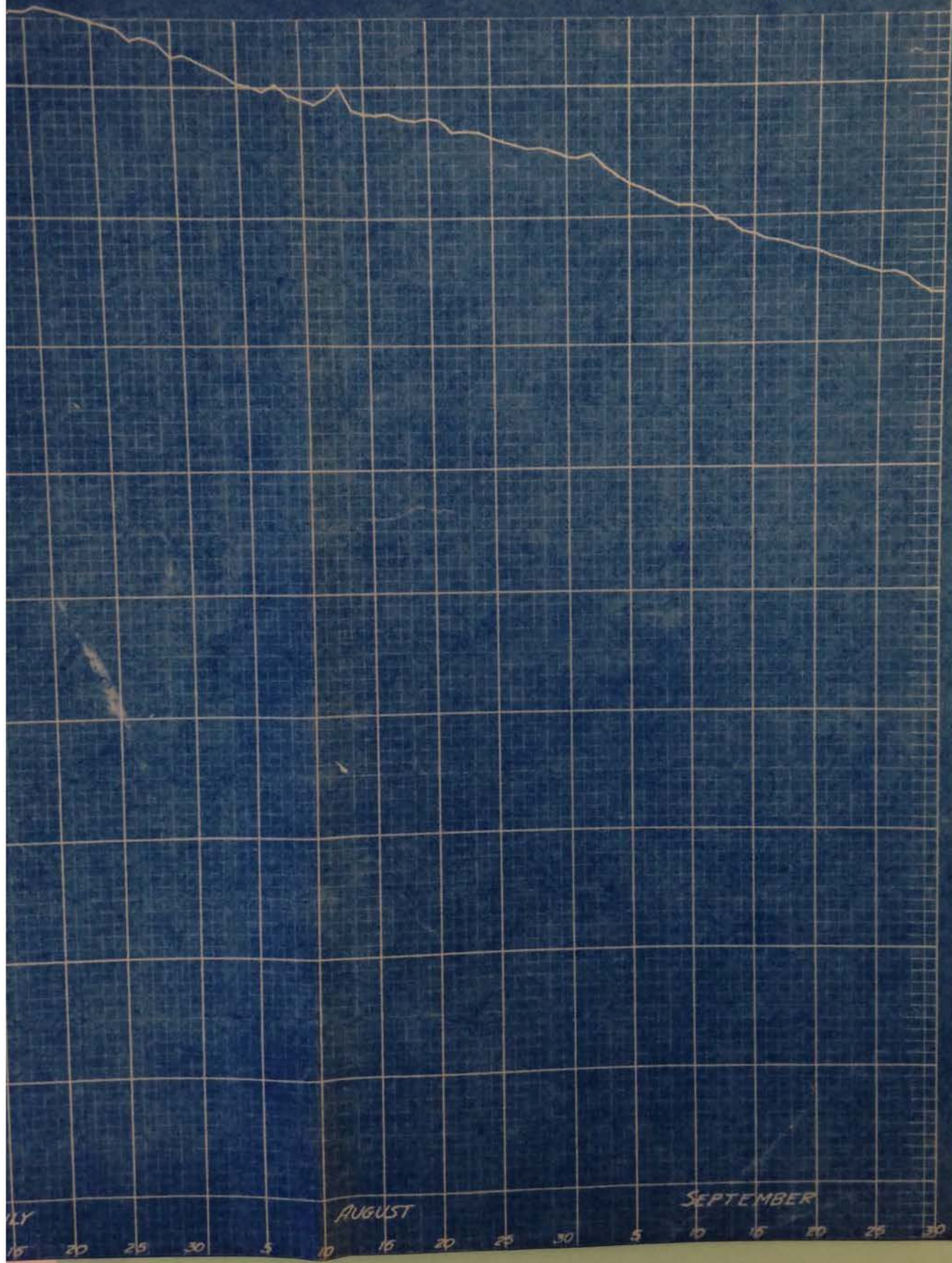
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21, 1916



File No. } Wash
Field



Washington
File No.
Field



There is a possibility that a portion of this loss may be a total loss due to percolation through the lava of the South Fork. Air bubbles rising to the surface during the entire season just above the mouth of Willow Creek have suggested this. It is not thought that the gases released from decaying vegetable matter would entirely explain the phenomenon, since very few air bubbles have been observed in other parts of the reservoir. Even though this theory is accepted as accounting for a small portion of the loss, it is believed that very large amounts of water were absorbed by the ground.

The reservoir was completely filled for the first time in 1916, and we should expect that the loss from seepage and ground storage would be very much less in succeeding years, as the ground becomes more and more impervious. Chemical processes, too, will probably play an important part in the future reduction of this loss. This ground water appears to be released comparatively slowly, as the reservoir falls, by the lowering of the ground water plane. Attention has already been called to the gain in capacity during the falling period, and it is shown very clearly on the hydrograph beginning July 21. The return water from this source would be expected to increase to a maximum during the fall months when the reservoir is ordinarily at its lowest stage.

This uncertain amount of loss or storage in the reservoir necessarily introduces a variable factor into any computations of capacity. As indicated by the results of the past season's work, the available capacity of the reservoir undoubtedly now exceeds materially the amount computed from the topographic survey but without further investigation and comparison during succeeding years it is impossible to determine the extent of dependable or permanent increase.

3. DAILY GAGE HEIGHTS

During the period of stored water delivery, beginning about July 15, daily gage readings were received by telephone by the writer at headquarters in Arrowrock, from gage readers at the river stations, and on Moore and Cottonwood creeks. Gage readings on the less important streams were received at less frequent intervals.

These gage heights were reported every morning by telephone to the Boise office of the Reclamation Service where they were directly available to interested parties.

Rating tables, based on the best information available from discharge measurements, were prepared by the writer and revised from time to time, as necessary. Copies of these tables were furnished to the Reclamation Service, to the State Engineer, and to the Special Deputy of the State Engineer who was charged with the apportionment of the flow of Boise River among the various water users in the Boise Valley.

Appendix "A"

GAGE HEIGHT AND DAILY DISCHARGE TABLES

daily gage height, in feet, and discharge, in second-feet, of

BOISE

River - TWINS

Drainage area 830 square miles.

ROY CALL

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
1	207	339	206	321	207	327			205	314
2	206	321	206	321	205	314				314
3	208	333	206	321	218	397				314
4	212	358	206	321	224	437				314
5	209	339	205	314	227	458			205	314
6	208	333	205	314	221	417				314
7	207	327	204	308	220	410	300			314
8	207	327	203	302	217	390				314
9	206	321	207	327	216	384				314
10	206	321	206	321	208	333				314
11	207	327	205	314	208	333				314
12	207	327	209	339	204	308				314
13	207	327	195	256	212	358	214	315	205	314
14	208	333	187	211	217	390		314		316
15	208	333	210	345	203	302	205	314		318
16	207	327	217	390	186	206				321
17	206	321	206	321	204	308				323
18	206	321	209	339	208	333				325
19	206	321	210	345	194	250	213	315	207	327
20	205	314	211	352	213	364				329
21	205	314	214	371	233	499				331
22	204	308	213	364	241	556	206	321	208	333
23	205	314	211	352	240	549				332
24	207	327	215	378	224	437				331
25	207	327	208	333	220	410	219			329
26	208	333	207	327	217	390			207	327
27	208	333	200	284	205	314	315	208	208	333
28	208	333	187	211	214	371	214	202	202	296
29	207	327	205	314	208	333		197	197	267
30	206	321	217	390		300				
31	205	314				300				
TOTAL		10121		9706		11478		9589		9220
Mean		326		304		370		309		318
Max. ft. per minute		358		390		446		372		383
Min. ft. depth in inches		45		44		51		43		41
Flow in acre-feet		29,000		19,500		22,800		19,000		18,300
Minimum		358		390		556		—		—
Maximum		308		211		206		—		—
Accuracy		A		A		B		C		C

ESTIMATED DEC. 30 - JAN. 12; JAN. 14 - 21 AND 23 - 30 ACCOUNT OF ICE INTERFERENCE.
USED RESULTS OF ACTUAL MEASUREMENT JAN. 13.

5.5

3.5

5.5

3.5

5.5

3.5

observer 1

Drainage area.....830.....acres

NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH		APRIL		MAY	
Day	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Day.	Gage height.	Discharge.	Gage height.
6	321	2.07	327		↑	2.05	314	1.93	244	1	3.32	1370	4.9
6	321	2.05	314				314	1.83	217	2	3.42	1470	5.1
6	321	2.18	397				314	1.85	201	3	3.6	1710	5.4
6	321	2.24	437				314	1.83	191	4	3.8	1980	5.9
25	314	2.27	458			2.05	314	1.93	244	5	3.8	1980	6.3
25	314	2.21	447				314	1.92	238	6	3.7	1840	6.5
24	308	2.20	410		300		314	1.87	211	7	3.75	1910	6.8
23	302	2.17	390				314	1.89	222	8	3.9	2130	6.2
27	327	2.16	384				314	1.99	278	9	4.0	2280	5.9
26	321	2.08	333				314	2.34	506	10	4.25	2690	5.4
25	314	2.08	333				314	2.68	764	11	4.95	3900	5.0
29	339	2.04	308				314	2.86	917	12	5.0	3990	4.65
25	256	2.12	358	2.14	315	2.05	314	3.07	1110	13	4.65	3370	4.4
27	211	2.17	390		314		316	3.00	1040	14	4.65	3370	4.2
10	345	2.03	302	2.05	314		318	2.98	1030	15	4.75	3550	4.15
17	390	1.86	206		↑		321	3.14	1180	16	4.7	3460	4.15
06	321	2.04	308				323	3.47	1550	17	4.55	3200	4.25
09	339	2.08	333		315		325	3.65	1770	18	4.45	3020	4.5
10	345	1.94	250	2.13		2.07	327	3.75	1910	19	4.25	2690	4.8
11	352	2.13	364				329	4.0	2280	20	4.05	2360	4.9
14	371	2.33	499		↓		331	3.95	2200	21	4.05	2360	5.0
13	364	2.41	556	2.06	321	2.08	333	3.7	1840	22	4.1	2440	4.9
11	352	2.40	549				332	3.5	1580	23	4.15	2520	4.65
15	378	2.24	437				331	3.31	1360	24	4.6	3280	4.5
28	333	2.20	410	2.19			329	3.19	1230	25	5.15	4260	4.35
07	327	2.17	390			2.07	327	3.10	1140	26	5.7	5270	4.2
00	284	2.05	314		315	2.08	333	3.07	1110	27	6.1	6030	4.1
27	211	2.14	371	2.14		2.02	296	3.28	1330	28	5.8	5460	4.15
05	314	2.08	333			1.97	267	3.31	1360	29	5.3	4540	4.25
17	390		300		↓			3.24	1290	30	4.95	3900	4.3
			300					3.25	1300	31		444	2770
	9706	11478		9589		9220		31843			42,350		114,820
	324	370		309		318		1030			3,080		3,870
	390	446		372		383		124			3.71		466
	44	51		43		41		1.43			4.14		537
	19,300	22,800		19,000		18,300		63,300			183,000		238,

UNITED STATES GEOLOGICAL SURVEY. [WATER RESOURCES BRANCH.]

Daily gage height, in feet, and discharge, in second-feet, of

BOISE

River ^{and} _{road} *Twin Springs*

Drainage area.....830.....square miles.

CALL & HIDDLESON

MARCH			APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
Day.	Gage height.	Discharge.	Day.	Gage height.	Discharge.	Day.	Gage height.	Discharge.	Day.	Gage height.	Discharge.	Day.	Gage height.	Discharge.
1	1.93	244	1	3.32	1370	1	4.9	3810	1	4.4	2940	1	4.9	3810
2	1.83	217	2	3.42	1470	2	5.1	4170	2	4.35	2850	2	5.35	4630
3	1.85	201	3	3.6	1710	3	5.4	4720	3	4.55	3200	3	5.15	4260
4	1.83	191	4	3.8	1980	4	5.9	5650	4	4.95	3900	4	4.75	3550
5	1.93	244	5	3.8	1980	5	6.3	6410	5	5.3	4540	5	4.65	3370
6	1.92	238	6	3.7	1840	6	6.5	6800	6	5.45	4810	6	4.95	3900
7	1.87	211	7	3.75	1910	7	6.8	7390	7	5.5	4900	7	5.1	4170
8	1.89	222	8	3.9	2130	8	6.2	6220	8	5.6	5090	8	5.2	4350
9	1.99	278	9	4.0	2280	9	5.9	5650	9	5.8	5460	9	5.25	4440
10	2.34	506	10	4.25	2690	10	5.4	4720	10	5.9	5650	10	4.95	3900
11	2.68	764	11	4.95	3900	11	5.0	3990	11	5.7	5270	11	4.7	3460
12	2.86	917	12	5.0	3990	12	4.65	3370	12	5.4	4720	12	4.65	3370
13	3.07	1110	13	4.65	3370	13	4.4	2940	13	5.35	4630	13	4.6	3280
14	3.00	1040	14	4.65	3370	14	4.2	2600	14	5.6	5090	14	4.5	3110
15	2.98	1030	15	4.75	3550	15	4.15	2520	15	5.9	5650	15	4.35	2850
16	3.14	1180	16	4.7	3460	16	4.15	2520	16	6.2	6220	16	4.2	2600
17	3.47	1550	17	4.55	3200	17	4.25	2690	17	6.5	6800	17	4.3	2770
18	3.65	1770	18	4.45	3020	18	4.5	3110	18	6.8	7390	18	4.0	2280
19	3.75	1910	19	4.25	2690	19	4.8	3640	19	7.1	7990	19	3.8	1980
20	4.0	2280	20	4.05	2360	20	4.9	3810	20	6.4	6610	20	3.65	1770
21	3.95	2200	21	4.05	2360	21	5.0	3990	21	5.6	5090	21	3.6	1710
22	3.7	1840	22	4.1	2440	22	4.9	3810	22	5.1	4170	22	3.5	1580
23	3.5	1580	23	4.15	2520	23	4.65	3370	23	4.75	3550	23	3.41	1470
24	3.31	1360	24	4.6	3280	24	4.5	3110	24	4.7	3460	24	3.34	1400
25	3.19	1230	25	5.15	4260	25	4.35	2850	25	4.95	3900	25	3.30	1350
26	3.10	1140	26	5.7	5270	26	4.2	2600	26	5.35	4630	26	3.27	1320
27	3.07	1110	27	6.1	6030	27	4.1	2440	27	5.6	5090	27	3.21	1250
28	3.28	1330	28	5.8	5460	28	4.15	2520	28	5.7	5270	28	3.13	1170
29	3.31	1360	29	5.3	4540	29	4.25	2690	29	5.6	5090	29	3.06	1100
30	3.24	1290	30	4.95	3900	30	4.3	2770	30	5.05	4080	30	3.00	1040
31	3.25	1300	31	4.4	2940	31	4.4	2940	31	2.96	1010	31	2.35	514
2220	31843			42,350			114,820		148,040		82,250		21,423	13,605
318	1030			3,080			3,870		4,930		2,650		691	454
383	124			3.71			4.66		5.94		3.19		833	547
41	1.43			4.14			5.37		6.63		3.68		96	.61
18,300	63,300			183,000			238,000		293,000		163,000		42,500	27,000
333	2280			6,030			7,390		7,990		4,630		980	535
267	191			1,370			2,440		2,850		1,010		574	397
C	B			A			A		A		A		A	A

UNITED STATES GEOLOGICAL SURVEY. (WATER RESOURCES BRANCH)

height, in feet, and discharge, in second-feet, of **BOISE** River, **TRINITY SPRINGS, IDAHO**, the year ending September 30, 1916.
 Drainage area, **830** square miles. **CANN & HIDDLESON**, observers.

APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	
1370	4.9	3810	4.4	2940	4.9	3810	2.93	980	2.33	444		1
1470	5.1	4170	4.35	2850	5.35	4630	2.89	943	2.31	485		2
1710	5.4	4720	4.55	3200	5.15	4260	2.85	908	2.32	442		3
1980	5.9	5650	4.95	3900	4.75	3550	2.82	882	2.35	514		4
1980	6.3	6410	5.3	4540	4.65	3370	2.78	847	2.33	494		5
1840	6.5	6800	5.45	4810	4.95	3900	2.73	805	2.32	412		6
1910	6.8	7390	5.5	4900	5.1	4170	2.69	772	2.31	485		7
2130	6.2	6220	5.6	5090	5.2	4350	2.67	756	2.29	471		8
2280	5.9	5650	5.8	5460	5.25	4440	2.65	740	2.31	485		9
2690	5.4	4720	5.9	5650	4.95	3900	2.63	724	2.38	535		10
3400	5.0	3990	5.7	5270	4.7	3460	2.60	700	2.34	506		11
3990	4.65	3370	5.4	4720	4.65	3370	2.58	685	2.32	492		12
3370	4.4	2940	5.35	4630	4.6	3280	2.57	677	2.30	478		13
3370	4.2	2600	5.6	5090	4.5	3110	2.55	662	2.28	464		14
3550	4.15	2520	5.9	5650	4.35	2850	2.53	646	2.28	464		15
3460	4.15	2520	6.2	6220	4.2	2600	2.52	638	2.27	458		16
3200	4.25	2690	6.5	6800	4.3	2770	2.57	677	2.25	444		17
3020	4.5	3110	6.8	7390	4.0	2280	2.82	882	2.23	430		18
2690	4.8	3640	7.1	7990	3.8	1980	2.63	724	2.22	424		19
2360	4.9	3810	6.4	6610	3.65	1770	2.55	662	2.22	424		20
2360	5.0	3990	5.6	5090	3.6	1710	2.52	638	2.21	417		21
2440	4.9	3810	5.1	4170	3.5	1580	2.48	608	2.21	417		22
2320	4.65	3370	4.75	3550	3.41	1470	2.45	586	2.20	410		23
3280	4.5	3110	4.7	3460	3.34	1400	2.42	564	2.19	404		24
4260	4.35	2850	4.95	3900	3.30	1350	2.41	556	2.19	404		25
5270	4.2	2600	5.35	4630	3.27	1320	2.38	535	2.19	404		26
6030	4.1	2440	5.6	5090	3.21	1250	2.37	528	2.20	410		27
5460	4.15	2520	5.7	5270	3.13	1170	2.37	528	2.18	397		28
4540	4.25	2690	5.6	5090	3.06	1100	2.36	521	2.18	397		29
3100	4.3	2770	5.05	4080	3.00	1040	2.38	535	2.19	404		30
	4.4	2940			2.96	1010	2.35	514				31
42,350		114,820		148,040		82,250		21,423		13,605		559,445
3,080		3,870		4,930		2,650		691		454		1,530
3.71		4.66		5.94		3.19		833		517		1.84
4.14		5.37		6.63		3.68		96		.61		25.06
183,000		238,000		293,000		163,000		42,500		27,000		1,110,000
6,030		7,390		7,990		4,630		980		535		7,790
1,370		2,440		2,850		1,010		574		397		191
A		A		A		A		A		A		

Dis. Eng. 10-3 4-9
 Gage hts. checked by **aut** 10-3 4-9
 Discharge applied by **aut** 10-3 4-9
 Discharge checked by **aut** 10-3 4-9
 Checked by **aut** 10-3 4-9
 Discharge checked by **aut** 10-3 4-9

Daily gage height, in feet, and discharge, in second-feet, of

BOISE

River **at DOWLING,**

FRANCES E. DOWLING.

Drainage area _____ square miles.

Day.	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	3.11	940	2.37	441	2.35	430	2.27	391	2.78	687
2	2.99	841	2.35	430	2.35	430	2.30	405	2.79	693
3	2.90	772	2.37	441	2.35	430	2.31	410	2.79	693
4	2.87	750	2.37	441	2.37	441	2.33	420	2.76	673
5	2.90	772	2.38	446	2.40	456	2.33	420	2.88	758
6	2.92	787	2.37	441	2.42	467	2.33	420	3.19	1010
7	2.88	758	2.41	462	2.39	451	2.33	420	3.34	1150
8	2.85	736	2.43	472	2.36	436	2.33	420	3.45	1270
9	2.83	722	2.37	441	2.37	441	2.34	425	3.66	1500
10	2.81	707	2.33	420	2.38	446	2.34	425	3.60	1430
11	2.79	693	2.37	441	2.38	446	2.34	425	3.52	1340
12	2.79	693	2.41	462	2.38	446	2.55	540	3.52	1340
13	2.78	687	2.37	441	2.40	456	2.60	570	3.53	1350
14	2.81	707	2.32	415	2.40	456	2.60	570	3.52	1340
15	2.82	714	2.33	420	2.40	456	2.60	570	3.34	1150
16	2.82	714	2.38	446	2.40	456	2.80	660	3.35	1160
17	2.96	818	2.42	467	2.41	462	2.88	690	3.53	1350
18	2.96	818	2.44	478	2.41	462	2.79	693	3.74	1600
19	2.86	743	2.46	489	2.42	467	2.79	693	3.8	1670
20	2.85	736	2.47	494	2.42	467	2.84	690	3.8	1670
21	2.84	729	2.46	489	2.42	467	2.98	690	3.57	1400
22	2.87	750	2.48	500	2.43	472	2.88	700	3.42	1230
23	2.78	687	2.48	500	2.43	472	2.77	680	3.53	1350
24	2.71	640	2.46	489	2.43	472	2.78	687	3.60	1430
25	2.67	614	2.37	441	2.44	478	2.79	693	3.66	1500
26	2.73	653	2.29	400	2.44	478	2.85	693	3.66	1500
27	2.73	653	2.30	405	2.41	462	2.90	693	3.73	1590
28	2.73	653	2.31	410	2.31	410	2.79	693	3.78	1650
29	2.69	627	2.32	415	2.30	405	2.81	690	3.77	1640
30	2.64	595	2.33	420	2.33	420	2.82	690		50
31	2.51	517			2.43	406	2.81			50
TOTAL		22,226		13,457		13,944		17,856		37,124
Mean		717		449		450		576		1,280
Sec.-ft. per square mile										
Run-off, depth in inches										
Run-off in acre-feet		44,100		26,700		27,700		35,400		73,600
Maximum		940		500		478		391		1,670
Minimum		517		400		405		A		673
Accuracy		A		A		A		A		A

LIMITS: - HALF TENTHS 3.8 FT. - 7.0 FT.
 USED RATING TABLE DATED 11/21/16 OCT. 1 - MAR. 22
 " " 10/19/16 MAR. 23 - MAY 27
 " " 10/10/16 MAY 29 - SEPTEMBER 30
 ESTIMATED DEC. 31, JANUARY 16-17, 20-22, 26-27 AND 29-31 ON ACCOUNT OF ICE

River POWELLING, IDAHO for 1946

FRANCES E. DOWLING, 1885-1965

UNITED STATES GEOLOGICAL SURVEY

Bally page height, in feet, and discharge, in second-feet, of

Date	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
430	227	391	2.78	687	3.76	1620	5.0	3690	6.45	7420	5.3	4210	6.25	
430	230	405	2.79	693	3.73	1590	5.25	4230	6.45	7420	5.3	4210	6.25	
430	231	410	2.79	693	3.64	1480	5.45	4690	6.5	7570	5.35	4320	6.45	
441	233	420	2.76	673	3.58	1410	5.5	4810	6.55	7730	5.55	4770	6.2	
456	233	420	2.88	758	3.58	1410	5.65	5180	6.65	8050	6.0	5880	5.9	
467	233	420	3.19	1010	3.58	1410	5.75	5430	6.7	8210	6.15	6280	5.8	
451	233	420	3.34	1150	3.55	1380	5.8	5560	6.8	8540	6.2	6440	6.0	
436	233	420	3.45	1270	3.47	1290	5.8	5560	6.9	8870	6.2	6410	6.3	
441	234	425	3.66	1500	3.45	1270	5.8	5560	6.95	9040	6.4	6970	6.55	
446	234	425	3.60	1430	3.51	1330	5.8	5560	6.95	9040	6.6	7550	6.3	
446	234	425	3.52	1340	3.85	1740	5.85	5700	6.95	9040	6.65	7700	5.85	
446	255	540	3.52	1340	4.95	3530	5.9	5830	6.95	9040	6.65	7700	5.75	
456	260	570	3.53	1350	5.2	4040	5.95	5970	6.9	8870	6.65	7700	5.7	
456	260	570	3.52	1340	5.15	3940	6.0	6100	6.9	8870	6.7	7850	5.6	
456	260	570	3.34	1150	5.1	3830	6.0	6100	6.85	8710	6.7	7850	5.45	
456	280	660	3.35	1160	5.1	3830	6.0	6100	6.8	8540	6.75	8000	5.3	
462	288	690	3.53	1350	5.1	3830	6.15	6530	6.75	8370	6.8	8150	5.3	
462	279	693	3.74	1600	5.1	3830	6.25	6820	6.25	6820	7.5	10500	5.25	
467	279	693	3.8	1670	5.15	3940	6.15	6530	5.85	5700	8.2	13100	4.9	
467	284	690	3.8	1670	5.15	3940	6.05	6240	6.05	6240	7.7	11200	4.9	
467	298	690	3.57	1400	4.5	2710	6.05	6240	6.25	6820	6.75	8000	5.05	
472	288	700	3.42	1230	3.00	849	6.05	6240	6.4	7260	6.75	8000	5.2	
472	277	680	3.53	1350	5.85	5700	6.05	6240	6.55	7730	6.7	7850	5.15	
472	278	687	3.60	1430	5.35	4450	6.05	6240	6.5	7570	6.4	6970	5.1	
478	279	693	3.66	1500	4.5	2740	6.1	6380	6.35	7110	6.4	6970	5.1	
478	285	693	3.66	1500	4.5	2740	6.1	6380	6.1	6380	6.25	6550	5.05	
462	290	693	3.73	1590	4.5	2740	6.2	6670	5.7	5300	6.05	6010	5.05	
410	279	693	3.78	1650	4.7	3100	6.3	6960	5.4	4500	6.15	6280	5.0	
405	281	690	3.77	1640	5.0	3690	6.35	7110	5.25	4100	6.65	7700	5.0	
420	282	690			5.0	3690	6.4	7260	5.25	4100	6.6	7550	5.0	
406	281				5.0	3690			5.25	4100				
3,944		17,856		37,124		86,739		177,910		227,060		218,640		4,95
450		576		1,280		2,800		5,930		7,320		7,290		14,756
														4,820
7,700		35,400		73,600		172,000		353,000		450,000		434,000		296,000
478				1,670		5,700		7,260		9,040		13,100		7,400
405		391		673		849		3,690		4,100		4,210		3,380
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Daily gage height, in feet, and discharge, in second-feet, of BOISE River ^{at} DOWLING, IDAHO, for 1911.

FRANCES E. DOWLING (about 1912)

No.	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	
20	5.0	3690	6.45	7420	5.3	4210	6.25	6550	4.85	3290	4.25	2260	1
10	5.25	4230	6.45	7420	5.3	4210	6.25	6550	4.85	3290	4.3	2340	2
30	5.45	4690	6.5	7570	5.35	4320	6.45	7110	4.8	3190	4.3	2340	3
10	5.5	4810	6.55	7730	5.55	4770	6.2	6440	4.8	3190	4.3	2340	4
10	5.65	5180	6.65	8050	6.0	5380	5.9	5620	4.8	3190	4.3	2340	5
10	5.75	5430	6.7	8210	6.15	6280	5.8	5370	4.75	3100	4.3	2340	6
30	5.8	5560	6.8	8540	6.2	6440	6.0	5880	4.75	3100	4.3	2340	7
10	5.8	5560	6.9	8870	6.2	6440	6.3	6690	4.75	3100	4.3	2340	8
70	5.8	5560	6.95	9040	6.4	6970	6.55	7400	4.75	3100	4.25	2260	9
30	5.8	5560	6.95	9040	6.6	7550	6.3	6690	4.7	3010	4.25	2260	10
140	5.85	5700	6.95	9040	6.65	7700	5.85	5500	4.7	3010	4.2	2180	11
530	5.9	5830	6.95	9040	6.65	7700	5.75	5250	4.4	2490	4.2	2180	12
040	5.95	5970	6.9	8870	6.65	7700	5.7	5130	3.60	1400	4.25	2260	13
940	6.0	6100	6.9	8870	6.7	7850	5.6	4890	3.67	1480	4.2	2180	14
830	6.0	6100	6.85	8710	6.7	7850	5.45	4540	4.0	1900	4.2	2180	15
830	6.0	6100	6.8	8540	6.75	8000	5.3	4210	4.25	2260	4.1	2040	16
830	6.15	6530	6.75	8370	6.8	8150	5.3	4210	4.35	2420	4.05	1970	17
830	6.25	6820	6.25	6820	7.5	10500	5.25	4100	4.3	2340	4.05	1970	18
940	6.15	6530	5.85	5700	8.2	13100	4.9	3380	4.3	2340	4.0	1900	19
940	6.05	6240	6.05	6240	7.7	11200	4.9	3380	4.3	2340	3.95	1830	20
710	6.05	6240	6.25	6820	6.75	8000	5.05	3680	4.3	2340	3.76	1590	21
849	6.05	6240	6.4	7260	6.75	8000	5.2	3790	4.25	2260	3.78	1610	22
700	6.05	6240	6.55	7730	6.7	7850	5.15	3890	4.25	2260	3.77	1600	23
1450	6.05	6240	6.5	7570	6.4	6970	5.1	3780	4.25	2260	3.8	1640	24
710	6.1	6380	6.35	7110	6.4	6970	5.1	3780	4.25	2260	3.77	1600	25
710	6.1	6380	6.1	6380	6.25	6550	5.05	3680	4.2	2180	3.74	1560	26
710	6.2	6670	5.7	5300	6.05	6010	5.05	3680	4.2	2180	3.77	1600	27
3100	6.3	6960	5.4	4500	6.15	6280	5.0	3580	4.2	2180	3.77	1600	28
3690	6.35	7110	5.25	4100	6.65	7700	5.0	3580	4.2	2180	3.8	1640	29
3690	6.4	7260	5.25	4100	6.6	7550	5.0	3580	4.25	2260	3.66	1470	30
2570			5.25	4100			4.95	3480	4.25	2260			31
739	177,910		227,060		218,640		142,560		78,160		57,760		1,102,436
2800	5,930		7,320		7,290		4,820		2,520		1,990		3,010
13,000	353,000		450,000		434,000		296,000		155,000		118,000		2,190,000
5,700	7,260		7,040		13,100		7,400		3,290		2,340		13,100
849	3,690		4,100		4,210		3,380		1,400		1,470		391
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discharge, in second foot, of BOISE River at DOWLING, IDAHO, for 1916.

FRANCES E. DOWLING, observer.

[illegible]

Gage 115, copied by 10-6 7-9
Gage 115, checked by 10-6 7-9

Discharge of 10-7 to 10-9
Discharge checked by 508

1574017
 10-2 3-9
 Concluded 10-24-94
 Checked by 9423 EML

Gage lts. checked by *awr*
Gage lts. checked by *awr*

Discharge made by Edw Edw
Discharge checked by Edw Edw

Checked by *[Signature]*

Daily gage height, in feet, and discharge, in second-feet, of

BOLSE

River ^{at} BELOW MOOSE

EDGAR KIRK

Drainage area _____ square miles.

Day.	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.2	1060	0.4	505	3.73	498	3.68	473	4.37	833
2	1.0	895	0.35	480	3.72	493	3.72	493	4.36	819
3	0.9	820	0.35	480	3.76	514	3.79	529	4.36	819
4	0.85	785	0.35	480	3.83	550	3.83	550	4.35	812
5	0.85	785	0.35	480	3.87	572	3.81	539	4.52	928
6	0.9	820	0.35	480	3.87	572	3.80	534	4.88	1230
7	0.85	785	0.4	505	3.84	556	3.80	534	5.1	1440
8	0.85	785	0.45	532	3.82	545	3.78	524	5.35	1730
9	0.8	750	0.45	532	3.81	539	3.77	519	5.55	1970
10	0.8	750	0.3	455	3.78	524	3.76	514	5.45	1840
11	0.8	750	0.35	480	3.79	529	3.76	514	5.4	1760
12	0.8	750	0.4	505	3.79	529	3.91	594	5.4	1760
13	0.8	750	0.45	532	3.83	550	4.02	657	5.35	1700
14	0.8	750	0.25	432	3.87	572	4.03	657	5.35	1690
15	0.8	750	0.3	455	3.80	534	4.04	663	5.2	1520
16	0.8	750	3.76	514	3.72	493	4.06	720	5.2	1510
17	0.8	750	3.77	519	3.76	514		745	5.4	1740
18	1.0	895	3.79	529	3.75	508	4.24	778	5.65	2060
19	0.85	785	3.85	561	3.75	508	4.25	785	5.7	2130
20	0.85	785	3.87	572	3.77	519	4.22	764	5.7	2130
21	0.85	785	3.88	577	3.81	539	4.18	732	5.5	1860
22	0.85	785	3.90	588	3.89	583	4.3	812	5.35	1680
23	0.9	820	3.90	588	3.98	634		846	5.45	1800
24	0.7	685	3.90	588	3.92	599		880	5.45	1800
25	0.7	685	3.78	524	3.92	599	4.43	913	5.6	2000
26	0.75	718	3.67	469	3.91	594		898	5.6	2000
27	0.75	718	3.68	473	3.86	566	4.42	884	5.7	2130
28	0.75	718	3.66	464	3.76	514	4.38	847	5.7	2130
29	0.75	718	3.69	478	3.72	493	4.37	840	5.65	2060
30	0.75	718	3.73	498	3.73	498	4.37	840		
31	0.65	652				486	4.38	840		
TOTAL		23,952		15,275		16,724		21,418		47,881
						539		691		1,650
Mean		773		509						
Sec.-ft. per square mile										
Run-off, depth in inches							42,500		94,900	
Run-off in acre-feet		47,500		30,300		33,100		913		2,130
Maximum		1,060		588		634		473		812
Minimum		652		432		486		B		5
						A				

LIMITS: STAFF GAGE (OLD TEMP.) HALF TENTHS 0.0 TO 1.5 FT. RECORDING GAGE

USED RATING TABLE DATED 1/27/16 OCT. 1 - NOV. 15 (TEMP. STAFF READINGS) DIRECT. 15 FOOT

FROM GAGE HEIGHTS SHIFTED JAN. 11 - FEB. 17 AND MARCH 12-20 ESTIMATED JAN. 16 - 17 ACCOUNT OF ICE EFFECT

DATE	DECEMBER		JANUARY		FEBRUARY		MARCH		DAY	APRIL		MAY		Gage height.
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	
505	3.73	498	3.68	473	4.37	833	5.65	2060	1	7.3	5620	8.4	8960	7.05
480	3.72	493	3.72	493	4.36	819	5.6	2000	2	7.6	6450	8.4	8960	7.05
480	3.76	514	3.79	529	4.36	819	5.45	1800	3	7.75	6890	8.4	8960	7.1
480	3.83	550	3.83	550	4.35	812	5.4	1740	4	7.85	7190	8.5	9310	7.3
480	3.87	572	3.81	539	4.52	928	5.45	1800	5	7.95	7500	8.6	9660	7.65
480	3.87	572	3.80	534	4.88	1230	5.45	1800	6	7.95	7500	8.7	10000	7.8
505	3.84	556	3.80	534	5.1	1440	5.35	1680	7	8.0	7660	8.7	10000	7.85
532	3.82	545	3.78	524	5.35	1730	5.3	1620	8	8.0	7660	8.7	10000	7.85
532	3.81	539	3.77	519	5.55	1970	5.35	1680	9	8.0	7660	8.8	10400	8.1
455	3.78	524	3.76	514	5.45	1840	5.6	2000	10	8.1	7980	8.7	10000	8.2
480	3.79	529	3.76	514	5.4	1760	6.1	2740	11	8.4	8960	8.7	10000	8.2
505	3.79	529	3.91	594	5.4	1760	7.25	5110	12	8.3	8630	8.7	10000	8.2
532	3.83	550	4.02	657	5.35	1700	7.4	5520	13	8.2	8300	8.6	9660	8.2
432	3.87	572	4.03	657	5.35	1690	7.3	5310	14	8.2	8300	8.6	9660	8.2
455	3.80	534	4.04	663	5.2	1520	7.2	5110	15	8.3	8630	8.5	9310	8.3
514	3.72	493	4.06	720	5.2	1510	7.2	5160	16	8.3	8630	8.5	9310	8.3
519	3.76	514		745	5.4	1740	7.25	5310	17	8.3	8630	8.5	9310	8.4
529	3.75	508	4.24	778	5.65	2060	7.3	5490	18	8.4	8960	8.0	7660	9.1
561	3.75	508	4.25	785	5.7	2130	7.35	5670	19	8.2	8300	7.65	6600	9.9
572	3.77	519	4.22	764	5.7	2130	7.5	6140	20	8.1	7980	7.85	7190	9.3
577	3.81	539	4.18	732	5.5	1860	7.25	5490	21	8.1	7980	7.95	7500	8.4
588	3.89	583	4.3	812	5.35	1680	6.1	3000	22	8.1	7980	8.1	7980	8.4
588	3.78	634		846	5.45	1800	8.0	7660	23	8.1	7980	8.2	8300	8.4
588	3.92	599		880	5.45	1800	7.4	5890	24	8.1	7980	8.2	8300	8.0
588	3.92	599	4.45	913	5.6	2000	6.6	3960	25	8.2	8300	8.1	7980	8.0
524	3.92	599		898	5.6	2000	6.6	3960	26	8.3	8630	7.8	7040	7.85
469	3.91	594		884	5.7	2130	6.65	4070	27	8.4	8960	7.4	5890	7.65
473	3.86	566	4.42	847	5.7	2130	7.05	4980	28	8.4	8960	7.1	5110	7.8
464	3.76	514	4.38	840	5.65	2060	7.35	5760	29	8.4	8960	6.95	4740	8.2
478	3.72	493	4.37	840			7.25	5490	30	8.4	8960	6.95	4740	8.2
498	3.73	486	4.38	840			7.2	5360				7.0	4860	
15,275		16,724		21,418		47,881		125,360			242,120		257,390	24
509		539		691		1,650		4,040			8,070		8,300	

on Moore Creek for 1916

Daily gage height, in feet, and discharge, in second-feet, of

BOISE

River and below

Drainage area, square miles.

EDGAR KIRK

FEBRUARY			MARCH			Day	APRIL		MAY		JUNE		JULY		AUGUST		SEP
Discharge.	Gage height.	Discharge.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.
833	5.65	2060			1	7.3	5620	8.4	8960	7.05	4980	7.85	7190	6.35	3460	5.75	
819	5.6	2000			2	7.6	6450	8.4	8960	7.05	4980	7.85	7190	6.3	3360	5.75	
819	5.45	1800			3	7.75	6890	8.4	8960	7.1	5110	8.1	7980	6.3	3360	5.75	
812	5.4	1740			4	7.85	7190	8.5	9310	7.3	5620	7.8	7040	6.25	3270	5.75	
928	5.45	1800			5	7.95	7500	8.6	9660	7.65	6600	7.55	6310	6.3	3360	5.75	
1230	5.45	1800			6	7.95	7500	8.7	10000	7.8	7040	7.35	5760	(6.25)	3270	5.75	
1440	5.35	1680			7	8.0	7660	8.7	10000	7.85	7190	7.5	6170	(6.25)	3270	5.75	
1730	5.3	1620			8	8.0	7660	8.7	10000	7.85	7190	7.85	7190	6.25	3270	5.75	
1970	5.35	1680			9	8.0	7660	8.8	10400	8.1	7980	8.0	7660	6.2	3180	5.75	
1840	5.6	2000			10	8.1	7980	8.7	10000	8.2	8300	7.75	6890	6.2	3180	5.75	
1760	6.1	2740			11	8.4	8960	8.7	10000	8.2	8300	7.35	5760	6.15	3090	5.7	
1760	7.25	5110			12	8.3	8630	8.7	10000	8.2	8300	7.3	5620	5.85	2580	5.7	
1900	7.4	5520			13	8.2	8300	8.6	9660	8.2	8300	7.25	5490	5.0	1450	5.7	
1690	7.3	5310			14	8.2	8300	8.6	9660	8.2	8300	7.1	5110	5.1	1560	5.7	
1520	7.2	5110			15	8.3	8630	8.5	9310	8.3	8630	6.95	4740	5.45	2000	5.65	
1510	7.2	5160			16	8.3	8630	8.5	9310	8.3	8630	(6.8)	4400	5.7	2350	5.55	
1740	7.25	5310			17	8.3	8630	8.5	9310	8.4	8960	(6.8)	4400	5.8	2500	5.55	
2060	7.3	5490			18	8.4	8960	8.0	7660	9.1	11500	6.75	4270	5.8	2500	5.5	
2130	7.35	5670			19	8.2	8300	7.65	6600	9.9	14600	6.4	3550	5.8	2500	5.45	
2130	7.5	6140			20	8.1	7980	7.85	7190	9.3	12200	6.4	3550	5.8	2500	5.4	
1860	7.25	5490			21	8.1	7980	7.45	7500	8.4	8960	6.55	3860	5.8	2500	5.2	
1680	6.1	3000			22	8.1	7980	8.1	7980	8.4	8960	6.7	4180	5.75	2420	5.2	
1800	8.0	7660			23	8.1	7980	8.2	8300	8.4	8960	6.6	3960	5.75	2420	5.2	
1800	7.4	5890			24	8.1	7980	8.2	8300	8.0	7660	6.6	3960	5.75	2420	5.25	
2000	6.6	3960			25	8.2	8300	8.1	7980	8.0	7660	6.55	3860	5.75	2420	5.2	
2000	6.6	3960			26	8.3	8630	7.8	7040	7.85	7190	6.55	3860	5.7	2350	5.15	
2130	6.65	4070			27	8.4	8960	7.4	5890	7.65	6600	6.55	3860	5.7	2350	5.2	
2130	7.05	4980			28	8.4	8960	7.1	5110	7.8	7040	6.5	3750	5.65	2280	5.2	
2060	7.35	5760			29	8.4	8960	6.95	4740	8.2	8300	6.5	3750	5.7	2350	5.2	
	7.25	5490			30	8.4	8960	6.95	4740	8.2	8300	6.45	3650	5.7	2350	5.1	
	7.2	5360						7.0	4360			6.45	3650	5.75	2420		
47881		125,360					242,120		257,390		242,340		158,630		82,290	62	
1,650		4,040					8,070		8,300		8,080		5,120		2,650	2	
94,900		248,000					430,000		510,000		481,000		315,000		163,000	124	
2,130		7660					8960		10,400		14,600		7,980		3,460	24	
812		1,620					5,620		4,740		4,980		3,550		1,450	1.5	
A		A					A		A		A		A		A	A	

height, in feet, and discharge, in second-feet, of

Boise

RIVER ~~at~~ BELOW MOORE CREEK 1916

EDGAR KIRK

exchange rates, and the amount of foreign currency required to acquire titles.

MAY		JUNE		JULY		AUGUST		SEPTEMBER			
Charge	Height	Discharge	Height	Height	Charge	Discharge	Charge	Discharge	Charge	Height	
3620	8.4	8760	7.05	4980	7.85	7190	6.35	3460	5.75	2420	1
6450	8.4	8760	7.05	4980	7.85	7190	6.3	3360	5.75	2420	2
6890	8.4	8760	7.1	5110	8.1	7980	6.3	3360	5.75	2420	3
7190	8.5	9310	7.3	5620	7.8	7040	6.25	3270	5.75	2420	4
7500	8.6	9660	7.65	6600	7.55	6310	6.3	3360	5.75	2420	5
7500	8.7	10000	7.8	7040	7.35	5760	(6.25)	3270	5.75	2420	6
7660	8.7	10000	7.85	7190	7.5	6170	(6.25)	3270	5.75	2420	7
7660	8.7	10000	7.85	7190	7.85	7190	6.25	3270	5.75	2420	8
7660	8.8	10400	8.1	7980	8.0	7660	6.2	3180	5.75	2420	9
7980	8.7	10000	8.2	8300	7.75	6890	6.2	3180	5.75	2420	10
8760	8.7	10000	8.2	8300	7.35	5760	6.15	3090	5.7	2350	11
8630	8.7	10000	8.2	8300	7.3	5620	5.85	2580	5.7	2350	12
8300	8.6	9660	8.2	8300	7.25	5490	5.0	1450	5.7	2350	13
8300	8.6	9660	8.2	8300	7.1	5110	5.1	1560	5.7	2350	14
8630	8.5	9310	8.3	8630	6.95	4710	5.45	2000	5.65	2280	15
8630	8.5	9310	8.3	8630	(6.8)	4400	5.7	2350	5.55	2130	16
8630	8.5	9310	8.4	8960	(6.8)	4400	5.8	2500	5.55	2130	17
8760	8.0	7660	9.1	11500	6.75	4270	5.8	2500	5.5	2060	18
8300	7.65	6600	9.9	14600	6.4	3550	5.8	2500	5.45	2000	19
7980	7.85	7190	9.3	12200	6.4	3550	5.8	2500	5.4	1930	20
7980	7.45	7500	8.4	8960	6.55	3860	5.8	2500	5.2	1680	21
7980	8.1	7980	8.4	8960	6.7	4180	5.75	2420	5.2	1680	22
7980	8.2	8300	8.4	8760	6.6	3960	5.75	2420	5.2	1680	23
7980	8.2	8300	8.0	7660	6.6	3960	5.75	2420	5.25	1740	24
8300	8.1	7980	8.0	7660	6.55	3860	5.75	2420	5.2	1680	25
8630	7.8	7040	7.85	7190	6.55	3860	5.7	2350	5.15	1620	26
8760	7.4	5890	7.65	6600	6.55	3860	5.7	2350	5.2	1680	27
8760	7.1	5110	7.8	7040	6.5	3750	5.65	2280	5.2	1680	28
8760	6.95	4740	8.2	8300	6.5	3750	5.7	2350	5.2	1680	29
8760	6.95	4740	8.2	8300	6.45	3650	5.7	2350	5.1	1560	30
	7.0	4860			6.45	3650	5.75	2420			31
242,120	257,390	242,340	158,630	82,290	62,810	1,216,190					
8070	8,300	8,080	5,120	2,650	2,090	3,540					
480,000	510,000	481,000	315,000	163,000	124,000	2,570,000					
8760	10,400	14,600	7,980	3,460	2,420	14,600					
5,620	4,7140	4,780	3,550	6,450	1,560	432					
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Daily gage height, in feet, and discharge, in second-feet, of COTTONWOOD CREEK near ARROWROCK the year 1916
 Drainage area 23 square miles. MRS. ELDORA HEDRICK

Day.	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.20	1.8								
2	.20	1.8								
3	.20	1.8								
4	.20	1.8								
5	.21	2.0								
6	.22	2.1								
7	.22	2.1								
8	.20	1.8								
9	.20	1.8								
10		↑								
11										
12							0.96	4.0		
13										
14										
15										
16		1.8								
17										
18										
19										
20										
21										
22										
23		Y								
24	.81	1.9								
25	.82	2.1								
26		↑								
27										
28		2.0								
29										
30										
31		Y								
TOTAL		58.2								
Mean		1.88								
Sec.-ft. per square mile		.817								
Run-off, depth in inches		.94								
Run-off in acre-feet		116								
Maximum										
Minimum		C								

Table of sec. Haff index. ABOVE 2.1

1916, October 1-9

1916, March 1-May 18

1916, May 19-July 4

ACTUAL MEASUREMENTS OCTOBER 24-25, JANUARY 18, JULY 10 & 20

ESTIMATED DISCHARGE JULY 5-9 AND 11-19 ACCOUNT OF LEAKAGE UNDER CONTROL

COTTONWOOD CREEK the year ending September 30,
near **ARRANROCK, IDAHO** for 1916.
Mrs. ELDORA HEDRICK, (discharge.)

UNITED STATES GEOLOGICAL SURVEY

Daily gage height, in feet, and discharge, in second-feet,

Drainage area, **23** square miles.

DECEMBER		JANUARY		FEBRUARY		MARCH		Day.	APRIL		MAY		JUNE	
Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
						120	13	1	175	62	192	89	161	39
						120	13	2	185	77	188	82	162	40
						120	13	3	182	72	190	85	162	40
						115	11	4	185	77	190	85	162	40
						130	18	5	185	77	192	89	164	42
							16	6	188	82	195	94	164	42
						120	13	7	190	85	192	89	165	43
						130	18	8	198	97	186	79	164	42
						150	33	9		106	180	67	165	43
						150	33	10		112	180	67	162	40
						152	35	11	208	119	181	71	157	36
		096	40			155	38	12	207	117	180	69	154	33
						155	38	13	198	97	176	63	154	33
						155	38	14	195	94	168	53	154	33
						165	49	15	198	97	160	43	148	27
						165	49	16	192	89	160	43	144	26
						165	49	17	192	89	160	43	141	24
						175	62	18	184	75	172	58	142	24
						175	62	19	178	66	174	53	150	30
						178	66	20	179	68	172	50	151	31
						185	77	21	180	69	170	48	146	27
						195	94	22	182	72	162	40	143	25
						195	94	23	185	77	160	38	140	23
						182	72	24	199	101	164	42	137	22
						180	69	25	199	101	168	46	133	20
						160	43	26	202	107	164	42	132	19
						165	49	27	21	123	160	38	130	18
						168	53	28	204	121	162	40	128	17
						172	58	29	194	92	162	40	124	16
						172	58	30	194	92	161	39	123	15
						172	58	31			161	39		
						1392			2719		1828		912	
						1417			90.6		59.0		30.4	
						175			394		257		132	
						225			440		296		147	
						2760			5390		3630		1810	
						94			123		94		43	
						11			62		38		15	
						A			A		A		A	

September 30,
for 1916.

UNITED STATES GEOLOGICAL SURVEY, [WATER RESOURCES BRANCH]

Daily gage height, in feet, and discharge, in second-feet, of COTTONWOOD CREEK NEAR ARROWROCK, IDAHO for the year ending Septe

Drainage area, 23 square miles.

MRS. ELDORA HEDRICK, observer.

ARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		
Discharge.	Day.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Day.
13	1	175	62	192	89	161	39	120	14	090	3.2	082	18	1
13	2	185	77	188	82	162	40	128	17	86	25	82	18	2
13	3	182	72	190	85	162	40	130	18	87	27	82	18	3
11	4	185	77	190	85	162	40	124	16	87	27	82	18	4
18	5	185	77	192	89	164	42	114	↑	88	29	82	18	5
16	6	188	82	195	94	164	42	106		86	25	83	20	6
13	7	190	85	192	89	165	43	102	12	87	27	82	18	7
18	8	198	97	186	79	164	42	97		86	25	82	18	8
33	9		106	180	69	165	43	94	✓	87	27	83	20	9
33	10		112	180	69	162	40	90	84	86	25	84	22	10
35	11	208	119	181	71	157	36	86	↑	84	22	84	22	11
38	12	207	117	180	69	154	33	90		84	22	84	22	12
38	13	198	97	176	63	154	33	91		84	22	83	20	13
38	14	195	94	168	53	154	33	87		84	22	84	22	14
49	15	198	97	160	43	148	29	83	70	84	22	84	22	15
49	16	192	89	160	43	144	26	82		84	22	84	22	16
49	17	192	89	160	43	141	24	80		92	37	83	20	17
62	18	184	75	172	58	142	24	80		97	48	81	17	18
62	19	178	66	174	53	150	30	80	✓	92	37	80	15	19
66	20	179	68	172	50	151	31	87	59	90	32	80	15	20
77	21	180	69	170	48	146	27	100	55	88	29	82	18	21
94	22	182	72	162	40	143	25	100	55	88	29	82	18	22
94	23	185	77	160	38	140	23	100	55	86	25	80	15	23
72	24	199	101	164	42	137	22	100	55	85	24	79	14	24
69	25	199	101	168	46	133	20	100	55	85	24	80	15	25
43	26	202	107	164	42	132	19	100	55	84	22	80	15	26
49	27	21	123	160	38	130	18	100	55	84	22	80	15	27
53	28	209	121	162	40	128	17	97	48	84	22	82	18	28
58	29	194	92	162	40	124	16	96	46	84	22	84	22	29
58	30	194	92	161	39	123	15	96	46	84	22		22	30
38	31			161	39			92	37	84	22			31
1392			2719		1828		912		258.5		81.8		55.7	
4419			90.6		59.0		30.4		8.34		264		186	
195			3.94		2.57		1.32		.363		.115		.0809	
225			4.40		2.96		1.47		.42		.13		.09	
2760			5390		3630		1810		513		162		111	14,500
94			123		94		43		18		48		22	
11			62		38		15		37		22		14	
A			A		A		A		B		A		A	

LLUORA HEDRICK, observer.

Discharge in cu. ft.

Gage Hts. checked from old book.

Completed by: *and*

checked

Gage Hts. checked from wire, book.
Compiled by Grant
Discharge values by Grant

the year ending September 30.

discharge, in second-feet, of COTTONWOOD CREEK near ARAPAHO, IDAHO for 1916

Mrs. ELDORA HEDRICK, observer.

MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		
89	161	39	120	14	80	3.2	82	18	1	
82	162	40	128	17	86	25	82	18	2	
85	162	40	130	18	87	27	82	18	3	
85	162	40	124	16	87	27	82	18	4	
89	164	42	114	↑	88	29	82	18	5	
94	164	42	106		86	25	83	20	6	
89	165	43	102	12	87	27	82	18	7	
79	164	42	97		86	25	82	18	8	
69	165	43	94	↓	87	27	83	20	9	
69	162	40	90	84	86	25	84	22	10	
71	157	36	86	↑	84	22	84	22	11	
69	154	33	90		84	22	84	22	12	
63	154	33	91		84	22	83	20	13	
53	154	33	87		84	22	84	22	14	
43	148	29	83	70	84	22	84	22	15	
43	144	26	82		84	22	84	22	16	
43	141	24	80		92	37	83	20	17	
58	142	24	80		97	48	81	17	18	
53	150	30	80	↓	92	37	80	15	19	
50	151	31	87	59	90	32	80	15	20	
48	146	27	100	55	88	29	82	18	21	
40	143	25	100	55	88	29	82	18	22	
38	140	23	100	55	86	25	80	15	23	
42	137	22	100	55	85	24	79	14	24	
46	133	20	100	55	85	24	80	15	25	
42	132	19	100	55	84	22	80	15	26	
38	130	18	100	55	84	22	80	15	27	
40	128	17	97	48	84	22	82	18	28	
40	124	16	96	46	84	22	84	22	29	
39	123	15	96	46	84	22		22	30	
39			92	37	84	22			31	
1828		912		258.5		81.8		55.7		
59.0		30.4		8.34		26.4		1.86		
257		132		.363		.115		.0809		
296		147		.42		.13		.09		
3630		1810		513		162		111	14,500	
94		43		18		48		22		
38		15		37		22		1.4		
A		A		B		A		A		

Gage No. checked from obs. book.

Computed by *awt*

Checked by *ELH*

Corrected by *ELH*

Checked by *ELH*

Discharge applied by *awt*

Discharge checked by *ELH*

Discharge checked by *ELH*

Discharge checked by *ELH*

Gage No. checked from obs. book.

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Daily gage height, in feet, and discharge, in second-feet, of SO. FK. OF BOISE River near LENDEX, IDAHO the year endingDrainage area 1090 square miles.R. S. SANDLIN

Day.	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		Gage height.
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	
1	230	292	226	281	249	337	245	↑	250	340	27
2	228	286		286	247	337	270		255	357	(27)
3	228	286	230	292	254	354			260	374	(26)
4	231	295	230	292	263	385		300	250	340	26
5	232	298	229	289	273	423			258	367	27
6	231	295	229	289	259	391	260		253	350	27
7	231	295	228	286	251	343	255	↓	277	439	26
8	231	295	227	284	243	334	245	324	278	443	(27)
9	230	292	230	292	243	318	246	328	262	381	28
10	229	289	231	295	238	303	245	324	265	392	32
11	229	289	225	278	230	281	243	318	277	439	3.5
12	230	292	229	289	232	287	255	357	267	400	3.7
13	231	295	226	281	238	303	254	354	257	364	3.9
14	233	301	207	232	255	357	254	354	256	360	3.9
15	232	298	230	281	236	298	242	315	256	360	3.8
16	232	298	260	374	210	231		↑	262	381	3.8
17	232	298	242	315	226	271			267	400	4.05
18	232	298	238	303	243	318		320	263	385	4.35
19	232	298	242	315	223	263			273	423	4.5
20	232	298	248	334	242	315		↓	272	419	4.3
21	231	295	253	350	270	411	290	493	273	423	4.85
22	230	292	245	324	284	468	320	634	274	427	4.7
23	227	284	243	318	283	464	287	480	282	459	4.5
24	226	281	243	318	255	357	268	404	283	464	4.25
25	226	281	237	301	237	301	264	389	283	464	4.15
26	227	284	232	287	241	312		↑	281	455	4.05
27	227	284	239	306	236	298		320	285	472	4.05
28	227	284	226	271	243	318		↓	286	476	4.35
29	226	281	239	306	241	312	239	306	278	443	4.4
30	226	281	262	381		300	247	331			4.4
31	226	281				300	249	337			4.45
TOTAL		9016		9050		10270		10708		11797	3.
Mean		291		302		331		345		407	
Sec.-ft. per square mile		267		277		304		317		373	
Run-off, depth in inches		31		31		35		37		44	
Run-off in acre-feet		17,900		18,000		20,400		21,200		23,400	62
Maximum		301		381		468		634		476	17
Minimum		281		232		231		3		340	3
Accuracy		A		B		B		D			

Table of use: Half number 3.5

6.0

11

Used rating table and

ESTIMATED DEC 30-JAN 7; JAN. 6-20 AND 26-29

OCTOBER 1-NOVEMBER 14; NOVEMBER 15-SEPTEMBER 30

of ICE SECT.

the year ending September 30,
 RIVER - **LENOX, IDAHO**, for 1916
 R.S. SANDLIN, observer

Daily gage height, in feet, and discharge, in second-feet, of **SO. Fk. of L.**

Drainage area, **6090** square miles.

JANUARY		FEBRUARY		MARCH		Day	APRIL		MAY		JUNE		JULY	
Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
245	↑	250	340	274	427	1	4.6	1560	6.8	4150	5.8	2750	5.75	2690
270		255	357	(271)	415	2	4.8	1730	6.9	4310	5.75	2690	6.0	3000
		260	374	(269)	407	3	5.05	1950	7.1	4640	5.85	2810	6.0	3000
	300	250	340	268	404	4	5.3	2190	7.6	5510	6.2	3260	5.65	2570
		258	367	277	439	5	5.4	2300	8.0	6240	6.6	3840	5.5	2400
260		253	350	273	423	6	5.4	2300	8.2	6620	6.8	4150	5.6	2520
255	↓	277	439	266	396	7	5.45	2350	8.5	7180	6.8	4150	5.65	2570
245	324	278	443	(271)	415	8	5.65	2570	8.1	6430	6.9	4310	5.6	2520
246	328	262	381	288	485	9	5.8	2750	7.8	5880	7.1	4640	5.65	2570
245	324	265	392	326	665	10	6.2	3260	7.3	4990	7.2	4810	5.45	2350
243	318	277	439	355	826	11	6.7	3990	6.9	4310	7.0	4480	5.25	2140
255	357	267	400	37	916	12	6.8	4150	6.5	3690	6.8	4150	5.1	2000
254	354	257	364	3.9	1050	13	6.6	3840	6.2	3260	6.6	3840	5.0	1900
254	354	256	360	3.9	1050	14	6.6	3840	5.95	2940	6.7	3990	4.85	1770
242	315	256	360	3.8	980	15	6.7	3990	5.8	2750	6.9	4310	4.7	1650
	↑	262	381	3.8	980	16	6.7	3990	5.7	2630	7.2	4810	4.6	1560
		267	400	4.05	1150	17	6.6	3840	5.7	2630	7.4	5160	4.65	1600
	320	263	385	4.35	1370	18	6.7	3990	5.9	2870	7.6	5510	4.45	1440
		273	423	4.5	1480	19	6.3	3400	6.4	3540	7.8	5880	4.3	1330
	↓	272	419	4.3	1730	20	5.9	2870	6.4	3540	7.4	5160	4.15	1220
290	493	273	423	4.85	1770	21	5.95	2940	6.5	3690	6.7	3990	4.05	1150
320	634	274	427	4.7	1650	22	6.1	3130	6.5	3690	6.3	3400	3.95	1080
287	480	282	459	4.5	1480	23	6.2	3260	6.3	3400	5.95	2940	3.85	1010
268	404	283	464	4.25	1290	24	6.6	3840	6.1	3130	5.8	2750	3.8	980
264	389	283	464	4.15	1220	25	7.1	4640	6.0	3000	5.9	2870	3.7	916
	↑	281	455	4.05	1150	26	7.6	5510	5.8	2750	6.1	3130	3.7	916
	320	285	472	4.05	1150	27	8.0	6240	5.65	2570	6.3	3400	3.6	855
	↓	286	476	4.35	1370	28	7.8	5880	5.55	2460	6.5	3690	3.55	826
239	306	278	443	4.4	1410	29	7.3	4990	5.6	2520	6.4	3540	3.49	790
247	331			4.4	1410	30	6.9	4310	5.65	2570	6.0	3000	3.41	745
249	337			4.45	1440	31			5.75	2690			3.34	707
	10708		11797		51348			105600		120580		117410		52775
								3520		3890		3910		1700
								323		357		359		156
								360		412		400		180
								209,000		239,000		233,000		105,000
								6240		7180		5880		3000
								1560		2460		2690		707
								A		A		A		A
								B		B		B		B

Number 30,
for 1916

UNITED STATES GEOLOGICAL SURVEY. (WATER RESOURCES BRANCH.)

Daily gage height, in feet, and discharge, in second-feet, of SO. FK. OF BOISE River near LENOX, IDAHO, for the year ending Septe

Drainage area 6090 square miles.

R. S. SANDLIN

Gage No.	Day	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day
		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	
427	1	4.6	1560	6.8	4150	5.8	2750	5.75	2690	3.29	680	2.67	400	1
445	2	4.8	1730	6.9	4310	5.75	2690	6.0	3000	3.26	665	2.64	389	2
407	3	5.05	1950	7.1	4640	5.85	2810	6.0	3000	3.20	634	2.61	378	3
404	4	5.3	2190	7.6	5510	6.2	3260	5.65	2570	3.17	619	2.63	385	4
437	5	5.4	2300	8.0	6240	6.6	3840	5.5	2400	3.15	610	2.65	392	5
423	6	5.4	2300	8.2	6620	6.8	4150	5.6	2520	3.14	605	2.63	385	6
396	7	5.45	2350	8.5	7180	6.8	4150	5.65	2570	3.10	585	2.62	381	7
415	8	5.65	2570	8.1	6430	6.9	4310	5.6	2520	3.06	566	2.61	378	8
485	9	5.8	2750	7.8	5880	7.1	4640	5.65	2570	3.03	552	2.60	374	9
665	10	6.2	3260	7.3	4990	7.2	4810	5.45	2350	3.02	547	2.68	404	10
826	11	6.7	3990	6.9	4310	7.0	4480	5.25	2140	2.98	529	2.71	415	11
916	12	6.8	4150	6.5	3690	6.8	4150	5.1	2000	2.95	516	2.70	411	12
1050	13	6.6	3840	6.2	3260	6.6	3840	5.0	1900	2.91	498	2.67	400	13
1050	14	6.6	3840	5.95	2940	6.7	3990	4.85	1770	2.89	489	2.63	385	14
980	15	6.7	3990	5.8	2750	6.9	4310	4.7	1650	2.86	476	2.62	381	15
980	16	6.7	3990	5.7	2630	7.2	4810	4.6	1560	2.86	476	2.59	371	16
1150	17	6.6	3840	5.7	2630	7.4	5160	4.65	1600	2.87	480	2.57	364	17
1370	18	6.7	3990	5.9	2870	7.6	5510	4.45	1440	2.97	524	2.54	354	18
1480	19	6.3	3400	6.4	3540	7.8	5880	4.3	1330	2.97	524	2.52	347	19
1730	20	5.9	2870	6.4	3540	7.4	5160	4.15	1220	2.72	502	2.52	347	20
1770	21	5.95	2940	6.5	3690	6.7	3990	4.05	1150	2.88	485	2.52	347	21
1650	22	6.1	3130	6.5	3690	6.3	3400	3.95	1080	2.85	472	2.51	343	22
1480	23	6.2	3260	6.3	3400	5.95	2940	3.85	1010	2.80	451	2.50	340	23
1290	24	6.6	3840	6.1	3130	5.8	2750	3.8	980	2.74	427	2.50	340	24
1220	25	7.1	4640	6.0	3000	5.9	2870	3.7	916	2.71	415	2.50	340	25
1150	26	7.6	5510	5.8	2750	6.1	3130	3.7	916	2.69	407	2.50	340	26
1150	27	8.0	6240	5.65	2570	6.3	3400	3.6	855	2.67	400	2.50	340	27
1370	28	7.8	5880	5.55	2460	6.5	3690	3.55	826	2.66	396	2.50	340	28
1410	29	7.3	4990	5.6	2520	6.4	3540	3.49	790	2.65	392	2.50	340	29
1410	30	6.9	4310	5.65	2570	6.0	3000	3.41	745	2.78	443	2.51	343	30
1440	31			5.75	2690			3.34	707	2.73	423			31
31348			105,600		120,580		117,410		52,775		15,788		11,054	505,396
1010			3,520		3,890		3,910		1,700		509		368	1,380
927			323		357		359		156		467		328	127
107			360		412		400		180		54		38	1725
62,100			209,000		239,000		233,000		105,000		31,300		21,900	1,000,000
1770			6240		7180		5880		3000		680		415	7,130
396			1560		2960		2690		707		392		340	231
A			A		A		A		A		A		A	17
			0		0		0		B		B		B	

Gage No. checked from obs. book
 Computed by aux
 Discharge checked by aux
 Year 1916

and discharge, in second-feet, of SO. FK OF BOISE River near LENOX, IDAHO, for 1916.

1090 square miles.

R. S. SANDLIN

observer.

of 30, 30,

16.

MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.	
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.		
8	4150	5.8	2750	5.75	2690	3.29	680	2.67	400	1	
9	4310	5.75	2690	6.0	3000	3.26	665	2.64	389	2	
1	4640	5.85	2810	6.0	3000	3.20	634	2.61	378	3	
6	5510	6.2	3260	5.65	2570	3.17	619	2.63	385	4	
0	6240	6.6	3840	5.5	2400	3.15	610	2.65	392	5	
2	6620	6.8	4150	5.6	2520	3.14	605	2.63	385	6	
5	7180	6.8	4150	5.65	2570	3.10	585	2.62	381	7	
1	6430	6.9	4310	5.6	2520	3.06	566	2.61	378	8	
8	5880	7.1	4640	5.65	2570	3.03	552	2.60	374	9	
7	4990	7.2	4810	5.45	2350	3.02	547	2.68	404	10	
6	4310	7.0	4480	5.25	2140	2.98	529	2.71	415	11	
5	3690	6.8	4150	5.1	2000	2.95	516	2.70	411	12	
6	3260	6.6	3840	5.0	1900	2.91	498	2.67	400	13	
5	2940	6.7	3990	4.85	1770	2.89	489	2.63	385	14	
5	2750	6.9	4310	4.7	1650	2.86	476	2.62	381	15	
5	2630	7.2	4810	4.6	1560	2.86	476	2.57	371	16	
5	2630	7.4	5160	4.65	1600	2.87	480	2.57	364	17	
5	2870	7.6	5510	4.45	1440	2.97	524	2.54	354	18	
6	3540	7.8	5880	4.3	1330	2.97	524	2.52	347	19	
6	3540	7.4	5160	4.15	1220	2.92	502	2.52	347	20	
6	3690	6.7	3990	4.05	1150	2.88	485	2.52	347	21	
6	3690	6.3	3400	3.95	1080	2.85	472	2.51	343	22	
6	3400	5.95	2940	3.85	1010	2.80	451	2.50	340	23	
6	3130	5.8	2750	3.8	980	2.74	427	2.50	340	24	
6	3000	5.9	2870	3.7	915	2.71	415	2.50	340	25	
5	2750	6.1	3130	3.7	915	2.69	407	2.50	340	26	
5	2570	6.3	3400	3.6	855	2.67	400	2.50	340	27	
5	2460	6.5	3690	3.55	826	2.66	396	2.50	340	28	
5	2520	6.4	3540	3.49	790	2.65	392	2.50	340	29	
5	2570	6.0	3000	3.41	745	2.78	443	2.51	343	30	
5	2690			3.34	707	2.73	423			31	
120,580		117,410		52,775		15,788		11,054		505,396	
3890		3,910		1,700		509		368		1,380	
3,657		3,597		1,566		1,467		338		1,27	
4,612		4,400		1,80		54		38		17,25	
239,000		233,000		105,000		31,300		21,900		1,000,000	
7,180		5,880		3,000		680		415		7,180	
2,860		2,690		707		392		340		231	
A		A		A		A		A		1.1	
B		B		B		B		B			

Dist. Eng.

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Daily gage height, in feet, and discharge, in second-feet, of SMITH CREEK the year

Drainage area _____ square miles.

near LENEX, IOWA[A. R. KRALL]

Day.	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1										
2								23	0.60	15
3							0.80	23		15
4								25		14
5							.90	27		13
6								24	.53	13
7								22		24
8					0.63		.70	19	1.10	35
9								18		32
10								16		28
11							.60	15		25
12					.70			14	.78	22
13								13		23
14							.52	12		24
15					.50			12		25
16							.55	13	.88	26
17			0.40					13		27
18								13		29
19							.54	13	1.00	31
20								13		31
21					.70			13		32
22							.53	13		32
23								15	1.03	32
24								17		32
25					.75		.72	20	.99	31
26								20		32
27								19		32
28								18	1.03	32
29								17	1.02	32
30								16		
31								15		
TOTAL							529		770	
							17.1		26.6	
Mean										
Sec.-ft. per square mile										
Run-off, depth in inches							1050		1530	
Run-off in acre-feet							27		35	
Maximum							12		13	
Minimum							C		C	
Accuracy										

Table of use: Daily readings 1.1. 11.10 2.6. 11.

Used rolling table dated 8/17/16

FRAGMENTARY GAGE HEIGHT RECORD IN DECEMBER AND MARCH; NO ESTIMATES MADE FOR THESE MONTHS.

the year ending September 30

near LENOX, IDAHO for 1916

A. R. KRALL

UNITED STATES GEOLOGICAL SURVEY, (WATER RESOURCE)

Daily gage height, in feet, and discharge, in second-feet, of SMITH CREEK

Drainage area.....square miles.

Discharge area..... square miles.															
JANUARY	FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Day.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	
23	0.60	15			1	28	181	27	168		97		111		
23		15	0.97		2		186		168	205	96	225	116	0.10	
25		14	.95		3		190		168		108		110		
27		13			4	29	195		168		118		104	.26	
24	.53	13			5		195	27	168		129		78		
22		24			6		195		175		139		92		
19	1.10	35			7	29	195		182	255	147		86		
18		32	1.10		8		222		188	250	143		81	.10	
16		28			9		248	29	195	245	138		75	-.17	
15		25			10		275		170		136		69		
14	.78	22	2.05		11	36	302		146		135		63	-.20	
13		23			12		276	2.30	121		134		57		
12		24			13		250	220	111	240	132	140	51		
12		25			14	3.1	224		105	250	143	135	48	-.20	
13	.88	26			15		213		94		156		45		
13		27			16		202	200	93		163		41	-.20	
13		29			17		192	200	93	28	181	115	38		
13	1.00	31			18	28	181		119		195	110	35	.35	
13		31			19		168	235	126		210	105	33		
13		32			20		156		121	3.1	227		31		
13		32			21	250	143		116		190	.96	29	-.25	
15	1.03	32			22		156		111		155	.92	28		
17		32			23		169	215	106	230	121	.88	26	-.28	
18	.99	31			24		182		100		121	.85	25		
20		31			25	29	195		95		121		22	-.26	
20		32			26	3.2	239	195	87		121	.69	19		
19		32			27		232		90	230	121		16		
18	1.03	32			28	3.1	224		92		116	.58	14	-.27	
17	1.02	32			29		205		93		111		12		
16					30		187		94	215	106	.47	11	-.28	
15					31				95			.30	6		
529		770					6178		3956		4216		1592	36.6	
17.1		266					206		128		141		51.4	1.8	
1080		1530					12,300		7870		8390		3160	113	
27		35					302		195		224		116	.72	
12		13					143		87		97		6	.2	
C		C					C		C		C		C	D	

age height, in feet, and discharge, in second-feet, of

SMITH CREEK

10

LENOX, IDAHO

for 1916.

Deadweight area _____ sq ft or _____ miles

A. P. KRALL, observer.

4

APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.	
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.		
181	27	168		97		111		4.5		0.2		1	
196		168	205	96	225	116	0.10	3.0		0.2		2	
190		168		108		110		4.2		0.2		3	
195		168		118		104	.26	5.3		0.2		4	
195	27	168		129		98		4.7		0.2		5	
195		175		139		92		4.2		0.2		6	
195		182	255	147		86		3.6	-25	0.2		7	
222		188	250	143		81	.10	3.0	-26	0.2		8	
248	29	195	245	138		75	-.17	0.6	-25	0.2		9	
275		170		136		69		0.5		0.3		10	
302		146		135		63	-.20	0.4	-22	0.3		11	
276	2.30	121		134		57		0.4		0.3		12	
250	2.20	111	240	132	140	51		0.4	-22	0.3		13	
224		105	250	143	135	48	-.20	0.4		0.3		14	
213		99		156		45		0.4	-25	0.2		15	
202	2.00	93		163		41	-.20	0.4	-20	0.4		16	
192	2.00	93	28	181	115	38		3.8		0.4		17	
181		110		195	110	35	.35	7.2	-20	0.4		18	
168	2.35	126		210	1.05	33		4.9		0.4		19	
156		121	3.1	224		31		2.5	-20	0.4		20	
143		116		190	.96	29	-.25	0.2		0.4		21	
156		111		155	.92	28		0.2		0.4		22	
169	2.15	106	2.30	121	.88	26	-.28	0.2	-20	0.4		23	
182		100		121	.85	25		0.2		0.4		24	
195		95		121		22	-.26	0.2	-.19	0.5		25	
237	1.95	89		121	.69	19		0.2		0.5		26	
232		90	2.30	121		16		0.2	-18	0.5		27	
224		72		116	.58	14	-.27	0.2		0.6		28	
205		93		111		12		0.2	-.17	0.6		29	
187		74	2.15	106	.47	11	-.28	0.2		0.6		30	
		95			.30	6		0.2				31	
6178		3956		4216		1592		56.6		10.4			
206		128		141		51.4		1.83		3.97			
12,300		7870		8390		3160		113		20.6		34,400	
302		195		224		116		7.2		.6			
143		89		97		6		.2		.2			
C		C		C		C		D		D		B	

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UNITED STATES GEOLOGICAL SURVEY, [WATER RESOURCES BRANCH.]

the year ending September 30,

gauge height, in feet, and discharge, in second-feet, of

SMITH CREEK

near

LENOX, IDAHO

for 1916

at 30, 10,

Drainage area, square miles,

A.R. KRAL

observer.

APRIL	DISCHARGE	GAGE HEIGHT	MAY	DISCHARGE	GAGE HEIGHT	JUNE	DISCHARGE	GAGE HEIGHT	JULY	DISCHARGE	GAGE HEIGHT	AUGUST	DISCHARGE	GAGE HEIGHT	SEPTEMBER	DISCHARGE	GAGE HEIGHT	DAY
	181	27	168		97		111		4.5		0.2	1						
	186		168	205	98	225	116	0.10	3.0		0.2	2						
	190		168		108		110		4.2		0.2	3						
	195		168		118		104	.26	5.3		0.2	4						
	195	27	168		129		98		4.7		0.2	5						
	195		175		139		92		4.2		0.2	6						
9	195		182	255	147		86		3.6	-25	0.2	7						
	222		188	250	143		81	.10	3.0	-26	0.2	8						
	248	29	195	245	138		75	-.17	0.6	-25	0.2	9						
	275		170		136		69		0.5		0.3	10						
6	302		146		135		63	-.20	0.4	-22	0.3	11						
	276	230	121		134		57		0.4		0.3	12						
	250	220	111	240	132	140	51		0.4	-22	0.3	13						
3.1	224		105	250	143	135	48	-.20	0.4		0.3	14						
	213		99		156		45		0.4	-25	0.2	15						
	202	200	93		163		41	-.20	0.4	-20	0.4	16						
	192	200	93	28	181	115	38		3.8		0.4	17						
28	181		110		135	110	35	.35	7.2	-20	0.4	18						
	168	235	126		210	165	33		4.9		0.4	19						
	156		121	3.1	224		31		2.5	-20	0.4	20						
250	143		116		190	96	29	-.25	0.2		0.4	21						
	156		111		155	92	28		0.2		0.4	22						
	169	215	106	250	121	88	26	-.28	0.2	-20	0.4	23						
	182		100		121	85	25		0.2		0.4	24						
2.9	195		95		121		22	-.26	0.2	-.19	0.5	25						
3.2	239	195	89		121	69	17		0.2		0.5	26						
	232		90	250	121		16		0.2	-.18	0.5	27						
3.1	224		92		116	.58	14	-.27	0.2		0.6	28						
	205		92		111		12		0.2	-.17	0.6	29						
	187		74	215	106	47	11	-.28	0.2		0.6	30						
			95			.30	6		0.2			31						
	6178		3956		4216		1592		56.6		10.4							
	206		128		141		51.4		1.83		347							
	12,300		7870		8390		3160		113		20.6	34,400						
	302		195		224		116		7.2		.6							
	143		89		97		6		.2		.2							
	C		C		C		C		D		D							

Dist. Eng.

Gage his. checked from old book.

Computed by *Dist. Eng.* Discharge applied by *Dist. Eng.* Discharge checked by *Dist. Eng.*Checked by *Dist. Eng.* Discharge checked by *Dist. Eng.* Discharge applied by *Dist. Eng.*Checked by *Dist. Eng.* Discharge checked by *Dist. Eng.* Discharge applied by *Dist. Eng.*Checked by *Dist. Eng.* Discharge checked by *Dist. Eng.* Discharge applied by *Dist. Eng.*Checked by *Dist. Eng.* Discharge checked by *Dist. Eng.* Discharge applied by *Dist. Eng.*

Daily gage height, in feet, and discharge, in second-feet, of LONG GULCH CREEK LEND
 Drainage area _____ square miles.

by A. R. KRALL

Day.	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1										
2								26	029	
3							0.13	26		
4								28		
5							.10	29		
6								27	.21	
7								25		
8					0.15		.10	23		
9								23		
10								24		
11							.11	24		
12					.16			25	.28	
13								26		
14							.14	27		
15					.23		.09	22		
16								22	.64	
17								22		
18								22		
19							.09	22	.68	
20								22		
21					.17			22		
22							.09	22		
23								32	.79	
24								42		
25								52	.77	
26							.42	61		
27					.20			55		
28								49		
29							.28	43	.75	
30								43	.69	
31								44		
								44		
								97.4		

TOTAL

Mean
 Sec. ft. per square mile
 Run-off, depth in inches
 Run-off in acre-feet
 Maximum
 Minimum
 Accuracy

3.14
 193
 6.1
 6.2
 D

Table of notes: Half tithing
 Used nothing but direct
 ESTIMATED JULY 3-12, ON ACCOUNT OF MISSING GAGE HEIGHTS
 UNCERTAIN BEING PRIOR TO AUG. 1; NO ESTIMATES MADE EXCEPT FOR JANUARY
 ABOVE 1.25
 JUN 2-28 AT 1000 FEET ADDING 0.20 TO GAGE HEIGHTS
 APRIL 1-SEPT 30 DIRECT

INDIVIDUAL BOND

the year ending September 30,

FULCH CREEK, LENOX, IDAHO for 1916.

Daily gage height, in feet, and discharge, in second-feet, of Low

A. R. KRALL

[observer.]

Drainage area.....square miles.

Gage height.	JANUARY		FEBRUARY		MARCH		Day.	APRIL		MAY		JUNE		Gage height.
	Discharge.		Discharge.		Discharge.			Discharge.		Discharge.		Discharge.		
	2.6	0.29					1	1.65	34	8.9		3.5		
0.13	2.6						2		34	0.75	8.2	0.40	3.3	0.32
	2.8						3		34		7.6		3.0	
.10	2.9						4	1.65	34	.68	7.0		2.7	
	2.7	.21					5		31	.68	7.0		2.4	
	2.5						6		29		7.0		2.1	
.10	2.3						7	1.4	24		6.9	.24	1.8	
	2.3				0.95		8		26		6.8	.26	2.0	
	2.4						9		28	.66	6.7	.18	1.4	
.11	2.4						10		30		6.5		1.4	
	2.5	.28			1.7		11	1.6	32		6.3		1.4	
	2.6						12		30	.62	6.1		1.5	
.14	2.7						13		28	.48	4.3	.20	1.5	.06
.09	2.2						14	1.45	26		4.6	.24	1.8	.09
	2.2	.64					15		24		4.9		1.4	
	2.2						16		23	.55	5.2	.14	1.1	
	2.2						17		22	.52	4.8		1.3	.10
.09	2.2	.68					18	1.24	20		4.9		1.6	.04
	2.2						19		18	.54	5.0		1.8	.02
	2.2						20		16		4.7	.26	2.0	
.09	2.2						21	1.05	14		4.5		2.0	-.06
	3.2	.79					22		14		4.3	.26	2.0	-.02
	4.2						23		13	.47	4.1	.24	1.8	.00
	5.2	.77					24		12		4.3		1.7	-.06
.42	6.1						25	.96	12		4.6		1.5	
	5.5						26	.95	12	.53	4.9	.19	1.4	-.06
	4.9						27		12		4.7	.19	1.4	
.28	4.3	.75					28	.91	11		4.4		1.3	-.08
	4.3	.69					29		10		4.2		1.3	
	4.4						30		9.6		3.9	.16	1.2	
	4.4						31				3.7			
	97.4								660.6		171.0		54.6	-.10
	3.14								220		5.52		1.82	
	193								1310		339		108	
	6.1								34		8.9		3.5	
	6.2								9.6		3.7		1.1	
D								C		C		C		D

CREEK [REDACTED] the year ending September 30,
 near LENOX, IDAHO for 1916
A. R. KRALL [REDACTED], observer.]

Daily gage height, in feet, and discharge, in second-feet, of LONG GULCH.

Drainage area.....square miles.

JANUARY		FEBRUARY		MARCH		Day.	APRIL		MAY		JUNE		JULY	
Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
	2.6	0.29				1	1.65	3.4		8.9		3.5		1.8
0.13	2.6					2		3.4	0.75	8.2	0.40	3.3	0.32	2.5
	2.8					3		3.4		7.6		3.0		
1.6	2.9					4	1.65	3.4	.68	7.0		2.7		
	2.7	.21				5		3.1	.68	7.0		2.4		
	2.5					6		2.7		7.0		2.1		1.5
1.0	2.3					7	1.4	2.4		6.9	.24	1.8		
	2.3			0.95		8		2.6		6.8	.26	2.0		
	2.4					9		2.8	.66	6.7	.18	1.4		
1.1	2.4					10		3.0		6.5		1.4		
	2.5	.28		1.7		11	1.6	3.2		6.3		1.4		
	2.6					12		3.0	.62	6.1		1.5		
1.4	2.7					13		2.8	.48	4.3	.20	1.5	.06	0.6
1.09	2.2					14	1.45	2.6		4.6	.24	1.8	.09	.8
	2.2	.64				15		2.4		4.9		1.4		.8
	2.2					16		2.3	.55	5.2	.14	1.1		.8
	2.2					17		2.2	.52	4.8		1.3	.10	.8
1.09	2.2	.68				18	1.24	2.0		4.9		1.6	.04	.6
	2.2					19		1.8	.54	5.0		1.8	.02	.5
	2.2					20		1.6		4.7	.24	2.0		.4
1.09	2.2					21	1.05	1.4		4.5		2.0	-.06	.2
	3.2	.79				22		1.4		4.3	.26	2.0	-.02	.3
	4.2					23		1.3	.47	4.1	.24	1.8	.00	.4
	5.2	.77				24		1.2		4.3		1.7	-.06	.2
1.42	6.1					25	.96	1.2		4.6		1.5		.2
	5.5					26	.95	1.2	.53	4.9	.19	1.4	-.06	.2
	4.9					27		1.2		4.7	.19	1.4		.2
1.28	4.3	.75				28	.91	1.1		4.4		1.3	-.08	.2
	4.3	.69				29		1.0		4.2		1.3		.2
	4.4					30		.96		3.9	.16	1.2		.1
	4.4					31				3.7			-.10	.1
	97.4							660.6		171.0		54.6		26.9
	3.44							22.0		5.52		1.82		.868
	193							1310		339		108		53.4
	6.1							3.4		8.9		3.5		2.5
	2.2							9.6		3.7		1.1		.1
	D							C		C		C		D

Daily gage height, in feet, and discharge, in second-feet, of LONG GULCH CREEK near LENEX, IDAHO for 1916.

Drainage area.....square miles.

[A. R. KROLL, observer.]

Day.	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	
1	14.5	34		8.9		3.5		1.8		0.1		.2	1
2		34	0.75	8.2	0.40	3.3	0.32	2.5	-0.10	.1		.2	2
3		34		7.6		3.0				.1		.2	3
4	14.5	34	.68	7.0		2.7			-1.0	.1		.2	4
5		31	.68	7.0		2.4				.1		.2	5
6		27		7.0		2.1		1.5		.2		.2	6
7	1.4	24		6.9	.24	1.8				.2	-0.06	.2	7
8		26		6.8	.26	2.0			-0.06	.2	-0.03	.3	8
9		28	.66	6.7	.18	1.4			-0.09	.1	-0.04	.3	9
10		30		6.5		1.4				.1		.4	10
11	1.6	32		6.3		1.4			-1.0	.1	-0.01	.4	11
12		30	.62	6.1		1.5				.1		.4	12
13		28	.48	4.3	.20	1.5	.06	0.6		.1	.00	.4	13
14	1.45	26		4.6	.24	1.8	.09	.8	-0.09	.1		.4	14
15		24		4.9		1.4		.8		.1	-0.02	.3	15
16		23	.55	5.2	.14	1.1		.8	-0.08	.2	-0.05	.2	16
17		22	.52	4.8		1.3	.10	.8		.4		.2	17
18	1.24	20		4.9		1.6	.04	.6	.02	.5	-0.06	.2	18
19		18	.54	5.0		1.8	.02	.5		.4		.2	19
20		16		4.7	.26	2.0		.4		.4	-0.05	.2	20
21	1.05	14		4.5		2.0	-0.06	.2	-0.03	.3		.2	21
22		14		4.3	.26	2.0	-0.02	.3		.4		.2	22
23		13	.47	4.1	.24	1.8	.00	.4	-0.01	.4	-0.05	.2	23
24		12		4.3		1.7	-0.06	.2		.4		.2	24
25	.96	12		4.6		1.5		.2	-0.03	.3	-0.04	.3	25
26	.95	12	.53	4.9	.19	1.4	-0.06	.2		.5		.3	26
27		12		4.7	.19	1.4		.2		.2	-0.04	.3	27
28	.91	11		4.4		1.3	-0.08	.2	-0.06	.2		.3	28
29		10		4.2		1.3		.2		.2	-0.03	.3	29
30		9.6		3.9	.16	1.2		.1	-0.07	.2		.3	30
31				3.7			-1.0	.1		.2			31
		660.6			171.0	54.6			26.9	6.8			7.9
		22.0			5.52	1.82			.868	.219			.263
		1310			339	10.8			53.4	13.5			15.6
		34			8.9	3.5			2.5	.5			.4
		9.6			3.7	1.1			.1	.1			.2
		C			C	C			D	D			D
													2,030

Dist. Eng.

Gage hts. checked from obs.' level.

Discharge supplied by

Gage hts. copied by

Checked by

Dist. Eng.

Checked by

Gage hts. copied by

Dist. Eng.

Checked by

Gage hts. copied by

Dist. Eng.

Checked by

and discharge, in second-foot, of LONG GULCH CREEK NEAR LENEX, IDAHO for 1916.

square miles.

A. R. KRALL, observer.

MAY	JUNE		JULY		AUGUST		SEPTEMBER		Day.
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Day.
8.9		3.5		1.8		0.1		.2	1
8.2	0.40	3.3	0.32	2.5	-0.10	.1		.2	2
7.6		3.0				.1		.2	3
7.0		2.7			- .10	.1		.2	4
7.0		2.4				.1		.2	5
7.0		2.1		1.5		.2		.2	6
6.9	.24	1.8				.2	-0.06	.2	7
6.8	.26	2.0			-0.06	.2	-0.03	.3	8
6.7	.18	1.4			-0.09	.1	-0.04	.3	9
6.5		1.4				.1		.4	10
6.3		1.4			- .10	.1	-0.01	.4	11
6.1		1.5				.1		.4	12
4.3	.20	1.5	.06	0.6		.1	.00	.4	13
4.6	.24	1.8	.09	.8	-0.09	.1		.4	14
4.9		1.4		.8		.1	-0.02	.3	15
5.2	.14	1.1		.8	-0.08	.2	-0.05	.2	16
4.8		1.3	.10	.8		.4		.2	17
4.9		1.6	.04	.6	.02	.5	-0.06	.2	18
5.0		1.8	.02	.5		.4		.2	19
4.7	.26	2.0		.4		.4	-0.05	.2	20
4.5		2.0	-0.06	.2	-0.03	.3		.2	21
4.3	.26	2.0	-0.02	.3		.4		.2	22
4.1	.24	1.8	.00	.4	-0.01	.4	-0.05	.2	23
4.3		1.7	-0.06	.2		.4		.2	24
4.6		1.5		.2	-0.03	.3	-0.04	.3	25
4.9	.19	1.4	-0.06	.2		.3		.3	26
4.7	.19	1.4		.2		.2	-0.04	.3	27
4.4		1.3	-0.08	.2	-0.06	.2		.3	28
4.2		1.3		.2		.2	-0.03	.3	29
3.9	.16	1.2		.1	-0.07	.2		.3	30
3.7			- .10	.1		.2			31
171.0		54.6		26.9		6.8		7.9	
5.52		1.82		.868		.219		.263	
3.39		10.8		53.4		13.5		15.6	2,030
8.9		3.5		2.5		.5		.4	
3.7		4.1		.1		.1		.2	
C		C		D		D		D	

Dist. Eng.

Gage hts. checked from alt. foot.

Computed by AKK Discharge applied by AKKChecked by AKK Discharge checked by AKK

Gage hts. checked from alt. foot.

Computed by AKK Discharge applied by AKKChecked by AKK Discharge checked by AKKGage hts. copied by AKKGage hts. checked by AKKGage hts. copied by AKKGage hts. checked by AKKGage hts. copied by AKK

Daily gage height, in feet, and discharge, in second-feet, of PATILE SNAKE CREEK near LENOXDrainage area 14 square miles.

A. R. KROLL & S. M. F. KESL

Day.	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1		8.2								
2	0.84	8.2		11		18	1.60	20	1.15	26
3	.83	7.7	.90	11		19	1.15	20		28
4		7.7	.91	13	1.06	20		23	1.18	29
5	.83	7.7		12		27	1.25	26		33
6	.85	8.6	.95	13	1.25	34		24		37
7		8.4		14		26		22		41
8	.84	8.2	.95	14	1.04	19	1.16	20		45
9		8.6	.91	12		22		18		49
10	.86	9.1		12		25		16	1.37	53
11	.85	8.6	.89	11	1.22	28	1.05	14		53
12		8.8	.85	8.6		32		15		53
13	.86	9.1	.83	7.7		24		15		53
14		8.8		12	.85	16	1.09	16		52
15	.85	8.6	1.00	16	.98	8.6	1.08	15		52
16		8.8		16		15	1.04	13	1.45	52
17	.86	9.1	0.98	15		17		14	1.50	56
18	.87	9.6	.98	15		20		15		60
19		9.6		15		22	1.09	16	1.60	65
20	.87	9.6		16	1.16	25		16		65
21		9.8	1.00	16		27		15		65
22	.88	10		16		↑	1.08	15		65
23		10		17				24	1.60	65
24	.89	11	1.01	17		135	34			62
25	.88	10		17		140	38	1.55		60
26		10	1.01	17	1.20	20	1.75	70		60
27	.90	11	1.02	18				64		60
28	.88	10		17				58		60
29		11	1.00	16				52		60
30	.91	12		17	1.68			45		60
31		12						39		
								32		
TOTAL		289.8		426.3		664.6		824		1514
Mean		9.35		14.2		21.4		26.6		52.4
Sec.-ft. per square mile		203		309		465		578		114
Run-off, depth in inches		.23		.34		.54		.67		1.23
Run-off in acre-feet		575		845		1320		1640		3010
Maximum		12		18		34		70		65
Minimum		7.7		7.7		8.6		13		26
Accuracy		B		B		D		D		D

Table of gage, Half-inch, 1.5
 New Gage, ALL HUNDREDS (JUNE 29 - SEPTEMBER 30)
 ORIGINAL GAGE (OCTOBER 1 - JUNE 27)
 (JUNE 27 - JUNE 27) AFTER SUBTRACTING 0.10' FROM GAGE HEIGHTS
 (JUNE 27 - JUNE 27) TO DEC. 20 DIRECT
 ESTIMATED DISCHARGE DEC. 21 - JANUARY 1 ON ACCOUNT OF ICE EFFECT

and discharge, in second feet, of BATTLE SNAKE CREEK near LENOX, IDAHO for 1914.

the year ending September 30,

Daily gage height, in feet

76 square miles.

A. R. KRALL & SAMUEL F. KESL, observers.

Drainage area.

OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH		Day	APRIL	
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.		Discharge.	Gage height.
82		11		18	1.60	20	1.15	26		60		1	24	137
82	0.90	11		19	1.15	20		28		60		2	24	137
77	.93	13	1.06	20		23	1.18	29		60		3		137
77	.91	12		27	1.25	26		33		60		4	2.4	137
77		13	1.25	34		24		37		60		5		137
86	.95	14		26		22		41		60		6		137
84		14	1.04	19	1.16	20		45	1.55	60		7	2.4	137
82	.95	14		22		18		49	1.60	65		8		132
8.6	.91	12		25		16	1.47	53		98		9	2.3	128
9.1		12		28	1.05	14		53		131		10		137
86	.89	11	1.22	32		15		53	2.7	164		11	2.5	146
8.8	.85	8.6		24		15		53	2.8	173		12		140
9.1	.83	7.7		16	1.09	16		52		174		13		134
8.8		12	.85	8.6	1.08	15		52		175		14	2.3	128
8.6	1.00	16	.98	15	1.04	13	1.45	52		176		15	2.3	128
8.8		16		17		14	1.50	56		177		16		122
9.1	0.98	15		20		15		60		178		17		116
9.6	.98	15		22	1.09	16	1.60	65		179		18	2.10	110
9.6		15		25		16		65		180		19		114
9.6		16	1.16	27		15		65		181		20	2.2	119
9.8	1.00	16		↑	1.08	15		65	2.9	182		21	1.90	92
10		16				24	1.60	65		170		22		99
10	1.01	17			1.35	34		62		157		23		106
11		17			1.40	38	1.55	60		144		24		112
10		17		20	1.75	70		60		132		25	2.2	119
10		17				64		60	2.2	119		26	2.2	119
10	1.01	17	1.20			58		60		122		27		119
11	1.02	18				52		60		125		28	2.2	119
10		17				45		60		128		29		117
11	1.00	16				39				131		30		114
12		17	1.68			32				134		31		
12				664.6		824		1519		4015			3729	
289.8		426.3				26.6		52.4		130			124	
9.35		14.2		21.4		.578		1.14		2.83			270	
203		309		465		.67		1.23		3.26			301	
23		34		54		1640		3010		7990			7380	
575		845		1320		70		65		182			146	
12		18		34		13		26		60			92	
77		77		8.6		D		D		D			8	

the year ending September 30.

UNITED STATES GEOLOGICAL SURVEY. (W)

NAKE GREEN

RIGHT

LENOX 10 AND 100 1916

Daily gage height, in feet, and discharge, in second-feet, at **BATTLE SNA**

A. R. KRALL & SAMUEL F. KESL

Drainage area 76 square miles.

Date.	JANUARY		FEBRUARY		MARCH		Day.	APRIL		MAY		JUNE		JULY	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
8	1.60	20	1.15	26		60	1	2.4	137		112		60		56
9	1.15	20		28		60	2	2.4	137	2.10	110	1.55	60	1.68	59
10		23	1.18	29		60	3		137		113		64	1.72	67
27	1.25	26		33		60	4	2.4	137		116		67		60
4		24		37		60	5		137	2.2	119		70	1.65	54
26		22		41		60	6		137		117	1.70	74		53
19	1.16	20		45	1.55	60	7	2.4	137		114	1.80	83		53
22		18		49	1.60	65	8		132		112	1.80	83	1.64	52
25		16	1.47	53		98	9	2.3	128	2.10	110	1.75	78	1.61	46
28	1.05	14		53		131	10		137		98		76		48
32		15		53	2.7	164	11	2.5	146		86	1.70	74	1.63	50
24		15		53	2.8	173	12		140	1.70	74	1.70	74		45
16	1.09	16		52		174	13		134	1.50	56	1.60	65		41
86	1.08	15		52		175	14	2.3	128		59	1.60	65	1.53	36
15	1.04	13	1.45	52		176	15	2.3	128		62	1.70	74		35
17		14	1.50	56		177	16		122	1.60	65	1.70	74		35
20		15		60		178	17		116	1.55	60		75	1.52	34
22	1.09	16	1.60	65		179	18	2.10	110	1.60	65		76		32
25		16		65		180	19		114	1.60	65		77	1.49	31
27		15		65		181	20	2.2	119	1.70	74	1.75	78		29
↑	1.08	15		65	2.9	182	21	1.90	92		71		72	1.46	28
		24	1.60	65		170	22		99		68	1.60	65		28
				62		157	23		106	1.60	65	1.60	65	1.45	28
	1.35	34		60		144	24		112		62	1.75	78	1.42	25
	1.40	38	1.55	60		132	25	2.2	119		59		69		24
20	1.75	70		60	2.2	119	26	2.2	119	1.50	56	1.55	60	1.41	24
		64		60		122	27		119		58	1.55	60		24
		58		60		125	28	2.2	119	1.55	60		60	1.42	25
		52		60		128	29		117		60	1.69	61	1.38	22
		45				131	30		114	1.55	60	1.64	52		22
		39				134	31				60			1.36	21
		32							3729		2466		2089		1187
664.6		824		1514		4015			124		74.5		69.6		38.3
21.4		26.6		52.4		130			270		1.73		1.51		8.75
465		.578		1.14		2.83			301		1.99		1.63		96
514		.67		1.23		3.26			7380		4890		4140		2360
1320		1640		3010		7990			146		119		83		67
34		70		65		182			92		56		52		21
8.6		13		26		60			8		8		8		B
D		D		D		D									

UNITED STATES GEOLOGICAL SURVEY. (WATER RESOURCES BRANCH.) the year ending
Daily gage height, in feet, and discharge, in second-feet, of RATTLE SNAKE CREEK near LENOX, IDAHO

height, in feet, and discharge, in second-feet, of RATTLE SNAKE CREEK near LENEX, IDAHO for 1914.Drainage area 44 square miles.

A. R. KRALL & SAMUEL F. KESL, observers.

Day.	MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.					
	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.						
1					56		20		13		1					
2					59	1.34	19		13		2					
3					67		20		13		3					
4					60	1.35	20	1.24	13		4					
5					54	1.34	19		12		5					
6					53	1.34	19	1.22	12		6					
7					53		19	1.21	12		7					
8					52	1.33	19	1.22	12		8					
9					46	1.31	18	1.27	15		9					
10					48		18		14		10					
11					50	1.30	17	1.23	13		11					
12					45		17		13		12					
13					41		17	1.24	13		13					
14					36	1.30	17	1.21	12		14					
15					35		16	1.22	12		15					
16					35	1.27	15	1.22	12		16					
17					34		18		12		17					
18					32	1.36	21	1.22	12		18					
19					31		19	1.22	12		19					
20					29		18	1.21	12		20					
21					28	1.28	16		12		21					
22					28	1.26	15		11		22					
23					28	1.26	15	1.20	11		23					
24					25		14	1.20	11		24					
25					24	1.24	13	1.19	10		25					
26					24		13		10		26					
27					24		14	1.19	10		27					
28					25	1.25	14		10		28					
29					22		13	1.20	11		29					
30					22	1.22	12		11		30					
31					21	1.24	13				31					
Year																
3729											2466	2089	1187	518	359	18086.7
124											79.5	69.6	38.3	16.7	12.0	49.4
270											173	151	83.3	36.3	26.1	1.07
301											179	163	96	42	29	14.62
7380											4890	4140	2360	1030	714	35,900
146											119	83	67	21	15	182
92											56	52	21	12	10	7.7
0											0	0	0	0	0	0

Daily gage height, in feet, and discharge, in second-feet, of WILLOW CREEK near LENOX, the year 1917

Drainage area _____ square miles.

Drainage area square miles.

S.F. KESL

		OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
Day.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1											
2						0.80					
3											
4								1.85			
5											
6										3.5	
7											
8						.85					
9								1.75			
10										2.5	
11											
12											
13										2.05	
14											
15											
16						1.00		1.80		1.90	
17											
18											3.
19											
20				0.65						1.85	
21											
22						1.15					
23								1.75			
24											
25				.81							2.5
26										1.95	
27											
28						1.90					
29											2.30
30								1.30			
31											
TOTAL											
Mean											
Sec. - ft. per square mile											
Run-off, depth in inches											
Run-off in acre-feet											
Maximum											
Minimum											
Accuracy											

gauge, in second-feet, of WILLOW CREEK

the year ending September 30,

near LENEX, IDAHO for 1916

Daily gage height, in feet, and discharge

square miles.

S.F. KESL

, observer.]

Drainage area

NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH		Day	APRIL		MAY	
Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
		0.80								1	194		45	
				1.85						2	2.40	194	41	
										3	185		37	
								1.60		4	176	0.88	33	
										5	167		31	
						3.5				6	2.10	158	.85	29
		.85								7	150		29	
				1.75						8	143	.90	29	
						2.5				9	1.90	135	26	
										10	134	.85	24	
								2.95		11	132		23	
						2.05				12	131	.82	22	
										13	1.85	130	.80	20
										14	128		20	
		1.00		1.80		1.90				15	126		20	
								3.00		16	1.80	124	.89	19
0.65										17	113		20	
						1.85				18	102	.92	21	
										19	1.50	91	22	
										20	88		23	
		1.15								21	85	.96	24	
				1.75						22	81		25	
										23	1.38	78	26	
								2.50		24	70	1.00	27	
.81						1.95				25	62		26	
										26	1.17	55	.96	24
										27	53		23	
		1.90						2.30		28	51	.93	22	
				1.80						29	50		22	
										30	1.10	48	.92	21
										31			18	
											34.34		79.2	
											114		25.5	
											6,780		1,570	
											194		45	
											48		18	
											C		C	

Drainage area square miles

S.F. KESL

obscurer.

Day.	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	
1		194		45	0.81	15		11		2.0		19	1
2	2.40	194		41	.81	15		11		2.1		2.0	2
3		185		37		18		10	0.33	2.1	0.32	2.0	3
4		176	0.88	33	.90	20	0.70	10		2.0		2.0	4
5		167		31		18		10		1.8		2.0	5
6	2.10	158	.85	29		17		9		1.6	.32	2.0	6
7		150		29	.81	15		8	.26	1.5	.34	2.2	7
8		143	.90	29		14	.65	8		1.6		2.2	8
9	1.90	135		26	.75	12	.50	4.5		1.6	.33	2.1	9
10		134	.85	24		11		5	.29	1.7		2.2	10
11		132		23		11		6		1.8		2.2	11
12		131	.82	22	.69	10	.58	6	.30	1.8	.35	2.3	12
13	1.85	130	.80	20	.61	7		4.6		1.9		2.4	13
14		128		20		9	.42	3.1	.32	2.0	.36	2.4	14
15		126		20		11		3.9		2.1		2.4	15
16	1.80	124	.89	19		13	.51	4.7		2.2		2.5	16
17		113		20		15		4.4	.35	2.3	.37	2.5	17
18		102	.92	21	.82	16		4.1		2.7		2.5	18
19	1.50	91		22		15		3.8		3.1		2.6	19
20		88		23		15	.44	3.5	.44	3.5	.38	2.6	20
21		85	.96	24	.79	14		2.9		3.0		2.6	21
22		81		25		13	.35	2.3	.38	2.6	.38	2.6	22
23	1.38	78		26		12	.35	2.3		2.5		2.7	23
24		70	1.00	27		12		2.4		2.5	.40	2.8	24
25		62		26	.72	11	.38	2.6		2.4		2.9	25
26	1.17	55	.96	24	.70	10		2.6	.35	2.3		3.0	26
27		53		23		11		2.7		2.2	.42	3.1	27
28		51	.93	22		11	.39	2.7		2.2		3.2	28
29		50		22	.74	12	.34	2.2	.33	2.1	.43	3.3	29
30	1.10	48	.92	21		12	.31	1.9		2.0		3.3	30
31				18				1.9	.31	1.9			31
34.34				792		395		157.1		67.1		74.5	
114				25.5		132		5.07		2.16		2.48	
6,780				1,570		786		312		133		148	9730
194				45		20		11		3.5		3.3	
48				18		7		1.9		1.5		1.9	
C				C		C		C		C		C	

Daily gage height, in feet, and discharge, in second-feet, of

MOORE CREEK

near BROWNSVILLE

Drainage area 12 square miles.

A.P. NEASE

Day	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY	
	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
TOTAL										
Mean										
Sec. ft. per square mile										
Run-off, depth in inches										
Run-off in acre-feet										
Maximum										
Minimum										

Table of use: Half yearly 1.5

Correcting table dated 10/23/16

ESTIMATED DISCHARGE DEC. 1-3 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 8-10 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 11-13 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 14-16 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 17-19 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 20-22 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 23-25 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 26-28 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 29-31 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 1-3 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 8-10 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 11-13 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 14-16 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 17-19 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 20-22 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 23-25 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 26-28 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 29-31 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

Correcting table dated 10/23/16

ESTIMATED DISCHARGE DEC. 1-3 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 8-10 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 11-13 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 14-16 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 17-19 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

ESTIMATED DISCHARGE DEC. 20-22 BY COMPARISON OF DOWLING & HIGHLAND RECORDS ON RIVER.

UNITED STATES GEOLOGICAL SURVEY

Drainage area 426 square miles.

DECEMBER		JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE			
Day	Discharge	Gage height	Discharge	Gage height	Discharge	Gage height	Discharge	Day	Gage height	Discharge	Gage height	Discharge	Gage height		
	75	145	69		140	295	351	1	4.8	1570	4.6	11400	680	3.30	
			90	195	140		316	2	5.3	2060		11400	680		
	124	175	112		137		280	3	5.3	2060	4.6	14000	680	3.45	
75	130	165	95	190	132	250	244	4	5.1	1860		1460	739		
	135		97		158	280	313	5	5.3	2060		1520	798	3.10	
85	140		97	220	184		296	6		1910	4.8	1530	798		
	136	170	101		268	265	278	7	5.0	1760		11490	798	2.90	
90	132		104	245	351		455	8	5.3	2060	4.6	14400	862	2.80	
	120	175	108		364		633	9	5.3	2060		1280	862		
95	107		87		378	4.0	811	10	5.5	2280	4.3	1150	862	2.75	
	112	145	66	3.10	392	4.3	1020	11	6.3	3440		1050	862		
	116		64		352	4.5	1180	12	6.0	2810		958	862	2.65	
75	121		62	2.80	313		1140	13		2700	3.9	862	830		
	84	140	60		301	4.4	1110	14		2600		771	798		
80	147		57	2.70	289		1120	15		2490	3.6	680	798	2.25	
	146	135	54		297		1130	16	5.6	2380		680	798		
120	146		67		305	4.4	1140	17		2170	3.6	680	862	2.10	
	64	155	80	2.80	313		1270	18	5.2	1960		804	1050		
	82		80		313	4.7	1400	19	5.1	1860	4.0	929	1230	2.05	
	100		80	2.80	313	5.3	1960	20		1770	3.7	737	1050	2.05	
175	118	155	80		326	5.0	1680	21		1670		737	862		
	115		123	2.90	338		1490	22	4.8	1580	3.7	737	801	1.90	
	111	2.10	166		338		1290	23		1670		737	740		
170	108		175		338	4.3	1180	24	5.0	1760	3.7	737	680	1.80	
	115	2.20	184	2.90	338		1070	25		1910		718	642	1.75	
180	122		172		351	4.2	1040	26	5.3	2060		679	604	1.70	
	118		160	3.00	364		1250	27		2060	3.6	680	604	1.60	
175	113	2.00	149		358	4.7	1460	28	5.2	1960	3.6	680	560	1.60	
	78		144				1500	29		1680		680	516	1.60	
	84	195	130				1540	30			3.6	680		1.60	
	3169		3229		8925		30145			61970		27976		23512	83
			104		287		972			2070		968		784	2
	102		244		674		228			486		227		184	
	289		28		73		263			542		262		205	
	28		6400		16500		59800			123000		57500		46700	17
	6270		184		392		1960			3140		1530		1230	
	110		314		132		264			1670		680		516	
	116									B		B		B	
	C		C		C		C								

er 30,
1916

UNITED STATES GEOLOGICAL SURVEY, (WATER RESOURCES BRANCH)

the year ending September 30

Daily gage height, in feet, and discharge, in second-feet, of MOORE CREEK near ARROW ROCK, IDAHO for 1916

Drainage area 426 square miles.

A.P. WEBB

(observer.)

Gage.	Day.	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.
		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	
51	1	4.8	1570	4.6	1400		680	3.30	536	1.60	116	1.18	58	1
16	2	5.3	2060		1400		680		590	1.48	98	1.12	51	2
80	3	5.3	2060	4.6	1400	3.6	680	3.45	604	1.45	94	1.12	51	3
44	4	5.1	1860		1460		739		531	1.40	87	1.12	51	4
78	5	5.3	2060		1520	3.8	798	3.10	458	1.35	80	1.14	53	5
13	6		1910	4.8	1580		798		425	1.30	73	1.10	49	6
296	7	5.0	1760		1490	3.8	798	2.90	392	1.32	76	1.10	49	7
78	8	5.3	2060	4.6	1400	3.9	862	2.80	364	1.30	73	1.10	49	8
455	9	5.3	2060		1280		862		358	1.30	73	1.10	49	9
633	10	5.5	2280	4.3	1150	3.9	862	2.75	351	1.30	73	1.25	66	10
811	11	6.3	3140		1050		862		338	1.28	70	1.25	66	11
1020	12	6.0	2810		958	3.9	862	2.65	326	1.28	70	1.25	66	12
1180	13		2700	3.9	862		830		295	1.25	66	1.20	60	13
1140	14		2600		771	3.8	798		264	1.24	65	1.18	58	14
1110	15		2490	3.6	680		798	2.25	234	1.22	63	1.15	54	15
1120	16	5.6	2380		680	3.8	798		218	1.22	63	1.10	58	16
1130	17		2170	3.6	680	3.9	862	2.10	203	1.22	63	1.15	54	17
1140	18	5.2	1960		804		1050		198	1.20	132	1.10	53	18
1270	19	5.1	1860	4.0	929	4.4	1230	2.05	194	1.55	108	1.10	53	19
1400	20		1770	3.7	737		1050	2.05	194	1.45	94	1.10	53	20
1960	21		1670		737	3.9	862		180	1.40	87	1.10	53	21
1680	22	4.8	1580	3.7	737		801	1.90	166	1.38	84	1.10	53	22
1490	23		1670		737		740		158	1.35	80	1.10	53	23
1290	24	5.0	1760	3.7	737	3.6	680	1.80	149	1.28	70	1.10	53	24
1100	25		1910		718		642	1.75	140	1.24	65	1.10	53	25
1070	26	5.3	2060		699	3.45	604	1.70	132	1.20	60	1.10	53	26
1040	27		2060	3.6	680		604	1.60	116	1.15	54	1.10	53	27
1250	28	5.3	2060		680	3.45	604	1.60	116	1.16	56	1.10	53	28
1460	29	5.2	1960	3.6	680		560	1.60	116	1.12	51	1.10	53	29
1500	30		1680		680	3.25	516	1.60	116	1.16	56	1.10	53	30
1540	31			3.6	680			1.60	116	1.20	60			31
10,145			61,970		29,976		23,512		8558		2360		1631	
972			2,070		968		784		276		76.1		544	
2.28			4.86		2.27		1.84		6.43		1.79		1.28	
263			5.42		262		205		75		21		1.14	
27,800			123,000		59,500		46,700		17,000		4,680		3240	343,000
1960			3,140		1580		1,230		604		132		66	
2414			1,570		680		516		116		51		49	
C			B		B		B		B		B		B	

Gage hts. checked from elev. last. Dist. Day.
 Compiled by Webb Discharge supplied by Webb Gage hts. copied by Webb
 Checked by Webb Discharge checked by Webb

UNITED STATES GEOLOGICAL SURVEY, WATER RESOURCES BRANCH

the year ending September 30,

gauge height, in feet, and discharge, in second-feet, of MOORE CREEK NEAR ARROW ROCK, IOWA for 1916.Drainage area, 426 square miles.A.P. WEBB

[check one]

APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		Day.
Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	
1570	4.6	1400		680	3.30	536	1.60	116	1.18	58		1
2060		1400		680		570	1.48	98	1.12	51		2
2060	4.6	1400	3.6	680	3.45	604	1.45	94	1.12	51		3
1860		1460		739		531	1.40	87	1.12	51		4
2060		1520	3.8	798	3.10	458	1.35	80	1.14	53		5
1910	4.8	1580		798		425	1.30	73	1.10	49		6
1760		1490	3.8	798	2.90	392	1.32	76	1.10	49		7
2060	4.6	1400	3.9	862	2.80	364	1.30	73	1.10	49		8
2060		1280		862		358	1.30	73	1.10	49		9
2280	4.3	1150	3.9	862	2.75	351	1.30	73	1.25	66		10
3140		1050		862		338	1.28	70	1.25	66		11
2810		958	3.9	862	2.65	326	1.28	70	1.25	66		12
2700	3.9	862		830		295	1.25	66	1.20	60		13
2600		771	3.8	798		264	1.24	65	1.18	58		14
2490	3.6	680		798	2.25	234	1.22	63	1.15	54		15
2380		680	3.8	798		218	1.22	63	1.18	58		16
2170	3.6	680	3.9	862	2.10	203	1.22	63	1.15	54		17
1960		804		1050		198	1.20	132	1.10	53		18
1860	4.0	929	4.4	1230	2.05	194	1.55	108	1.10	53		19
1770	3.7	737		1050	2.05	174	1.45	94	1.10	53		20
1670		737	3.9	862		180	1.40	87	1.10	53		21
1580	3.7	737		801	1.90	166	1.38	84	1.10	53		22
1670		737		740		158	1.35	80	1.10	53		23
1760	3.7	737	3.6	680	1.80	149	1.28	70	1.10	53		24
1910		718		642	1.75	140	1.24	65	1.10	53		25
2060		679	3.45	604	1.70	132	1.20	60	1.10	53		26
2060	3.6	680		604	1.60	116	1.15	54	1.10	53		27
2060		680	3.45	604	1.60	116	1.16	56	1.10	53		28
1960	3.6	680		560	1.60	116	1.12	51	1.10	53		29
1680		680	3.25	516	1.60	116	1.16	56	1.10	53		30
	3.6	680			1.60	116	1.20	60				31
61,970		27,976		23,512		85,538		2360		1631		
2070		968		784		276		76.1		54.4		
486		2.27		1.84		6.43		1.79		1.28		
542		2.62		2.05		.75		.21		.14		
123,000		59,500		46,700		17,000		4,680		3240		343,000
3,140		1,580		1,230		604		132		66		
1,570		680		516		116		51		49		
B		B		B		B		B		B		

Gage hts. checked from obs. level. Dist. Eng.

Gage hts. copied by AWBDischarge copied by AWBDischarge checked by AWBGage hts. checked by AWB

