

Report to
THE INTERNATIONAL JOINT COMMISSION
on
THE DIVISION AND USE MADE OF THE WATERS OF
ST. MARY AND MILK RIVERS

by

J. T. JOHNSTON
representing Canada

and

N. C. GROVER
representing the United States

1931



HD
1694
.A2
R424
1931

Report to
THE INTERNATIONAL JOINT COMMISSION
on
THE DIVISION AND USE MADE OF THE WATERS OF
ST. MARY AND MILK RIVERS

by

J. T. JOHNSTON
representing Canada

and

N. C. GROVER
representing the United States

1931

REPORT TO
THE INTERNATIONAL JOINT COMMISSION

1931

The Honourable, The International Joint Commission,
Washington, D. C., and Ottawa, Ontario.

Gentlemen:-

In compliance with the Provisions
of Clause 10 of your Order of the 4th of October, 1921,
directing the division of the waters of St. Mary and
Milk Rivers between the United States and Canada, we are
transmitting herewith a report on the operations during
the irrigation season of 1931.

Respectfully submitted,

Accredited Officer of His Majesty,

Accredited Officer of the United States.

April 5th, 1932.

Introduction

The field work incidental to the division and administration of the waters of the St. Mary and Milk Rivers in Alberta, Saskatchewan and Montana was conducted, during the irrigation season of 1931, by the same engineers as in previous years.

Mr. N. C. Grover, Chief Hydraulic Engineer, of the United States Geological Survey, as accredited officer for the United States, was represented in the field by Mr. W. A. Lamb, District Engineer, Helena, Montana. Mr. J. T. Johnston, Director, Dominion Water Power and Hydrometric Bureau, as accredited officer of His Majesty, was represented by Mr. S. G. Dawson, Ottawa, Canada.

The water of the two rivers was divided between the two countries in accordance with the Order of the Commission dated in Ottawa, Canada, on the 4th day of October, 1921.

The hydrometric data, on which this report is based, were obtained in Montana, by engineers of the United States Geological Survey under the personal supervision of Mr. Lamb; while those from streams and ditches in Canada were collected by engineers of the Dominion Water Power and Hydrometric Bureau, under the supervision of the Commissioner of Irrigation, Calgary, Alberta. The joint

2.

international gauging stations were visited frequently by representatives of both countries.

When the natural flow of the St. Mary river fell below the combined capacity of the two canals diverting therefrom, and when the demand for water in each country was equivalent to or in excess of its share of the natural flow of St. Mary river, which was from the middle of June until the closing of the canals, the field engineers were compelled to keep constantly informed as to the natural flow of the river, the water stored or released from storage and the quantity diverted by each country. Any discrepancy in the division was, therefore, discovered and adjustments made to allow each country its proper share. Statements showing the daily division of the water were prepared and forwarded to the Superintendent, Lethbridge section, Canadian Pacific Irrigation System and to the Project Manager, United States Bureau of Reclamation, Malta, Montana.

Water from Swiftcurrent creek was stored in Sherburne Reservoir until late in June and was later released to augment the United States share of the natural flow of St. Mary river and satisfy the increased demand for irrigation water from the lands in the Lower Milk river valley in Montana.

Division of Water

The United States St.Mary Canal was opened at the intake on the 14th of April, and, with the exception of the period May 24th-28th when the canal was carrying less than 10 second-feet, and the period September 8th to October 20th when the canal was closed, was kept in operation until the 7th of November when it was closed for the season. During the first ten days water was used to clear the canal between intake and St.Mary Crossing and was returned to the river. On the 25th of April water was delivered to the North Branch of Milk river. During the period September 10th to October 23rd a small flow entering the canal at the headworks was returned to the river at St.Mary Crossing. As the loss in the canal by seepage between the intake and the crossing of the St.Mary river, which was this year 13% of the water diverted at the headgates, is assumed to return directly to the river channel and eventually become available to Canada, the discharge of 135,000 acre-feet passing in the canal at the St.Mary river crossing is considered as the actual quantity diverted from St.Mary river by the United States. Of this quantity, 132,000 acre-feet were delivered to the Milk river and made available for irrigation in Montana. This 2% loss in the canal between St.Mary river crossing and Hudson Bay Divide, at the end of the canal, was due to seepage and evaporation.

During the winter months and from the break-up, late in April, until the 24th of June a portion of the daily flow of Swiftcurrent creek was stored in Sherburne Reservoir. This conservation made available 54,000 acre-feet which might later be used to supplement the share of the natural flow due the United States. By the last week in June it was found that this share was not sufficient to fulfil the demands on the canal, consequently stored water was released; by the end of October this reserve was completely exhausted. As very little water was diverted from the Milk river in Canada during this season, the natural flow of the river is considered as being delivered to the United States. The total diversion for irrigation from Milk river in Montana was 159,067 acre-feet.

The total recorded flow crossing the International Boundary from the Northern tributaries of Milk river during the irrigation season of 1931 was 16,652 acre-feet, which is about 17% of the flow recorded in 1930, and the lowest on record.

The Canadian Pacific Railway canal, previously known as the Alberta Railway and Irrigation Company canal, at Kimball, Alberta, diverted 191,000 acre-feet from the St. Mary river during the period of operation from the 28th of March to the 16th of October, to irrigate lands in Southern Alberta.

Any question as to the proper share of St. Mary river being delivered to either country was decided in the following manner. Current meter measurements were made of Swiftcurrent creek at Many Glacier and Canyon creek near Many Glacier, but the flow of the other small creeks entering Swiftcurrent above the Sherburne dam were estimated. The total flow of these creeks gave the inflow into Sherburne Reservoir. The evaporation and losses from the Reservoir were considered when estimating the flow from the unrecorded small streams. A current meter measurement of the outflow from the reservoir was made at the gauging station just below the dam. The difference between the inflow and the outflow showed the quantity of water being stored or released from storage. A measurement of the United States St. Mary canal at St. Mary Crossing was made to find the water being diverted by the United States, and a measurement of the St. Mary river at Kimball, to determine the water being delivered to Canada.

If water was being stored in Sherburne Reservoir, the natural flow of St. Mary river at the Boundary was obtained by adding the quantity of water stored to that diverted by the St. Mary canal and that delivered to Canada, a one day lag was allowed for stored water to reach the Boundary. If stored water was being released, the quantity released was deducted from the combined flow of the St. Mary canal and that in the

river at Kimball to determine the natural flow.

The natural flow having been determined, the share to which each country was entitled was calculated on the following basis:-

(1) When the natural flow of St. Mary river was less than 666 cubic-feet per second, Canada was entitled, by the ruling of the Commission, to three-quarters of that flow and the United States to one-quarter.

(2) When the natural flow of St. Mary river was greater than 666 cubic-feet per second, Canada was entitled to 500 cubic-feet per second plus one-half of the increase over 666 cubic-feet per second, and the United States was entitled to the remainder.

No actual division was made of the waters of Milk river and its Northern tributaries.

Water Supply

The precipitation on the drainage basins of the St. Mary and Milk rivers during the winter of 1930-31 was much below normal.

In the St. Mary river drainage basin, the tenth annual international survey of the snow conditions on the headwaters of Swiftcurrent creek, an area considered typical of the headwaters of the St. Mary river, indicated that the

run-off from the area during May, June and July would be 74% of the average for the years of survey. The long period of hot dry weather during these months caused a heavy drain on the glaciers which produced a run-off slightly in excess of this prediction and practically equal to that of 1930. The flow of the St. Mary river basin as recorded at the international boundary during the irrigation season was 60% of the 30-year average.

On the prairies, forming the major portion of the drainage basin of Milk river and its tributaries in Canada, the winter snows had practically disappeared by the time break-up occurred during the second week of April. Some of the smaller tributaries had no discharge, while the larger ones, after a very light run-off, dried up by the end of May. Streams which usually have a continuous flow throughout the irrigation season ceased flowing by the end of July. The flow at the international boundary from the Northern tributaries during the irrigation season of 1930 was the lowest on record, being only 7% of the average.

Again, as in last year, the total precipitation in Southern Alberta was below the 29-year average. The 1931 total reached 11.64 inches as against an average of 15.84 inches. During April, May, June and July the rainfall averaged one and one-quarter inches each month. The precipitation in Northern Montana was below normal for this period and slightly lower than that in Southern Alberta. This

deficiency in rain-fall during the growing season greatly increased the demand for irrigation water, which was only satisfied by careful conservation and rotation.

The twenty-three international gauging stations, previously used in the determination of the daily flow of the streams in the St. Mary and Milk river basins, were maintained and operated under the joint supervision of the field engineers.

Owing to the lack of sufficient funds, several stations, previously maintained by Canada on International streams and canals diverting therefrom, were abandoned. For records of the diversions in Canada from the Northern tributaries of Milk river the Dominion Water Power and Hydrometric Bureau is largely dependent upon the irrigators themselves for such records as, in the majority of cases, the diversions are too small to justify the expense of appointing and paying gauge observers in each case. Consequently, the records are believed to be incomplete and of doubtful value and do not show the total diversion.

It is reported that in Canada 330 acre-feet were diverted from Lodge creek, 1177 acre-feet from Battle creek and 291 acre-feet from Frenchman river.

An Appendix to this report gives the results of current meter measurements, the daily gauge heights and the discharge at all the gauging stations operated in the two

drainage basins during 1931.

Description of Tables

The tables following have been prepared to summarize the data on the division and use made of the waters in the St. Mary and Milk river basins.

Table No. 1 shows the method used to determine the natural flow of the St. Mary river during the irrigation season of 1931, the water available for use and used by the United States and Canada. In this table there are four pages for each month from April to October, inclusive.

Page 1, (water stored or released from Sherburne reservoir) shows the daily inflow to and the outflow from Sherburne reservoir. The difference gives the quantity of water stored or released from storage. On this sheet the unrecorded inflow is determined by comparison with the recorded flows in Swiftcurrent and Canyon creeks and the use of the storage curve of Sherburne reservoir to give the gain or loss in storage, after allowance has been made for evaporation and seepage losses. This estimate is put in the column headed "Unrecorded Inflow".

Page 2, (determination of the natural flow of the St. Mary river) shows the actual flow of St. Mary river at Kimball near the International boundary, the quantity of water diverted, stored or released from storage by the

United States and the computed natural flow of St. Mary river, or that flow which would have crossed the boundary had there been no interference. It has been decided that one day is required for stored water released from Sherburne reservoir to influence the flow at the International boundary, consequently, a one day lag has been applied to the stored or released water.

Page 3 (water available for use and used by the United States) shows the water available for use by the United States under the ruling of the Order of October 4th, 1921, the water diverted and stored and the excess or deficit in the quantity used over the quantity available.

Page 4 (water available for use and used by Canada) shows the natural flow of St. Mary river at the International boundary, Canada's share by the ruling of the Commission, the actual discharge of St. Mary river at Kimball, which is the quantity available for use by Canada, the quantity used by Canada and the excess or deficit of the quantity received by Canada as compared with the share.

Table 2 is a statement showing the quantity in acre-feet taken in each month by each country and the quantity thereof applied to the land, the quantity diverted from the St. Mary river, the loss or waste from the canals and the diversions from Milk river in the United States.

11.

Table 3 shows the available information on the diversions from the Northern tributaries of Milk river in Canada.

Table 4 gives the diversions from the Northern tributaries of Milk river in the United States.

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
APRIL - 1931

Day	<u>INFLOW TO SHERBURNE RESERVOIR</u>	Outflow	Stored	Released
	<u>Recorded Inflow:</u> Un- <u>Swift-Canyon:</u> recorded <u>current Creek:</u> Creek	Total Inflow: Estimated	Swiftcurrent: Creek at Sherburne	in Reservoir: Sec.ft.
1		36	13	23
2		39	13	26
3		42	13	29
4		44	13	31
5		48	13	35
6		50	13	37
7		53	13	40
8		53	13	40
9		54	13	41
10		57	13	44
11		60	13	47
12		63	13	50
13		64	13	51
14		65	13	52
15		74	19	55
16		86	29	57
17		178	118	60
18		139	76	63
19		109	45	64
20		86	21	65
21		97	27	70
22		107	37	70
23		288	218	70
24	No record available	248	286	-- 38
25	No record available	185	342	-- 157
26		150	339	-- 189
27		155	337	-- 182
28		130	333	-- 203
29		142	333	-- 191
30	No record available	287	427	-- 140
Total Sec.Ft.		3189	3169	1120 1100
Mean		106	106	37 37
Ac.Ft.		6310	6310	2200 2200

Table 1
April
Page 2

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
APRIL - 1931

Day	St. Mary River at Kimball	Diverted by U.S.B.R.	Stored by U.S.B.R.	Total in Sec. Ft.	Released	Natural Flow St. Mary River
1	187	--	22	209	--	209
2	170	--	23	193	--	193
3	162	--	26	188	--	188
4	160	--	29	189	--	189
5	159	--	31	190	--	190
6	160	--	35	195	--	195
7	162	--	37	199	--	199
8	163	--	40	208	--	208
9	158	--	40	198	--	198
10	152	--	41	193	--	193
11	132	--	44	176	--	176
12	148	--	47	195	--	195
13	158	--	50	208	--	208
14	162	--	51	213	--	213
15	166	--	52	218	--	218
16	154	--	55	209	--	209
17	146	--	57	203	--	203
18	128	--	60	188	--	188
19	132	--	63	195	--	195
20	188	--	64	252	--	252
21	199	--	65	264	--	264
22	199	--	70	269	--	269
23	202	--	70	272	--	272
24	146	92	70	308	--	308
25	138	173	--	311	38	273
26	130	237	--	367	157	210
27	125	284	--	409	189	220
28	154	288	--	442	182	260
29	188	295	--	483	203	280
30	240	301	--	541	191	350
Total Sec. Ft.	4873	1670	1142	7685	960	6725
Mean	162	239 (24 - 30)	38	256	32	224
Ac. Ft.	9640	3310	2260	15200	1900	13300

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
APRIL - 1931.

Day	Natural Flow		AVAILABLE FOR USE BY U.S.A.		USED BY U.S.A.		Excess or Deficit	
	St. Mary River	U.S. Share	Released	Total Storage	Diverted	Stored	Total Used	of Share Used
1	209	52	--	52	--	22	22	-- 30
2	193	48	--	48	--	23	23	-- 25
3	188	47	--	47	--	26	26	-- 21
4	189	47	--	47	--	29	29	-- 18
5	190	48	--	48	--	31	31	-- 17
6	195	49	--	49	--	35	35	-- 14
7	199	50	--	50	--	37	37	-- 13
8	208	52	--	52	--	40	40	-- 12
9	198	50	--	50	--	40	40	-- 10
10	193	48	--	48	--	41	41	-- 7
11	176	44	--	44	--	44	44	--
12	195	49	--	49	--	47	47	-- 2
13	208	52	--	52	--	50	50	-- 2
14	213	53	--	53	--	51	51	-- 2
15	218	55	--	55	--	52	52	-- 3
16	209	52	--	52	--	55	55	-- 3
17	203	51	--	51	--	57	57	-- 6
18	188	47	--	47	--	60	60	-- 13
19	195	49	--	49	--	63	63	-- 14
20	252	63	--	63	--	64	64	-- 1
21	264	66	--	66	--	65	65	-- 1
22	269	67	--	67	--	70	70	-- 3
23	272	68	--	68	--	70	70	-- 2
24	308	77	--	77	92	70	162	-- 85
25	273	68	38	106	173	--	173	-- 67
26	210	52	157	209	237	--	237	-- 28
27	220	55	189	244	234	--	284	-- 40
28	260	65	182	247	288	--	288	-- 41
29	280	70	203	273	295	--	295	-- 22
30	350	88	191	279	301	--	301	-- 22
Total								
Sec.Ft.	6725	1682	960	2643	1670	1142	2812	347 177
Mean	224	56.4	32	88	239 (24-30)	38	94	12 6
Ac.Ft.	13300	3330	1900	5240	3310	2260	5590	710 360

Table 1
April
Page 4

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
APRIL - 1931

Day	Natural flow St. Mary R. at Boundary	Canada's Share Available	St. Mary R. at Kimball Delivered	Diverted by Kimball	Excess or Deficit of Canada	Share Delivered
1	209	157	187	65	30	--
2	193	145	170	73	25	--
3	188	141	162	100	21	--
4	189	142	160	85	18	--
5	190	142	159	105	17	--
6	195	146	160	98	14	--
7	199	149	162	96	13	--
8	208	156	168	104	12	--
9	198	148	158	93	10	--
10	193	145	152	103	7	--
11	176	132	132	98	--	--
12	195	146	148	112	2	--
13	208	156	158	125	2	--
14	213	160	162	128	2	--
15	218	163	166	133	3	--
16	209	157	154	116	--	3
17	203	152	146	109	--	6
18	188	141	128	96	--	13
19	195	146	132	101	--	14
20	252	189	188	158	--	1
21	264	198	199	174	1	--
22	269	202	199	172	--	3
23	272	204	202	178	--	2
24	308	231	146	114	--	85
25	273	205	138	110	--	67
26	210	158	130	98	--	28
27	220	165	125	95	--	40
28	260	195	154	121	--	41
29	230	210	188	163	--	22
30	350	262	240	219	--	22
Total Sec.Ft.	6725	5043	4873	3542	177	347
Mean	224	168	162	118	6	12
Ac.Ft.	13300	10000	9640	7020	360	710

Table 1
May
Page 1

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
MAY - 1931

Day	<u>INFLOW TO SHERBURNE RESERVOIR</u>			Outflow	Stored	Released
	Recorded Inflow:	Un-	Total	Swiftcurrent:	in	from
1				396	556	--
2				470	620	--
3	406 ^e	55 ^e	44 ^e)	714	603	111
4)	561	594	--
5)	380	552	--
6	290	60	33	383	513	--
7	468	74	51	593	475	118
8	428	49	45	522	438	84
9	320	35	34	389	455	--
10	271	33	29	333	452	--
11	303	38	32	373	446	--
12	414	58	45	517	441	76
13	610	81	66	757	432	325
14	750	90	80	920	441	479
15	949	111	101	1161	449	712
16	1040	111	108	1259	308	951
17	965	100	101	1166	206	960
18	571	63	60	694	99	595
19	374	42	40	456	14	442
20	277	35	29	341	14	327
21	216	29	23	268	14	254
22	179	27	20	226	14	212
23	176	34	20	230	13	217
24	223	49	26	298	13	285
25	453	91	52	596	13	583
26	592	87	65	744	13	731
27	502	63	54	619	13	606
28	442	59	48	549	14	535
29	380	50	41	471	14	457
30	414	60	45	519	98	421
31	542	71	58	671	153	518
Total						
Sec.Ft.	14179	1875	1522	17576	8480	9999
Mean	457	61	49	567	274	322
Ac.Ft.	28100	3750	3010	34900	16800	19800
						1780

Table 1
May
Page 2

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
MAY - 1931

Day	St.Mary River at: Kimball	Diverted by U.S.B.R.	Stored by U.S.B.R.	Total in Sec.Ft.	Stored Water Released	Natural Flow St.Mary River
1	370	314	--	684	140	544.
2	501	358	--	859	160	699
3	679	397	--	1076	150	926
4	854	399	111	1364	--	1364
5	920	401	--	1321	33	1288
6	966	404	--	1370	172	1198
7	1060	404	--	1464	130	1334
8	1090	424	118	1632	--	1632
9	1080	435	84	1599	--	1599
10	1060	455	--	1515	66	1449
11	1060	482	--	1542	119	1423
12	1030	484	--	1514	73	1441
13	1120	486	76	1682	--	1682
14	1260	490	325	2075	--	2075
15	1590	495	479	2564	--	2564
16	2010	501	712	3223	--	3223
17	2320	501	951	3772	--	3772
18	2340	497	960	3797	--	3797
19	2070	488	595	3153	--	3153
20	1780	482	442	2704	--	2704
21	1460	476	327	2263	--	2263
22	1240	472	254	1966	--	1966
23	1290	296	212	1798	--	1798
24	1420	22	217	1659	--	1659
25	1410	8	285	1703	--	1703
26	1520	6	583	2109	--	2109
27	1590	8	731	2329	--	2329
28	1760	9	606	2375	--	2375
29	1460	222	535	2217	--	2217
30	1330	382	457	2169	--	2169
31	1320	469	421	2210	--	2210
Total Sec.Ft.	40960	11267	9481	61708	1043	60665
Mean	1322	363	306	1991	34	1957
Ac.Ft.	81300	22300	18800	122000	2090	120000

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
MAY - 1931

Day	Natural:		AVAILABLE		USED		Excess or Deficit	
	Flow	FOR USE BY U.S.A.	BY U.S.A.					
	St. Mary:U.S.	Released:	Total:	Divert-	Stored:	Total:	of Share Used	
	River	Share:	Storage	Avail+ ed		: Used	:	
			able :					
1	544	136	140	276	314	--	314	38
2	699	183	160	343	358	--	358	15
3	926	296	150	446	397	--	397	--
4	1364	515	--	515	399	111	510	--
5	1288	477	33	510	401	--	401	--
6	1198	432	172	604	404	--	404	--
7	1334	500	130	630	404	--	404	--
8	1632	649	--	649	424	118	542	--
9	1599	633	--	633	435	84	519	--
10	1449	558	66	624	455	--	455	--
11	1423	545	119	664	482	--	482	--
12	1441	554	73	627	484	--	484	--
13	1682	674	--	674	486	76	562	--
14	2075	871	--	871	490	325	815	--
15	2564	1115	--	1115	495	479	974	--
16	3223	1445	--	1445	501	712	1213	--
17	3772	1719	--	1719	501	951	1452	--
18	3797	1732	--	1732	497	960	1457	--
19	3153	1410	--	1410	488	595	1083	--
20	2704	1185	--	1185	482	442	924	--
21	2263	965	--	965	476	327	803	--
22	1966	816	--	816	472	254	726	--
23	1798	732	--	732	296	212	508	--
24	1659	663	--	663	22	217	239	--
25	1703	685	--	685	8	285	293	--
26	2109	888	--	888	6	583	589	--
27	2329	998	--	998	8	731	739	--
28	2375	1021	--	1021	9	606	615	--
29	2217	942	--	942	222	535	757	--
30	2169	918	--	918	382	457	839	--
31	2210	938	--	938	469	421	890	--
Total								
Sec.Ft.	60665	25195	1043	26238	11267	9481	20748	53 5543
Mean	1957	813	34	847	363	306	.669	1.7 179
Ac.Ft.	120000	50000	2090	52100	22300	18800	41100	100 11000

Table 1
May
Page 4

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
MAY - 1931

Day	Natural flow St.	Canada's Share Available at Bound-ary	St. Mary R. at Kimball Delivered	Diverted by Canada	Excess or Deficit of Share Delivered
1	544	408	370	331	-- 38
2	699	516	501	456	-- 15
3	926	630	679	602	49 --
4	1364	849	854	667	5 --
5	1288	811	920	610	109 --
6	1198	766	966	623	200 --
7	1334	834	1060	604	226 --
8	1632	983	1090	591	107 --
9	1599	966	1080	589	114 --
10	1449	891	1060	584	169 --
11	1423	878	1060	620	182 --
12	1441	887	1030	646	143 --
13	1682	1008	1120	659	112 --
14	2075	1204	1260	662	56 --
15	2564	1449	1590	664	141 --
16	3223	1778	2010	682	232 --
17	3772	2053	2320	659	267 --
18	3797	2065	2340	646	275 --
19	3153	1743	2070	620	327 --
20	2704	1519	1780	617	261 --
21	2263	1298	1460	628	162 --
22	1966	1150	1240	589	90 --
23	1793	1066	1290	654	224 --
24	1659	996	1420	641	424 --
25	1703	1018	1410	654	392 --
26	2109	1221	1520	685	299 --
27	2529	1331	1590	685	259 --
28	2375	1354	1760	698	406 --
29	2217	1275	1460	656	185 --
30	2169	1251	1330	698	79 --
31	2210	1272	1320	716	48 --
Total Sec.Ft.	60665	35470	40960	19436	5543 53
Mean	1957	1144	1322	627	179 1.7
Ave.Ft.	120000	70300	81300	38600	11000 100

Table 1
June
Page 1

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
JUNE - 1931

Day	<u>INFLOW TO SHERBURNE RESERVOIR</u>				Outflow	Stored	Released
	Recorded Inflow:	Un- Swift-Canyon current: Creek	Total recorded Inflow: Inflow	Swiftcurrent: Creek at Sherburne	in Reservoir: Sherburne	Sec.ft.	Sec.ft.
1	584	78	43	705	153	552	--
2	584	73	43	700	132	568	--
3	529	59	38	626	53	573	--
4	394	41	28	463	42	421	--
5	313	36	23	372	42	330	--
6	303	37	22	362	41	321	--
7	340	45	25	410	41	369	--
8	418	57	31	506	61	445	--
9	446	59	33	538	121	417	--
10	446	55	33	534	164	370	--
11	411	46	30	487	238	249	--
12	336	37	24	397	288	109	--
13	277	35	20	332	257	75	--
14	245	31	18	294	218	76	--
15	245	33	18	296	224	72	--
16	284	40	21	345	259	86	--
17	380	48	28	456	282	174	--
18	404	43	29	476	284	192	--
19	336	35	24	395	284	111	--
20	277	31	20	328	297	31	--
21	235	30	40	305	310	--	5
22	245	32	43	320	306	14	--
23	294	34	50	378	312	66	--
24	287	32	49	368	344	24	--
25	232	29	39	300	364	--	64
26	216	30	37	283	369	--	86
27	245	32	43	320	408	--	88
28	258	32	44	334	446	--	112
29	239	29	40	308	458	--	150
30	207	25	35	267	458	--	191
Total Sec.Ft.	10010	1224	971	12205	7256	5645	696
Mean	334	41	32	407	242	188	23
Ac.Ft.	19900	2440	1900	24200	14400	11200	1370

Table 1
June
Page 2

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
JUNE - 1931

Day	St. Mary River at Kimball	Diverted by U.S.B.R.	Stored by U.S.B.R.	Total in Sec. Ft.	Stored Water Released	Natural Flow St. Mary River
1	1390	512	518	2420	--	2420
2	1520	529	552	2601	--	2601
3	1610	535	568	2713	--	2713
4	1610	540	573	2723	--	2723
5	1490	537	421	2448	--	2448
6	1340	533	330	2203	--	2203
7	1230	529	321	2080	--	2080
8	1190	526	369	2085	--	2085
9	1180	542	445	2167	--	2167
10	1240	546	417	2203	--	2203
11	1280	546	370	2196	--	2196
12	1290	546	249	2085	--	2085
13	1240	544	109	1893	--	1893
14	1150	544	75	1769	--	1769
15	1040	544	76	1660	--	1660
16	989	548	72	1609	--	1609
17	1050	556	86	1692	--	1692
18	1050	554	174	1778	--	1778
19	1040	554	192	1786	--	1786
20	1000	554	111	1665	--	1665
21	966	554	31	1551	--	1551
22	920	556	--	1476	5	1471
23	877	556	14	1447	--	1447
24	854	556	66	1476	--	1476
25	814	556	24	1394	--	1394
26	765	556	--	1321	64	1257
27	738	554	--	1292	86	1206
28	730	558	--	1288	88	1200
29	738	564	--	1302	112	1190
30	756	571	--	1327	150	1177
Total Sec. Ft.	33087	16400	6163	55650	505	55145
Mean	1103	547	205	1855	17	1838
Ac.Ft.	65600	32500	12200	110000	1010	109000

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
JUNE - 1931

Day	Natural Flow	AVAILABLE FOR USE BY U.S.A.		USED BY U.S.A.		Excess or Deficit		
	St. Mary River	U.S. Share	Released Storage	Total Available	Diverted Ed	Stored	Total Used	of Share Used
1	2420	1043	--	1043	512	518	1030	-- 13
2	2601	1134	--	1134	529	552	1081	-- 53
3	2713	1190	--	1190	535	568	1103	-- 87
4	2723	1195	--	1195	540	573	1113	-- 82
5	2448	1057	--	1057	537	421	958	-- 99
6	2203	935	--	935	533	330	863	-- 72
7	2080	873	--	873	529	321	850	-- 23
8	2085	876	--	876	526	369	895	19 --
9	2167	917	--	917	542	445	987	70 --
10	2203	935	--	935	546	417	963	28 --
11	2196	931	--	931	546	370	916	-- 15
12	2085	876	--	876	546	249	795	-- 81
13	1893	780	--	780	544	109	653	-- 127
14	1769	718	--	718	544	75	619	-- 99
15	1660	663	--	663	544	76	620	-- 43
16	1609	638	--	638	548	72	620	-- 18
17	1692	679	--	679	556	86	642	-- 37
18	1778	722	--	722	554	174	728	6 --
19	1786	726	--	726	554	192	746	20 --
20	1665	666	--	666	554	111	665	-- 1
21	1551	609	--	609	554	31	585	-- 24
22	1471	569	5	574	556	--	556	-- 18
23	1447	557	--	557	556	14	570	13 --
24	1476	571	--	571	556	66	622	51 --
25	1394	530	--	530	556	24	580	50 --
26	1257	462	64	526	556	--	556	30 --
27	1206	436	86	522	554	--	554	32 --
28	1200	433	88	521	558	--	558	37 --
29	1190	428	112	540	564	--	564	24 --
30	1177	422	150	572	571	--	571	-- 1
Total		55145	22571	505	23076	16400	6163	22563 380 893
Sec.Ft.								
Mean	1838	752	17	769	547	205	752	13 30
Ac.Ft.	109000	44700	1010	45800	32500	12200	44700	773 1780

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
JUNE - 1931

Day	Natural flow St.	Canada's Share Available at Bound-ary	St. Mary R. at Kimball Delivered	Diverted by Canada	Excess or Deficit of Share Delivered	
1	2420	1377	1390	740	13	--
2	2601	1467	1520	729	53	--
3	2713	1523	1610	708	87	--
4	2723	1528	1610	708	82	--
5	2448	1391	1490	688	99	--
6	2203	1268	1340	688	72	--
7	2080	1207	1230	680	23	--
8	2085	1209	1190	698	--	19
9	2167	1250	1180	685	--	70
10	2203	1268	1240	659	--	28
11	2196	1265	1280	669	15	--
12	2085	1209	1290	690	81	--
13	1893	1113	1240	732	127	--
14	1769	1051	1150	747	99	--
15	1660	997	1040	755	43	--
16	1609	971	989	750	18	--
17	1692	1013	1050	737	37	--
18	1778	1056	1050	701	--	6
19	1786	1060	1040	690	--	20
20	1665	999	1000	734	1	--
21	1551	942	966	729	24	--
22	1471	902	920	753	18	--
23	1447	890	877	760	--	13
24	1476	905	854	760	--	51
25	1394	864	814	754	--	50
26	1257	795	765	735	--	30
27	1206	770	738	709	--	32
28	1200	767	730	720	--	37
29	1190	762	738	694	--	24
30	1177	755	756	660	1	--
Total Sec.Ft.	55145	32574	33087	21462	893	380
Mean	1838	1086	1103	715	30	13
Ac.Ft.	109000	64600	65600	42500	1780	773

Table 1
July
Page 1

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
JULY - 1931

Day	<u>INFLOW TO SHERBURNE RESERVOIR</u>			Outflow	Stored	Released
	Recorded Inflow:	Un- Swift-Canyon current: Creek	Total recorded Inflow: Inflow	Swiftcurrent Creek at Sherburne	in Reservoir Sec.ft.	from Reservoir Sec.ft.
1	165	22	50	237	466	229
2	142	21	43	206	472	266
3	137	22	42	201	455	254
4	134	22	42	198	458	260
5	150	26	47	223	472	249
6	159	27	50	236	472	236
7	153	28	48	229	481	252
8	156	28	49	233	484	251
9	162	27	50	239	519	280
10	170	27	52	249	540	291
11	173	25	53	251	540	289
12	153	22	47	222	537	315
13	142	22	44	208	537	329
14	145	24	45	214	543	329
15	142	23	44	209	552	343
16	150	21	45	216	546	330
17	156	20	47	223	571	348
18	142	20	43	205	600	395
19	142	20	43	205	616	411
20	140	20	43	203	613	410
21	137	21	42	200	607	407
22	137	21	42	200	607	407
23	137	21	42	200	623	423
24	131	20	40	191	633	442
25	129	20	40	189	630	441
26	124	19	38	181	626	445
27	121	18	37	176	630	454
28	119	17	36	172	623	451
29	109	15	33	157	607	450
30	137	32	45	214	616	402
31	188	81	71	340	630	290
Total						
Sec.Ft.	4482	752	1393	6627	17306	10679
Mean	145	24	45	214	558	344
Ac.Ft.	8920	1480	2770	13200	34300	21200

Table 1
July
Page 2

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
JULY - 1931

Day	St. Mary River at Kimball	Diverted by U.S.B.R.	Stored by U.S.B.R.	Total in Sec. Ft.	Stored Water Released	Natural Flow St. Mary River
1	704	566		1270	191	1079
2	662	564		1226	229	997
3	679	564		1243	266	977
4	629	564		1193	254	939
5	580	562		1142	260	882
6	613	562		1175	249	926
7	606	562		1168	236	932
8	573	558		1131	252	879
9	553	556		1109	251	858
10	566	556		1122	280	842
11	566	554		1120	291	829
12	573	560		1133	289	844
13	566	558		1124	315	809
14	566	556		1122	329	793
15	580	560		1140	329	811
16	573	560		1133	343	790
17	559	558		1117	330	787
18	553	558		1111	348	763
19	566	558		1124	395	729
20	580	560		1140	411	729
21	580	558		1138	410	728
22	553	560		1113	407	706
23	529	558		1087	407	680
24	535	556		1091	423	668
25	535	554		1089	442	647
26	529	554		1083	441	642
27	512	552		1064	445	619
28	490	552		1042	454	588
29	496	554		1050	451	599
30	559	558		1117	450	667
31	806	544		1350	402	948
Total			No water stored during July			
Sec.Ft.	17971	17296		35267	10580	24687
Mean	580	558		1138	341	796
Ac.Ft.	35700	34300		70000	21000	48900

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
JULY - 1931

Day	St. Mary River	U.S. Share	Released	Total	Diverted	Stored	Total	of Share Used	Excess or Deficit
									Used
	:	:	:	:	:	:	:	:	:
1	1079	373	191	564	566		566	2	--
2	997	332	229	561	564		564	3	--
3	977	322	266	588	564		564	--	24
4	939	303	254	557	564		564	7	--
5	882	274	260	534	562		562	28	--
6	926	296	249	545	562		562	17	--
7	932	299	236	535	562		562	27	--
8	879	273	252	525	558		558	33	--
9	858	262	251	513	556		556	43	--
10	842	254	280	534	556		556	22	--
11	829	248	291	539	554		554	15	--
12	844	255	289	544	560		560	16	--
13	809	238	315	553	558		558	5	--
14	793	230	329	559	556		556	--	3
15	811	239	329	568	560		560	--	8
16	790	228	343	571	560		560	--	11
17	787	227	330	557	558		558	1	--
18	763	215	348	563	558		558	--	5
19	729	198	395	593	558		558	--	35
20	729	198	411	609	560		560	--	49
21	728	197	410	607	558		558	--	49
22	706	186	407	593	560		560	--	33
23	680	173	407	580	558		558	--	22
24	668	167	423	590	556		556	--	34
25	647	162	442	604	554		554	--	50
26	642	161	441	602	554		554	--	48
27	619	155	445	600	552		552	--	48
28	588	147	454	601	552		552	--	49
29	599	150	451	601	554		554	--	47
30	667	167	450	617	558		558	--	59
31	948	307	402	709	544		544	--	165
Total									
Sec.Ft.	24687	7236	10580	17816	17296		17296	219	739
Mean	796	233	341	574	558		558	7	24
Ac.Ft.	48900	14300	21000	35300	34300		34300	430	1480

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
JULY - 1931

Day	Natural flow St. Mary R. at Bound-ary	Canada's Share Available	St. Mary R. at Kimball Delivered	Diverted by Canada	Used	Excess or Deficit of Share Delivered
1	1079	706	704	638	--	2
2	997	665	662	633	--	3
3	977	655	679	638	24	--
4	939	636	629	548	--	7
5	882	608	580	525	--	28
6	926	630	613	532	--	17
7	932	633	606	532	--	27
8	879	606	573	510	--	33
9	358	596	553	500	--	43
10	842	588	566	510	--	22
11	829	581	566	513	--	15
12	844	589	573	506	--	16
13	809	571	566	510	--	5
14	793	563	566	515	3	--
15	811	572	580	506	8	--
16	790	562	573	517	11	--
17	787	560	559	515	--	1
18	763	548	553	502	5	--
19	729	531	566	494	35	--
20	729	531	580	513	49	--
21	728	531	580	517	49	--
22	706	520	553	500	33	--
23	680	507	529	482	22	--
24	668	501	535	484	34	--
25	647	485	535	482	50	--
26	642	481	529	476	48	--
27	619	464	512	463	48	--
28	588	441	490	450	49	--
29	599	449	496	446	47	--
30	667	500	559	504	59	--
31	948	641	806	678	165	--
Total Sec.Ft.	24687	17451	17971	16139	739	219
Mean	796	563	580	521	24	7
Ac.Ft.	48900	34600	35700	32000	1480	430

Table 1
August
Page 1

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
AUGUST - 1931

Day	Recorded Inflow	Un- recorded current: Creek	Total Inflow	Outflow Swiftcurrent: Estimated:	Stored in Sherburne	Released from Reservoir: Sec.ft.
1	219	65	369	623		254
2	194	45	311	620		309
3	165	35	260	616		356
4	148	29	230	613		383
5	129	25	200	597		397
6	114	23	178	590		412
7	102	21	160	587		427
8	98	20	153	522		369
9	90	18	140	481		341
10	86	18	135	475		340
11	86	17	134	507		373
12	84	16	130	528		398
13	84	16	130	543		413
14	80	15	124	559		435
15	75	15	117	565		448
16	75	15	117	562		445
17	78	16	122	565		443
18	80	16	125	571		446
19	82	17	129	565		436
20	84	17	131	556		425
21	84	17	131	574		443
22	82	16	127	571		444
23	80	15	123	559		436
24	75	15	117	546		429
25	73	14	113	546		433
26	69	13	107	568		461
27	69	13	107	565		458
28	62	12	96	559		463
29	61	11	94	571		477
30	61	11	94	568		474
31	59	11	91	556		465
Total	2928	607	1060	4595	17428	12833
Mean	94	20	34	148	562	414
Ac.Ft.	5780	1230	2090	9100	34600	25500

Table 1
August
Page 2

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
AUGUST - 1931

Day	St. Mary River at Kimball	Diverted by U.S.B.R.	Stored by U.S.B.R.	Total in Sec. Ft.	Stored Water Released	Natural Flow St. Mary River
1	935	514		1449	290	1159
2	935	512		1447	254	1193
3	891	514		1405	309	1096
4	838	509		1347	356	991
5	790	509		1299	383	916
6	747	507		1254	397	857
7	695	520		1215	412	803
8	642	533		1175	427	748
9	559	529		1088	369	719
10	490	526		1016	341	675
11	438	531		969	340	629
12	420	529		949	373	576
13	397	533		930	398	532
14	374	544		918	413	505
15	374	544		918	435	483
16	365	542		907	448	459
17	347	540		887	445	442
18	343	540		883	443	440
19	343	542		885	446	439
20	335	542		877	436	441
21	327	540		867	425	442
22	323	540		863	443	420
23	323	542		865	444	421
24	311	544		855	436	419
25	293	540		833	429	404
26	282	537		819	433	386
27	289	540		829	461	368
28	289	537		826	458	368
29	279	540		819	463	356
30	272	537		809	477	332
31	266	535		801	474	327
No water stored during August						
Total						
Sec.Ft.	14512	16492		31004	12658	18346
Mean	468	532		1000	408	592
Ac.Ft.	28800	32700		61500	25100	36400

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
AUGUST - 1931

Day	Natural:		AVAILABLE		USED		Excess or Deficit	
	Flow	St. Mary	U.S.	Released	Total	Diverted	Stored	Total
	River	Share	Storage	Available	ed	:	Used	:
	:	:	:	:able	:	:	:	:
1	1159	413	290	703	514		514	--
2	1193	430	254	684	512		512	--
3	1096	381	309	690	514		514	--
4	991	329	356	685	509		509	--
5	916	291	383	674	509		509	165
6	857	262	397	659	507		507	152
7	803	235	412	647	520		520	127
8	748	207	427	634	533		533	101
9	719	193	369	562	529		529	33
10	675	171	341	512	526		526	14
11	629	157	340	497	531		531	34
12	576	144	373	517	529		529	12
13	532	133	398	531	533		533	2
14	505	126	413	539	544		544	5
15	483	121	435	556	544		544	--
16	459	115	448	563	542		542	--
17	442	110	445	555	540		540	15
18	440	110	443	553	540		540	13
19	439	110	446	556	542		542	14
20	441	110	436	546	542		542	--
21	442	111	425	536	540		540	4
22	420	105	443	548	540		540	--
23	421	105	444	549	542		542	--
24	419	105	436	541	544		544	3
25	404	101	429	530	540		540	10
26	386	96	433	529	537		537	8
27	368	92	461	553	540		540	--
28	368	92	458	550	537		537	13
29	356	89	463	552	540		540	12
30	332	83	477	560	537		537	23
31	327	82	474	556	535		535	21
Total								
Sec.Ft.	18346	5209	12658	17867	16492		16492	81
Mean	592	168	408	576	532		532	47
Ac.Ft.	36400	10300	25100	35400	32700		32700	180
						N.G. Water stored during August		2890

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
AUGUST - 1931

Day	: Natural flow St.	: Canada's Share Available at Bound-ary	: St. Mary R. Kimball Delivered	: Diverted by Canada	: Excess or Deficit of Share Delivered
1	1159	746	935	774	189
2	1193	763	935	759	172
3	1096	715	891	733	176
4	991	662	838	694	176
5	916	625	790	676	165
6	857	595	747	635	152
7	803	568	695	600	127
8	748	541	642	573	101
9	719	526	559	506	33
10	675	504	490	455	---
11	629	472	438	417	34
12	576	432	420	397	12
13	532	399	397	384	2
14	505	379	374	366	5
15	483	362	374	366	12
16	459	344	365	359	21
17	442	332	347	345	15
18	440	330	343	343	13
19	439	329	343	343	14
20	441	331	335	334	4
21	442	331	327	324	4
22	420	315	323	320	8
23	421	316	323	315	7
24	419	314	311	305	3
25	404	303	293	290	10
26	386	290	282	274	8
27	368	276	289	281	13
28	368	276	289	276	13
29	356	267	279	269	12
30	332	249	272	258	23
31	327	245	266	253	21
Total Sec.Ft.	18346	13137	14512	13224	1467
Mean	592	424	468	427	47
Ac.Ft.	36400	26100	28800	26300	2890
					180

Table 1
September
Page 1

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
SEPTEMBER - 1931

Day	INFLOW TO SHERBURNE RESERVOIR	Outflow	Stored	Released		
	Recorded Inflow	Un- recorded Swift- current: Creek	Total Inflow	Swiftcurrent: Creek at Sherburne	in Reservoir: Reservoir Sec.ft.	from Sec.ft.
1	58	10	13	81	562	--
2	56	10	13	79	562	--
3	58	11	13	82	559	--
4	59	12	12	83	525	--
5	61	12	11	84	220	--
6	62	13	11	86	61	25
7	66	12	12	90	69	21
8	69	13	13	95	61	34
9	77	14	14	105	62	43
10	61	12	11	84	62	22
11	53	14	10	77	62	15
12	56	18	11	85	62	23
13	68	22	13	103	62	41
14	86	25	17	128	63	65
15	92	28	19	139	65	74
16	90	26	18	134	67	67
17	86	26	17	129	70	59
18	84	25	17	126	73	53
19	90	33	19	142	73	69
20	102	38	22	162	74	88
21	126	49	28	203	75	128
22	121	44	26	191	76	115
23	109	37	23	169	78	91
24	100	32	21	153	79	74
25	92	27	18	137	79	58
26	92	26	18	136	79	57
27	92	26	18	136	78	58
28	96	26	19	141	76	65
29	96	22	18	136	76	60
30	88	19	16	123	73	50
Total						
Sec.Ft.	2446	682	491	3619	4183	1455
Mean	82	23	16	121	139	48
Ac.Ft.	4830	1370	950	7200	8270	2860
						3990

Table 1
September
Page 2

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
SEPTEMBER - 1931

Day	St. Mary River at Kimball	Diverted by U.S.B.R.	Stored by U.S.B.R.	Total in Sec. Ft.	Stored Water Released	Natural Flow St. Mary River
1	258	542		800	465	335
2	252	540		792	481	311
3	255	529		784	483	301
4	249	505		754	477	277
5	365	478		841	442	399
6	629	100		729	136	593
7	507	10	25	542	--	542
8	490	--	21	511	--	511
9	529	--	34	563	--	563
10	464	--	43	507	--	507
11	424	--	22	446	--	446
12	392	--	15	407	--	407
13	365	--	23	388	--	388
14	365	--	41	406	--	406
15	360	--	65	425	--	425
16	360	--	74	434	--	434
17	356	--	67	423	--	423
18	365	--	59	424	--	424
19	370	--	53	423	--	423
20	388	--	69	457	--	457
21	433	--	88	521	--	521
22	438	--	128	566	--	566
23	448	--	115	563	--	563
24	448	--	91	539	--	539
25	459	--	74	533	--	533
26	459	--	58	517	--	517
27	459	--	57	516	--	516
28	464	--	58	522	--	522
29	474	--	65	539	--	539
30	469	--	60	529	--	529
Total Sec. Ft.	12292	2704	1405	16401	2484	13917
Mean	410	90	47	547	83	464
Ac. Ft.	24400	5360	2800	32500	4940	27600

Table 1
September
Page 3

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
SEPTEMBER - 1931

Day	Natural Flow		AVAILABLE FOR USE BY U.S.A.		USED BY U.S.A.		Excess or Deficit	
	St. Mary River	U.S. Share	Released	Total Storage	Diverted	Stored	Total Used	of Share Used
	:	:	:	Avail-able	ed	:	:	
1	335	84	465	549	542	--	542	7
2	311	78	481	559	540	--	540	19
3	301	75	483	558	529	--	529	29
4	277	69	477	546	505	--	505	41
5	399	100	442	542	478	--	478	64
6	593	148	136	284	100	--	100	184
7	542	136	--	136	10	25	35	101
8	511	128	--	128	--	21	21	107
9	563	141	--	141	--	34	34	107
10	507	127	--	127	--	43	43	84
11	446	112	--	112	--	22	22	90
12	407	102	--	102	--	15	15	87
13	388	97	--	97	--	23	23	74
14	406	102	--	102	--	41	41	61
15	425	106	--	106	--	65	65	41
16	434	103	--	108	--	74	74	34
17	423	106	--	106	--	67	67	39
18	424	106	--	106	--	59	59	47
19	423	106	--	106	--	53	53	53
20	457	114	--	114	--	69	69	45
21	521	130	--	130	--	88	88	42
22	566	142	--	142	--	128	128	14
23	563	141	--	141	--	115	115	26
24	539	135	--	135	--	91	91	44
25	533	133	--	133	--	74	74	59
26	517	129	--	129	--	58	58	71
27	516	129	--	129	--	57	57	72
28	522	131	--	131	--	58	58	73
29	539	135	--	135	--	65	65	70
30	529	132	--	132	--	60	60	72
Total								
Sec.Ft.	13917	3482	2484	5966	2704	1405	4109	1857
Mean	464	116	83	199	90	47	137	62
Ac.Ft.	27600	6900	4940	11800	5360	2800	8090	3690

No excess of share used during September

Table 1.
September
Page 4.

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
SEPTEMBER - 1931

Day:	Natural flow St.	Canada's Share Available at Bound-	St. Mary R. at Kimball Delivered	Diverted by Canada	Excess or Deficit of Share Delivered
1	335	251	258	244	7
2	311	233	252	236	19
3	301	226	255	240	29
4	277	208	249	249	41
5	399	299	363	307	64
6	593	445	629	504	184
7	542	406	507	470	101
8	511	383	490	457	107
9	563	422	529	490	107
10	507	380	464	438	84
11	446	334	424	402	90
12	407	305	392	374	87
13	388	291	365	352	74
14	406	304	365	352	61
15	425	319	360	345	41
16	434	326	360	345	34
17	423	317	356	339	39
18	424	318	365	347	47
19	423	317	370	348	53
20	457	343	388	366	45
21	521	391	433	402	42
22	566	424	438	404	14
23	563	422	448	411	26
24	539	404	448	413	44
25	533	400	459	420	59
26	517	388	459	420	71
27	516	387	459	420	72
28	522	391	464	429	73
29	539	404	474	431	70
30	529	397	469	435	72
Total Sec.Ft.	13917	10435	12292	11390	1857
Mean	464	348	410	380	62
Ac.Ft.	27600	20700	24400	22600	3690

No deficit of share during September

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
OCTOBER - 1931

Day	Recorded Inflow:	Un- recorded	Total	Outflow Swiftcurrent:	Stored in Creek at Sherburne	Released from Reservoir: Reservoir Sec.ft.	Sec.ft.
1	78	17	15	110	66	44	--
2	75	16	15	106	62	44	--
3	77	15	15	107	62	45	--
4	73	14	15	102	59	43	--
5	66	13	14	93	56	37	--
6	66	13	13	92	54	38	--
7	61	12	12	85	53	32	--
8	56	10	11	77	53	24	--
9	50	10	10	70	52	18	--
10	46	10	9	65	51	14	--
11	43	9	8	60	51	9	--
12	41	9	8	58	51	7	--
13	38	9	7	54	51	3	--
14	37	8	7	52	50	2	--
15	35	8	7	50	48	2	--
16	34	8	7	49	46	3	--
17	33	8	6	47	45	2	--
18	32	8	6	46	44	2	--
19	30	8	6	44	41	3	--
20	29	7	5	41	37	4	--
21	28	7	5	40	--	--	46
22	28	8	5	41	--	--	109
23	30	8	6	44	--	--	161
24	32	8	6	46	--	--	198
25	29	8	5	42	--	--	226
26	32	8	5	45	--	--	245
27	30	8	5	43	--	--	227
28	28	7	5	40	--	--	183
29	27	6	5	38	--	--	134
30	26	4	4	34	--	--	132
31	25	4	4	33	--	--	135
Total Sec.Ft.	1315	288	251	1854		376	1796
Mean	42	9	8	59		12	58
Ac.Ft.	2580	550	490	3630		740	3570

Table 1
October
Page 2

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
OCTOBER - 1931

Day	St. Mary River at Kimball	Diverted by U.S.B.R.	Stored by U.S.B.R.	Total in Sec.Ft.	Stored Water Released	Natural Flow St.Mary River
1	454	--	50	504	--	504
2	438	--	44	482	--	482
3	429	--	44	473	--	473
4	424	--	45	469	--	469
5	410	--	43	453	--	453
6	392	--	37	429	--	429
7	378	--	38	416	--	416
8	370	--	32	402	--	402
9	356	--	24	380	--	380
10	335	--	18	353	--	353
11	323	--	14	337	--	337
12	304	--	9	313	--	313
13	300	--	7	307	--	307
14	290	--	5	293	--	293
15	282	--	2	284	--	284
16	276	--	2	278	--	278
17	263	--	3	266	--	266
18	260	--	2	262	--	262
19	255	--	2	257	--	257
20	249	--	3	252	--	252
21	219	34	4	257	--	257
22	140	141	--	281	46	235
23	134	180	--	314	109	205
24	150	186	--	336	161	175
25	170	188	--	358	198	160
26	181	190	--	371	226	145
27	188	183	192	580	375	245
28	162	164	190	352	354	227
29	156	146	182	318	328	183
30	147	206	102	249	308	134
31	158	190	94	252	284	132
Total	8573	8671	1679	426	10678	1661
Sec.Ft.						9017 9115
Mean	277	280	54	14	345	54
Ac.Ft.	17000	3320	861	21200	3320	17900
			845		3245	

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
OCTOBER - 1931

Day	Natural Flow			AVAILABLE FOR USE BY U.S.A.		USED BY U.S.A.		Excess or Deficit	
	St. Mary River		U.S. Share	Released	Total Storage	Diverted	Stored	Total Used	of Share Used
	1	2	3	4	5	6	7	8	9
1	504	126	--	126	--	50	50	--	76
2	482	120	--	120	--	44	44	--	76
3	473	118	--	118	--	44	44	--	74
4	469	117	--	117	--	45	45	--	72
5	453	113	--	113	--	43	43	--	70
6	429	107	--	107	--	37	37	--	70
7	416	104	--	104	--	38	38	--	66
8	402	101	--	101	--	32	32	--	69
9	380	95	--	95	--	24	24	--	71
10	353	88	--	88	--	18	18	--	70
11	337	84	--	84	--	14	14	--	70
12	313	78	--	78	--	9	9	--	69
13	307	77	--	77	--	7	7	--	70
14	293	73	--	73	--	3	3	--	70
15	284	71	--	71	--	2	2	--	69
16	278	69	--	69	--	2	2	--	67
17	266	67	--	67	--	3	3	--	64
18	262	66	--	66	--	2	2	--	64
19	257	64	--	64	--	2	2	--	62
20	252	63	--	63	--	3	3	--	60
21	257	64	--	64	34	4	38	--	26
22	235	59	46	105	141	--	141	36	--
23	205	51	109	160	180	--	180	20	--
24	175	44	161	205	186	--	186	--	19
25	160	40	198	238	188	--	188	--	50
26	145	36	226	262	190	--	190	--	72
27	135 130	34 32	245	279	192	--	192	--	87
28	125 127	31 32	227	258	190	--	190	--	68
29	135 145	34 36	183	217	182	--	182	--	35
30	115 114	26 44	134	163	102	--	102	--	61
31	120 152	30 38	132	162	94	--	94	--	68
Total Sec.Ft.	9115 9017 294	2277 2253 73.5	1661	3914	1679	426	2105	56	1865
Mean	291	73	54	127	54	14	68	2	60
Ac.Ft.	17900	4490	3320 3295	7810	3320	861 825	4180	110	3690

DIVISION OF WATER OF ST. MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
OCTOBER - 1931

Day	Natural flow St.	Canada's Share Available at Bound-ary	St. Mary R. Kimball Delivered	Diverted by Canada Used	Excess or Deficit of Share Delivered
1	504	378	454	422	76
2	482	362	438	408	76
3	473	355	429	402	74
4	469	352	424	397	72
5	453	340	410	384	70
6	429	322	392	374	70
7	416	312	378	366	66
8	402	301	370	356	69
9	380	285	356	347	71
10	353	265	335	329	70
11	337	253	323	324	70
12	313	235	304	302	69
13	307	230	300	300	70
14	293	220	290	290	70
15	284	213	282	280	69
16	278	209	276	273	67
17	266	199	263	261	64
18	262	196	260	252	64
19	257	193	255	250	62
20	252	189	249	242	60
21	257	193	219	212	26
22	235	176	140	98	36
23	205	154	134	94	20
24	175	131	150	134	19
25	160	120	170	156	50
26	145	109	181	165	72
27	135 130	101 98	188 183	167	87
28	125 121	94 95	162 164	151	68
29	135 145	101 109	136 146	124	35
30	115 174	86 130	147 206	164	61
31	120 152	96 114	158 190	169	68
Total Sec.Ft.	9017 9115	6764 6838	8573 8671	8193	1865
Mean	291 294	218 221	277 280	264	60
Ac.Ft.	17900	13400	17000	16200	3690
					110

Table 2

DIVISION OF ST.MARY RIVER

CANADA

Water Available in Acre-Feet

1931

Month	St. Mary R. at Kimball	Rolph Creek	Lee Creek	Pothole Creek	Combined Flow
April	9,640		1,450	244	11,334
May	81,200		2,490	61	83,751
June	65,500		1,560	4	67,064
July	35,700		492		36,192
August	28,800		307		29,107
September	24,400		559		24,959
October	17,000		500 ^e		17,500
Total	262,240	No Record	7,358 ^b	309 ^b	269,907 ^c

DISPOSITION

Month	Diverted by: A.R. & I. Co.	Gain or Loss	Wasted by: A.R. & I. Co.	Applied to: Land	St. Mary R. at Lethbridge
April	7,020	+ 187	1,531	5,920	5,300
May	38,600	- 1,050	3,615	33,996	42,500
June	42,500	+ 1,371	4,298	39,577	28,100
July	32,000	+ 2	258	31,744	2,700
August	26,300	+ 112	485	25,927	3,140
September	22,600	+ 288	1,056	21,832	4,820
October	16,200	+ 1,084	289	16,995	
Total	185,220 ^d	+ 1,994 ^f	11,532 ^g	175,991 ^h	x

b - Natural flow only.

c - Computed.

d - Diverted by A.R. & I. Co. at Kimball.

e - Estimated.

f - Gain between Kimball and Magrath.

g - Wasted in Pinepound and Pothole Creeks.

h - Flow in Canal at Magrath plus diversion by Laterals:

x - Below all points of diversion.

Table 2

DIVISION OF ST. MARY RIVER

UNITED STATES

Water Available in Acre-Feet

1931

Month	St. Mary River					Total Flow
	U. S.	Sherburne Res.	Total			Milk River
	Share	Stored	Released	Available	Diverted	Eastern
				for		Crossing
				Diversion:		
Apl.	3,330	360		2,970	3,310	000
May	50,000	16,710		33,290	22,300	10,990
June	44,700	11,190		33,510	32,500	1,010
July	14,300		21,000	35,300	34,300	1,000
Aug.	10,300		25,100	35,400	32,700	2,700
Sept.	6,900		2,140	9,040	5,360	3,680
Oct.	4,490		2,459	6,949	3,320	3,629
Total:	134,020	28,260	50,699	156,459	133,790	23,009
						142,620

Note: Water stored in Sherburne Reservoir April 1 - 24,900 Acre-Feet.
 " " " " " Oct. 31 - 1,541 " "

DIVERSIONS FROM MILK RIVER IN THE UNITED STATES

(Quantities in Acre-Feet)

	Ft.				Dodson	Dodson	Van-	:
Month	Belknap	Paradise	Harlem	Agency	North	South	:dalia	Total
	Canal.	Canal.	Canal.	Canal.	Canal.	Canal.	Canal.	Canal.
March								
Apl.	1,936	1,438	674	941	1,663	5,670	1,708	14,030
May	6,666	2,749	2,697	1,986	2,035	2,854	5,268	24,255
June	5,072	1,839	2,806	2,085	2,654	4,578	4,220	23,254
July	7,058	3,318	3,717	1,944	4,567	7,194	4,365	32,163
Aug.	5,992	2,366	2,325	1,022	2,726	13,794	2,050	30,275
Sep.	3,586	1,278	1,164	476	1,517	6,195	2,748	16,964
Oct.	1,230			492	393	386	2,272	4,773
Nov.	1,672		772	333	107	2,155	1,123	6,162
Total:	33,212	12,988	14,155	9,279	15,662	50,017	23,754	159,067

Table 3

DISPOSITION OF THE WATERS OF THE NORTHERN TRIBUTARIES
OF MILK RIVER IN CANADA

1931

Quantities in Acre-Feet.

<u>Irrigator</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Total</u>
<u>Lodge Creek</u>								
English, J.								40
Spangler, C.	--	247	43	--				290
Total Reported as Diverted in Canada								330
Flow at the Boundary	60	1	77	314	37	--	--	489
<u>Battle Creek</u>								
Spangler, J.M.								150
Stirling & Nash	"	"						200
Wilkes Bros.	"	"						30
Gaff	"	"						55
McKinnon	121	301	70					492
Patterson	--	28	197					225
Linder Bros.	--	98	62					160
Total Reported as Diverted in Canada								1312
Flow at the Boundary	1200	86	1					1287
<u>Frenchman River</u>								
Pearse		9	32					41
Bolingnroke			7					7
Vylie, D.J.								200
Armstrong	"	"						40
Bate	"	"						3
Total Reported as Diverted in Canada								291
Flow at the Boundary	4050	1800	1180	2580	117	2	--	9792

Table 4

DIVERSIONS FROM THE NORTHERN TRIBUTARIES

1931

Irrigator	:	:	:	:	:	:	:	:	Total
	:March:	April:	May	:June:	July:	Aug.	:Sept.:	:	
	:	:	:	:	:	:	:	:	
<u>Lodge Creek</u>									
N.Chinook Canal						200	1.6		202
<u>Battle Creek</u>									
Matheson Canal	71	464	4.6	.4	1.4				541
<u>Frenchman River</u>									
Frenchman Canal		433	873	486	373	4.6			2,170

ENVIRONMENT CANADA LIBRARY
CALGARY



33500381