W. T. McFarlane

Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION AND USE MADE OF THE WATERS OF

ST. MARY AND MILK RIVERS

by

N. C. GROVER
representing the United States

and

J. T. JOHNSTON
representing Canada

1938

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

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 ended October 31st, 1938.

Respectfully submitted,

Accredited Officer of the United States.
(To January 31st, 1939)

Accredited Officer of His Majesty.

April 4th, 1939.

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 1938, by the same groups of engineers as in previous years.

Mr. N. C. Grover, Chief Hydraulic Engineer, United States Geological Survey, as accredited officer for the United States (to January 31st, 1939) was represented in the field by Mr. A. H. Tuttle, District Engineer, Helena, Montana. Mr. J. T. Johnston, Controller, Dominion Water and Power Bureau, as accredited officer of His Majesty, was represented by Mr. O. H. Hoover, Engineer-in-Charge, Calgary, Alberta.

The waters 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 supervision of Mr. Tuttle; while those from streams and ditches in Canada were collected by engineers of the Dominion Water and Power Bureau, under the direction of Mr. Hoover. The joint international gauging stations were visited frequently by representatives of both countries.

The annual report was compiled and assembled by Mr. S. G. Dawson, Dominion Water and Power Bureau, Ottawa, Canada.

When the natural flow of 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 occurred this season towards the middle of July and continued until the closing of the season, the field engineers kept closely 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 as set forth in the Order of the Commission dated October 4th, 1921. Statements showing the daily division of water were prepared and forwarded to the Superintendent, Lethbridge section, Canadian Pacific Irrigation System; to the Project Manager, United States Bureau of Reclamation, Malta, Montana; and to the Controller, Dominion Water and Power Bureau.

Division of Water

The United States St.Mary canal was in operation from April 24th to September 9th, and from October 15th to November 10th, except for the period May 26th to June 2nd,

when the canal was closed for repairs, water being delivered to the North Branch Milk River on April 25th.

As seepage losses in the canal between the intake and the crossing of the St.Mary River, which this year were 10% of the water diverted at the headgates, are assumed to return directly to the river and eventually become available to Canada, the discharge of 167,700 acre-feet passing in the canal at the St.Mary River crossing is considered as the actual quantity diverted from the St.Mary River by the United States. Of this quantity, 165,950 acre-feet was delivered to the North Branch Milk River and made available for irrigation in Montana. The loss of 1,750 acre-feet between the St.Mary River crossing and the Hudson Bay Divide, the end of the canal, was due to evaporation and seepage.

On November 1st, 1937, a total of 2,300 acre-feet of water remained in storage in Sherburne reservoir. Approximately 12,220 acre-feet of water was in storage on April 1st, 1938. The maximum storage reached during the season was 60,165 acre-feet on June 27th - 29th. On October 31st, 1938, 1,300 acre-feet of water remained in storage.

As only a small quantity of water was diverted in Canada from Milk River, the natural flow of the river is considered as being delivered to the United States at

Eastern Crossing. The total diversion for irrigation from Milk River in Montana was 172,194 acre-feet.

The total recorded flow delivered to the United States at the International Boundary from the Northern tributaries of Milk River during the year 1938 was 100,200 acre-feet, which was nearly three times the flow recorded in 1937 and about 55% of the average natural flow for the years of record.

The establishment of reservoirs and irrigation districts in the basin, again necessitated the actual apportionment of the waters of the Frenchman River at the International Boundary. During the irrigation season, Canada stored or held back 8,390 acre-feet of the natural flow of the river for irrigation of lands near East End and Val Marie, Saskatchewan, while 23,830 acre-feet of the natural flow were delivered to Montana. This apportionment is shown in Table 3.

The Canadian Pacific Railway canal at Kimball, Alberta, diverted 185,000 acre-feet from the St.Mary River during the period of operation from the 15th of April to the 11th of October, 168,330 acre-feet being used to irrigate lands in Southern Alberta.

The Dominion Water and Power Bureau is dependent to a large extent upon the irrigators themselves for records of the diversions in Canada from the Northern tributaries

of Milk River as, in the majority of cases, the diversions are too small to justify the expense of appointing and paying gauge observers. Consequently the records are believed to be incomplete and of doubtful value. The total diversion from these tributaries in Canada as reported are shown in Table 4 and were; from Lodge Creek, 30 acre-feet; from Battle Creek 825 acre-feet; from Frenchman River, 5,386 acre-feet.

Any question as to the proper share of St.Mary River being delivered to either country was decided in the following manner. Record of the daily flow was kept of Swiftcurrent Creek at Many Glacier, but the flow of the other creeks entering Swiftcurrent Creek above the Sherburne dam were estimated. The total of these creeks gave the inflow into Sherburne reservoir. The losses by evaporation in the reservoir were considered when estimating the flow from the unrecorded small streams. A record of the outflow from the reservoir was kept 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 record of the daily flow of the United States St.Mary canal at St.Mary crossing was kept to find the water diverted by the United States and a record of the daily flow of the St.Mary River at Kimball, near the International Boundary, was kept 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 two 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 the St.Mary River was 666 cubic-feet per second or less, Canada was entitled, by the ruling of the Commission, to three-fourths of that flow and the United States to one-fourth.

(2) When the natural flow of the 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 or its Northern tributaries except those of Frenchman River.

Water Supply

On the foothills and in the mountainous areas forming the headwaters of the St.Mary and Milk Rivers, the precipitation during 1938 was above normal, and on the prairies tributary to the Milk River, practically normal.

In the mountainous areas tributary to the St.Mary River basin, as shown by the seventeenth annual international survey of the snow conditions on the headwaters of Swiftcurrent Creek, an area considered typical of the headwaters of St.Mary River, the snow cover was 127% of the mean of the sixteen years of record while the water content of this snow cover was 121% of the mean. The run-off of 73,500 acre-feet from the area surveyed, during May, June and July, was 110% of the average for the sixteen year period.

The natural flow of 571,900 acre-feet of St.Mary River at the boundary during the irrigation season of 1938, from the first of April to the end of October, was 96% of the average for 35 years of record.

The run-off from the prairies, as indicated by the Northern tributaries of Milk River, was 60% of the average.

Twenty-two international gauging stations previously used in the determination of the daily natural flow of the streams in the St.Mary and Milk River basins were maintained and operated under the joint supervision of the field engineers. The construction of three reservoirs and the formation of two irrigation districts in the valley, necessitated the establishment of several new gauging stations on the 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 1938.

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 1938, the water available for use and used by 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 into and 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 Creek and with the use of the water levels of Sherburne reservoir to give the gain or loss in storage, after direct application of the evaporation and seepage losses has been made. 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 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 determined that two days are required for stored water, released from Sherburne reservoir, to influence the flow at the boundary, consequently a two 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 and used 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 the 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 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 canals and the diversions from Milk River in the United States.

Table 3 shows the determination of the natural flow of Frenchman River at the International Boundary. This Table consists of three pages; page 1 shows the quantity used by Canada at East End and the loss or gain in the river between East End and Fifty-mile, page 2 shows the quantity used by Canada at Val Marie and the loss or gain between Fifty-mile and Val Marie, page 3 shows the loss or gain between Val Marie and the International Boundary and the natural flow of Frenchman River at the boundary.

Table 4 shows the available information on the diversions from the Northern tributaries of Milk River in Canada.

Table 5 gives the measured diversions from the Northern tributaries of Milk River in the United States. Smaller diversions have not been measured.

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
APRIL - 1938.

Day	Inflow to Sherburne Reservoir: Recorded inflow: Swiftcurrent Creek	Un-recorded inflow est'd	Total inflow	Outflow Swiftcurrent Creek at Sherburne	Stored in Reservoir sec-ft. Gross	Released from Reservoir sec-ft. Net
1					125	--
2					155	
3					160	
4					136	
5					166	
6					202	
7					171	
8					182	
9					182	
10					272	
11					182	
12					353	
13					151	
14	74	10	84	1	83	
15	87	10	97	1	96	
16	109	10	119	2	117	
17	193	20	213	4	209	
18	692	40	732	6	726	
19	673	50	723	4	719	
20	426	40	466	6	460	
21	283	20	303	6	297	
22	230	10	240	6	234	
23	208	10	218	6	212	
24	184	10	194	6	188	
25	154	10	164	6	158	
26	131	10	141	6	135	
27	122	10	132	6	126	
28	128	108	236	74	162	
29	181	142	323	293	30	
30	279	186	465	328	137	--
Total sec-ft.	4154 (14-30)	696 (14-30)	4850 (14-30)	761 (14-30)	6526	--
Mean	244	41	285	45	214	--
Ac-ft.	8240	1380	9620	1510	12730	--

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
APRIL - 1938

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	125	--	17	142	--	142
2	125	--	75	200		200
3	125	--	125	250		250
4	125	--	155	280		280
5	125	--	160	285		285
6	133	--	136	269		269
7	149	--	166	315		315
8	167	--	202	369		369
9	216	--	171	387		387
10	302	--	182	484		484
11	311	--	182	493		493
12	220	--	272	492		492
13	235	--	182	417		417
14	250	--	353	603		603
15	262	--	151	413		413
16	269	--	83	352		352
17	301	--	96	397		397
18	467	--	117	584		584
19	541	--	209	750		750
20	613	--	726	1339		1339
21	753	--	719	1472		1472
22	871	--	460	1331		1331
23	944	--	297	1241		1241
24	661	327	234	1222		1222
25	643	332	212	1187		1187
26	630	334	188	1152		1152
27	607	334	158	1099		1099
28	578	345	135	1058		1058
29	541	404	126	1071		1071
30	624	434	162	1220	--	1220
Total sec-ft.	11913	2510 (24-30)	6451	20874	--	20874
Mean	397	359	215	696	--	696
Ac-ft.	23630	4980	12800	41400	--	41400

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
APRIL - 1938.

Day	Natural Flow St.Mary river	AVAILABLE FOR USE BY U.S.A. U.S. Share	Released Storage Net	Total Available	USED BY U.S.A. Diverted	Stored Gross	Total Used	Excess of share used	Deficit
1	142	36	--	36	--	17	17	--	19
2	200	50		50	--	75	75	25	--
3	250	62		62	--	125	125	63	--
4	280	70		70	--	155	155	85	--
5	285	71		71	--	160	160	89	--
6	269	67		67	--	136	136	69	--
7	315	79		79	--	166	166	87	--
8	369	92		92	--	202	202	110	--
9	387	97		97	--	171	171	74	--
10	484	121		121	--	182	182	61	--
11	493	123		123	--	182	182	59	--
12	492	123		123	--	272	272	149	--
13	417	104		104	--	182	182	78	--
14	603	151		151	--	353	353	202	--
15	413	103		103	--	151	151	48	--
16	352	88		88	--	83	83	--	5
17	397	99		99	--	96	96	--	3
18	584	146		146	--	117	117	--	29
19	750	208		208	--	209	209	1	--
20	1339	503		503	--	726	726	223	--
21	1472	569		569	--	719	719	150	--
22	1331	499		499	--	460	460	--	39
23	1241	454		454	--	297	297	--	157
24	1222	444		444	327	234	561	117	--
25	1187	427		427	332	212	544	117	--
26	1152	409		409	334	188	522	113	--
27	1099	383		383	334	158	492	109	--
28	1058	362		362	345	135	480	118	--
29	1071	369		369	404	126	530	161	--
30	1220	443	--	443	434	162	596	153	--
Total sec-ft.	20874	6752	--	6752	2510 (24-30)	6451	8961	2461	252
Mean	696	225	--	225	359	215	299	82	8.4
Ac-ft.	41400	13390	--	13390	4980	12800	17780	4880	500

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
APRIL - 1938.

Day	Natural flow of St.Mary R. at Boundary	Canada's share Available	St.Mary R. at Kimball Delivered	Diverted by Canada Used	Excess of share	deficit delivered
1	142	106	125	---	19	--
2	200	150	125	---	--	25
3	250	188	125	---	--	63
4	280	210	125	---	--	85
5	285	214	125	---	--	89
6	269	202	133	---	--	69
7	315	236	149	---	--	87
8	369	277	167	---	--	110
9	387	290	216	---	--	74
10	484	363	302	---	--	61
11	493	370	311	---	--	59
12	492	369	220	105	--	149
13	417	313	235	155	--	78
14	603	452	250	148	--	202
15	413	310	262	163	--	48
16	352	264	269	167	5	--
17	397	298	301	194	3	--
18	584	438	467	246	29	--
19	750	542	541	295	--	1
20	1339	836	613	401	--	223
21	1472	903	753	469	--	150
22	1331	832	871	505	39	--
23	1241	787	944	511	157	--
24	1222	778	661	385	--	117
25	1187	760	643	484	--	117
26	1152	743	630	480	--	113
27	1099	716	607	467	--	109
28	1058	696	578	434	--	118
29	1071	702	541	401	--	161
30	1220	777	624	478	--	153
Total sec-ft.	20874	14122	11913	6488 (12-30)	252	2461
Mean	696	471	397	341	8.4	82
Ac-ft.	41400	28010	23630	12870	500	4880

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
MAY - 1938.

Day	Inflow to Sherburne Reservoir: Recorded inflow: Swiftcurrent Creek	Un-recorded inflow est'd	Total inflow	Outflow Swiftcurrent Creek at Sherburne	Stored in Reservoir sec-ft. Gross	Released from Reservoir sec-ft. Net
1	356	112	468	330	138	---
2	380	173	553	258	295	
3	322	279	601	191	410	
4	273	101	374	191	183	
5	217	139	356	191	165	
6	178	186	364	191	173	
7	148	111	259	191	68	
8	128	117	245	192	53	
9	125	114	239	192	47	
10	131	125	256	192	64	
11	160	70	230	192	38	
12	258	217	475	194	281	
13	490	254	744	208	536	
14	498	219	717	219	498	
15	474	220	694	226	468	
16	474	241	715	230	485	
17	457	281	738	238	500	
18	430	290	720	4	716	
19	366	278	644	4	640	
20	295	181	476	4	472	
21	273	159	432	4	428	
22	322	270	592	4	588	
23	515	131	646	4	642	
24	799	333	1132	467	665	
25	948	395	1343	581	762	
26	1060	348	1408	665	743	
27	1060	321	1381	877	504	
28	886	340	1226	914	312	
29	683	426	1109	954	155	
30	779	386	1165	954	211	
31	759	428	1187	764	423	
Total sec-ft.	14244	7245	21489	9826	11663	---
Mean	459	234	693	317	376	---
Ac-ft.	28250	14390	42640	19490	23150	---

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
MAY - 1938

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	706	496	30	1232	--	1232
2	994	546	137	1677		1677
3	1050	549	138	1737		1737
4	1000	546	295	1841		1841
5	960	544	410	1914		1914
6	935	542	183	1660		1660
7	840	538	165	1543		1543
8	782	532	173	1487		1487
9	767	530	68	1365		1365
10	726	525	53	1304		1304
11	686	521	47	1254		1254
12	699	525	64	1288		1288
13	767	526	38	1331		1331
14	856	530	281	1667		1667
15	952	540	536	2028		2028
16	1060	546	498	2104		2104
17	1180	553	468	2201		2201
18	1470	557	485	2512		2512
19	1700	513	500	2713		2713
20	1650	509	716	2875		2875
21	1610	506	640	2756		2756
22	1560	528	472	2560		2560
23	1850	420	428	2698		2698
24	2650	25	588	3263		3263
25	3220	3	642	3865		3865
26	3920	--	665	4585		4585
27	4370	--	762	5132		5132
28	4670	--	743	5413		5413
29	4700	--	504	5204		5204
30	4700	--	312	5012		5012
31	4580	--	155	4735	--	4735
Total sec-ft.	57610	12150	11196	80956	--	80956
Mean	1858	392	361	2611	--	2611
Ac-ft.	114300	24100	22200	160600	--	160600

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
MAY - 1938.

Day	Natural Flow St.Mary river	AVAILABLE FOR USE BY U.S.A. U.S. Share	Released Storage Net	Total Available	USED BY U.S.A. Diverted	Stored Gross	Total Used	Excess of share used	Deficit used
1	1232	449	--	449	496	30	526	77	--
2	1677	672		672	546	137	683	11	--
3	1737	702		702	549	138	687	--	15
4	1841	754		754	546	295	841	87	--
5	1914	790		790	544	410	954	164	--
6	1660	663		663	542	183	725	62	--
7	1543	605		605	538	165	703	98	--
8	1487	577		577	532	173	705	128	--
9	1365	516		516	530	68	598	82	--
10	1304	485		485	525	53	578	93	--
11	1254	460		460	521	47	568	108	--
12	1288	477		477	525	64	589	112	--
13	1331	499		499	526	38	564	65	--
14	1667	667		667	530	281	811	144	--
15	2028	847		847	540	536	1076	229	--
16	2104	885		885	546	498	1044	159	--
17	2201	934		934	553	468	1021	87	--
18	2512	1089		1089	557	485	1042	--	47
19	2713	1190		1190	513	500	1013	--	177
20	2875	1271		1271	509	716	1225	--	46
21	2756	1211		1211	506	640	1146	--	65
22	2560	1113		1113	528	472	1000	--	113
23	2698	1182		1182	420	428	848	--	334
24	3263	1465		1465	25	588	613	--	852
25	3865	1766		1766	3	642	645	--	1121
26	4585	2126		2126	--	665	665	--	1461
27	5132	2399		2399	--	762	762	--	1637
28	5413	2540		2540	--	743	743	--	1797
29	5204	2435		2435	--	504	504	--	1931
30	5012	2339		2339	--	312	312	--	2027
31	4735	2201	--	2201	--	155	155	--	2046
Total sec-ft.	80956	35309	--	35309	12150	11196	23346	1706	13669
Mean	2612	1139	--	1139	392	361	753	55	441
Ac-ft.	160600	70040	--	70040	24100	22200	46300	3380	27120

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
MAY - 1938.

Day	Natural flow of St.Mary R. at boundary	Canada's share Available	St.Mary R. at Kimball Delivered	Diverted by Canada Used	Excess or deficit of share delivered	
1	1232	783	706	538	--	77
2	1677	1005	994	522	--	11
3	1737	1035	1050	486	15	--
4	1841	1087	1000	562	--	87
5	1914	1124	960	542	--	164
6	1660	997	935	536	--	62
7	1543	938	840	531	--	98
8	1487	910	782	538	--	128
9	1365	849	767	544	--	82
10	1304	819	726	547	--	93
11	1254	794	686	536	--	108
12	1288	811	699	560	--	112
13	1331	832	767	636	--	65
14	1667	1000	856	677	--	144
15	2028	1181	952	696	--	229
16	2104	1219	1060	684	--	159
17	2201	1267	1180	577	--	87
18	2512	1423	1470	301	47	--
19	2713	1523	1700	230	177	--
20	2875	1604	1650	182	46	--
21	2756	1545	1610	176	65	--
22	2560	1447	1560	189	113	--
23	2698	1516	1850	274	334	--
24	3263	1798	2650	276	852	--
25	3865	2099	3220	301	1121	--
26	4585	2459	3920	303	1461	--
27	5132	2733	4370	280	1637	--
28	5413	2873	4670	292	1797	--
29	5204	2769	4700	282	1931	--
30	5012	2673	4700	288	2027	--
31	4735	2534	4580	346	2046	--
Total sec-ft.	80956	45647	57610	13432	13669	1706
Mean	2612	1473	1858	433	441	55
Ac-ft.	160600	90560	114300	26640	27120	3380

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
JUNE - 1938.

Day	Inflow to Sherburne Reservoir: Recorded inflow: Swiftcurrent Creek	Un-recorded inflow est'd	Total inflow	Outflow Swiftcurrent Creek at Sherburne	Stored in Reservoir sec-ft. Gross	Released from Reservoir sec-ft. Net
1	632	313	945	287	658	--
2	646	255	901	287	614	--
3	637	300	937	287	650	--
4	673	296	969	287	682	--
5	799	48	847	287	560	--
6	697	336	1033	914	119	--
7	486	273	759	904	---	145
8	445	155	600	745	---	145
9	430	149	579	346	233	--
10	362	96	458	346	112	--
11	299	119	418	346	72	--
12	292	146	438	346	92	--
13	377	170	547	348	199	--
14	519	150	669	350	319	--
15	524	145	669	350	319	--
16	575	214	789	352	437	--
17	706	113	819	355	464	--
18	606	159	765	355	410	--
19	503	189	692	355	337	--
20	470	125	595	357	238	--
21	545	157	702	497	205	--
22	566	221	787	634	153	--
23	536	176	712	678	34	--
24	461	102	563	614	---	51
25	410	183	593	536	57	--
26	457	151	608	536	72	--
27	465	136	601	564	37	--
28	449	137	586	578	8	--
29	414	146	560	578	---	18
30	414	102	516	510	6	--
Total sec-ft.	15395	5262	20657	13929	7087	359
Mean	513	175	688	464	236	12
Ac-ft.	30540	10410	40950	27630	14040	720

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
JUNE - 1938

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	4120	--	211	4331	--	4331
2	3870	--	423	4293	--	4293
3	3380	200	658	4238	--	4238
4	2920	597	614	4131	--	4131
5	2850	654	650	4154	--	4154
6	3120	670	682	4472	--	4472
7	3220	694	560	4474	--	4474
8	3140	690	119	3949	--	3949
9	2780	686	--	3466	145	3321
10	2450	676	--	3126	145	2981
11	2110	668	233	3011	--	3011
12	1800	674	112	2586	--	2586
13	1660	672	72	2404	--	2404
14	1650	696	92	2438	--	2438
15	1700	696	199	2595	--	2595
16	1750	700	319	2769	--	2769
17	1870	704	319	2893	--	2893
18	1940	706	437	3083	--	3083
19	2010	712	464	3186	--	3186
20	2010	710	410	3130	--	3130
21	2010	708	337	3055	--	3055
22	2260	712	238	3210	--	3210
23	2410	706	205	3321	--	3321
24	2510	710	153	3373	--	3373
25	2500	704	34	3238	--	3238
26	2450	702	--	3152	51	3101
27	2380	700	57	3137	--	3137
28	2300	698	72	3070	--	3070
29	2210	698	37	2945	--	2945
30	2100	696	8	2804	--	2804
Total sec-ft.	73480	18839	7715	100034	341	99693
Mean	2449	628	257	3334	11	3323
Ac-ft.	145700	37370	15290	198360	680	197680

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
JUNE - 1938.

Day	Natural Flow St.Mary river	AVAILABLE FOR USE BY U.S.A. U.S. Share	Released Storage Net	Total Available	USED BY U.S.A. Diverted	Stored Gross	Total Used	Excess of share used	Deficit used
1	4331	1999	---	1999	---	211	211	--	1788
2	4293	1980	---	1980	---	423	423		1557
3	4238	1952	---	1952	200	658	858		1094
4	4131	1899	---	1899	597	614	1211		688
5	4154	1910	---	1910	654	650	1304		606
6	4472	2069	---	2069	670	682	1352		717
7	4474	2070	---	2070	694	560	1254		816
8	3949	1808	---	1808	690	119	809		999
9	3321	1494	145	1639	686	---	686		953
10	2981	1324	145	1469	676	---	676		793
11	3011	1339	---	1339	668	233	901		438
12	2586	1126	---	1126	674	112	786		340
13	2404	1035	---	1035	672	72	744		291
14	2438	1052	---	1052	696	92	788		264
15	2595	1131	---	1131	696	199	895		236
16	2769	1218	---	1218	700	319	1019		199
17	2893	1280	---	1280	704	319	1023		257
18	3083	1375	---	1375	706	437	1143		232
19	3186	1426	---	1426	712	464	1176		250
20	3130	1398	---	1398	710	410	1120		278
21	3055	1361	---	1361	708	337	1045		316
22	3210	1438	---	1438	712	238	950		488
23	3321	1494	---	1494	706	205	911		583
24	3373	1520	---	1520	710	153	863		657
25	3238	1452	---	1452	704	34	738		714
26	3101	1384	51	1435	702	---	702		733
27	3137	1402	---	1402	700	57	757		645
28	3070	1368	---	1368	698	72	770		598
29	2945	1306	---	1306	698	37	735		571
30	2804	1235	---	1235	696	8	704	--	531
Total sec-ft.	99693	44845	341	45186	18839	7715	26554	--	18632
Mean	3323	1495	11	1506	628	257	885	--	621
Ac-ft.	197680	88960	680	89640	37370	15290	52660	--	36980

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
JUNE - 1938.

Day	Natural flow of St.Mary R. at boundary	Canada's share Available	St.Mary R. at Kimball Delivered	Diverted by Canada Used	Excess or Deficit of share delivered	
1	4331	2332	4120	413	1788	--
2	4293	2313	3870	482	1557	
3	4238	2286	3380	490	1094	
4	4131	2232	2920	496	688	
5	4154	2244	2850	533	606	
6	4472	2403	3120	658	717	
7	4474	2404	3220	687	816	
8	3949	2141	3140	720	999	
9	3321	1827	2780	725	953	
10	2981	1657	2450	747	793	
11	3011	1672	2110	782	438	
12	2586	1460	1800	818	340	
13	2404	1369	1660	914	291	
14	2438	1386	1650	927	264	
15	2595	1464	1700	994	236	
16	2769	1551	1750	1020	199	
17	2893	1613	1870	1040	257	
18	3083	1708	1940	1050	232	
19	3186	1760	2010	1050	250	
20	3130	1732	2010	1040	278	
21	3055	1694	2010	1040	316	
22	3210	1772	2260	1050	488	
23	3321	1827	2410	1060	583	
24	3373	1853	2510	1050	657	
25	3238	1786	2500	1050	714	
26	3101	1717	2450	1040	733	
27	3137	1735	2380	1030	645	
28	3070	1702	2300	1030	598	
29	2945	1639	2210	1040	571	
30	2804	1569	2100	1040	531	--
Total sec-ft.	99693	54848	73480	26016	18632	--
Mean	3323	1828	2449	867	621	--
Ac-ft.	197680	108720	145700	51600	36980	--

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
JULY - 1938.

Day	Inflow to Sherburne Reservoir: Recorded inflow: Swiftcurrent Creek	Un-recorded inflow est'd	Total inflow	Outflow Swiftcurrent Creek at Sherburne	Stored in Reservoir sec-ft. Gross	Released from Reservoir sec-ft. Net
1	308	98	478	467	11	---
2	338	140	478	467	11	---
3	345	132	477	467	10	---
4	352	99	451	467	--	16
5	342	101	443	467	--	24
6	318	77	395	403	--	8
7	305	120	425	373	52	---
8	308	146	454	373	81	---
9	299	56	355	373	--	18
10	276	91	367	376	--	9
11	264	76	340	343	--	3
12	251	76	327	328	--	11
13	245	67	312	280	32	---
14	239	87	326	312	14	---
15	236	61	297	380	--	83
16	236	76	312	378	--	66
17	233	67	300	378	--	78
18	233	46	279	430	--	151
19	226	44	270	539	--	269
20	211	56	267	588	--	321
21	196	67	263	581	--	318
22	190	31	221	574	--	353
23	190	38	228	578	--	350
24	202	80	282	570	--	288
25	175	67	242	570	--	328
26	151	66	217	560	--	343
27	142	24	166	556	--	390
28	142	34	176	592	--	416
29	134	50	184	607	--	423
30	134	52	186	600	--	414
31	119	49	168	596	--	428
Total sec-ft.	7412	2274	9686	14573	211	5098
Mean	239	73	312	470	6.8	164
Ac-ft.	14700	4490	19190	28910	418	10138

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
JULY - 1938.

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	1960	694	--	2654	18	2636
2	1870	690	6	2566	--	2566
3	2100	696	11	2807	--	2807
4	2010	688	11	2709	--	2709
5	2050	444	10	2504	--	2504
6	1940	299	--	2239	--	2239
7	1460	718	--	2178	24	2154
8	1330	720	--	2050	8	2042
9	1270	714	52	2036	--	2036
10	1190	708	81	1979	--	1979
11	1100	706	--	1806	18	1788
12	1010	698	--	1708	9	1699
13	985	664	--	1649	3	1646
14	848	686	--	1534	1	1533
15	825	692	32	1549	--	1549
16	833	696	14	1543	--	1543
17	789	694	--	1483	83	1400
18	760	692	--	1452	66	1386
19	767	700	--	1467	78	1389
20	789	704	--	1493	151	1342
21	789	706	--	1495	269	1226
22	760	708	--	1468	321	1147
23	720	702	--	1422	318	1104
24	746	706	--	1452	353	1099
25	740	712	--	1452	350	1102
26	706	708	--	1414	288	1126
27	655	704	--	1359	328	1031
28	618	700	--	1318	343	975
29	584	698	--	1282	390	892
30	551	700	--	1251	416	835
31	525	698	--	1223	423	800
Total sec-ft.	33280	21045	217	54542	4274	50268
Mean	1074	679	7	1760	138	1622
Ac-ft.	66010	41740	430	108180	8490	99670

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
JULY - 1938.

Day	Natural Flow St.Mary river	AVAILABLE FOR USE BY U.S.A. U.S. Share	Released Storage Net	Total Available	USED BY U.S.A. Diverted	Stored Gross	Total Used	Excess of share used	Deficit used
1	2636	1151	18	1169	694	--	694	--	475
2	2566	1116	--	1116	690	6	696	--	420
3	2807	1237	--	1237	696	11	707	--	530
4	2709	1188	--	1188	688	11	699	--	489
5	2504	1085	--	1085	444	10	454	--	631
6	2223	945	16	961	299	--	299	--	662
7	2154	910	24	934	718	--	718	--	216
8	2042	854	8	862	720	--	720	--	142
9	2036	851	--	851	714	52	766	--	85
10	1979	823	--	823	708	81	789	--	34
11	1788	727	18	745	706	--	706	--	39
12	1699	683	9	692	698	--	698	6	--
13	1646	656	3	659	664	--	664	5	--
14	1533	600	1	601	686	--	686	85	--
15	1549	608	--	608	692	32	724	116	--
16	1543	605	--	605	696	14	710	105	--
17	1400	533	83	616	694	--	694	78	--
18	1386	526	66	592	692	--	692	100	--
19	1389	528	78	606	700	--	700	94	--
20	1342	504	151	655	704	--	704	49	--
21	1226	446	269	715	706	--	706	--	9
22	1147	407	321	728	708	--	708	--	20
23	1104	385	318	703	702	--	702	--	1
24	1099	383	353	736	706	--	706	--	30
25	1102	384	350	734	712	--	712	--	22
26	1126	396	288	684	708	--	708	24	--
27	1031	349	328	677	704	--	704	27	--
28	975	321	343	664	700	--	700	36	--
29	892	279	390	669	698	--	698	29	--
30	835	251	416	667	700	--	700	33	--
31	800	233	423	656	698	--	698	42	--
Total sec-ft.	50268	19964	4274	24238	21045	217	21262	829	3805
Mean	1622	644	138	782	679	7	686	27	123
Ac-ft.	99670	39600	8490	48090	41740	430	42170	1640	7560

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
JULY - 1938.

Day	Natural flow of St.Mary R. at boundary	Canada's share Available	St.Mary R. at Kimball Delivered	Diverted by Canada Used	Excess of share delivered	or deficit
1	2636	1485	1960	1030	475	--
2	2566	1450	1870	1020	420	--
3	2607	1570	2100	1010	530	--
4	2709	1521	2010	983	489	--
5	2504	1419	2050	660	631	--
6	2223	1278	1940	507	662	--
7	2154	1244	1460	865	216	--
8	2042	1188	1330	825	142	--
9	2036	1185	1270	723	85	--
10	1979	1156	1190	730	34	--
11	1783	1061	1100	742	39	--
12	1699	1016	1010	826	--	6
13	1646	990	985	806	--	5
14	1533	933	848	795	--	85
15	1549	941	825	790	--	116
16	1543	938	833	784	--	105
17	1400	867	789	767	--	78
18	1386	860	760	735	--	100
19	1389	861	767	740	--	94
20	1342	838	789	767	--	49
21	1226	780	789	772	9	--
22	1147	740	760	750	20	--
23	1104	719	720	706	1	--
24	1099	716	746	725	30	--
25	1102	718	740	725	22	--
26	1126	730	706	701	--	24
27	1031	682	655	651	--	27
28	975	654	618	605	--	36
29	892	613	584	574	--	29
30	835	584	551	538	--	33
31	800	567	525	511	--	42
Total sec-ft.	50268	30304	33280	23363	3805	829
Mean	1622	978	1074	754	123	27
Ac-ft.	99670	60070	66010	46340	7560	1640

DETERMINATION OF NATURAL FLOW OF ST. MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
AUGUST - 1938.

Day	Inflow to Sherburne Reservoir: Recorded inflow: Swiftcurrent Creek	Un-recorded inflow est'd	Total inflow	Outflow Swiftcurrent Creek at Sherburne	Stored in Reservoir sec-ft. Gross	Released from Reservoir sec-ft. Net
1	114	12	126	649	--	523
2	112	41	153	673		520
3	96	18	114	669		555
4	92	23	115	702		587
5	89	24	113	741		628
6	89	60	149	750		601
7	89	75	164	759		595
8	85	55	140	759		619
9	78	55	133	759		626
10	78	13	91	750		659
11	78	63	141	755		614
12	78	41	119	741		622
13	76	28	104	732		628
14	72	40	112	728		616
15	76	16	92	750		658
16	72	69	141	778		637
17	70	40	110	778		668
18	72	69	141	769		628
19	101	75	176	759		583
20	106	71	177	750		573
21	92	29	121	737		616
22	87	33	120	746		626
23	85	78	163	750		587
24	81	59	140	750		610
25	81	80	161	737		576
26	78	41	119	732		613
27	78	70	148	741		593
28	81	8	89	737		648
29	78	38	116	737		621
30	76	81	157	755		598
31	74	62	136	750	--	614
Total sec-ft.	2614	1467	4081	22923	--	18842
Mean	84	47	131	739	--	608
Ac-ft.	5180	2910	8090	45470	--	37380

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
AUGUST - 1938.

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	500	694	--	1194	414	780
2	510	694		1204	428	776
3	495	696		1191	523	668
4	466	700		1166	520	646
5	452	698		1150	555	595
6	461	698		1159	587	572
7	461	698		1159	628	531
8	457	696		1153	601	552
9	442	694		1136	595	541
10	438	694		1132	619	513
11	419	696		1115	626	489
12	415	694		1109	659	450
13	397	690		1087	614	473
14	410	690		1100	622	478
15	401	688		1089	628	461
16	388	688		1076	616	460
17	384	694		1078	658	420
18	384	694		1078	637	441
19	415	700		1115	668	447
20	415	700		1115	628	487
21	406	702		1108	583	525
22	388	696		1084	573	511
23	393	694		1087	616	471
24	388	694		1082	626	456
25	384	690		1074	587	487
26	367	686		1053	610	443
27	363	684		1047	576	471
28	354	684		1038	613	425
29	354	684		1038	593	445
30	346	682		1028	648	380
31	346	682	--	1028	621	407
Total sec-ft.	12799	21474	--	34273	18472	15801
Mean	413	693	--	1106	596	510
Ac-ft.	25390	42590	--	67980	36650	31330

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
AUGUST - 1938.

Day	Natural Flow St.Mary river	AVAILABLE FOR USE BY U.S.A. U.S. Share	Released Storage Net	Total Available	USED BY U.S.A Diverted	Stored Gross	Total Used	Excess of share used	Deficit
1	780	223	414	637	694	--	694	57	--
2	776	221	428	649	694		694	45	--
3	668	167	523	690	696		696	6	--
4	646	162	520	682	700		700	18	--
5	595	149	555	704	698		698	--	6
6	572	143	587	730	698		698	--	32
7	531	133	628	761	698		698	--	63
8	552	138	601	739	696		696	--	43
9	541	135	595	730	694		694	--	36
10	513	128	619	747	694		694	--	53
11	489	122	626	748	696		696	--	52
12	450	112	659	771	694		694	--	77
13	473	118	614	732	690		690	--	42
14	478	120	622	742	690		690	--	52
15	461	115	628	743	688		688	--	55
16	460	115	616	731	688		688	--	43
17	420	105	658	763	694		694	--	69
18	441	110	637	747	694		694	--	53
19	447	112	668	780	700		700	--	80
20	487	122	628	750	700		700	--	50
21	525	131	583	714	702		702	--	12
22	511	128	573	701	696		696	--	5
23	471	118	616	734	694		694	--	40
24	456	114	626	740	694		694	--	46
25	487	122	587	709	690		690	--	19
26	443	111	610	721	686		686	--	35
27	471	118	576	694	684		684	--	10
28	425	106	613	719	684		684	--	35
29	445	111	593	704	684		684	--	20
30	380	95	648	743	682		682	--	61
31	407	102	621	723	682	--	682	--	41
Total sec-ft.	15801	4006	18472	22478	21474	--	21474	126	1130
Mean	510	129	596	725	693	--	693	4	36
Ac-ft.	31330	7930	36650	44580	42590	--	42590	245	2215

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
AUGUST - 1938.

Day	Natural flow of St.Mary R. at boundary	Canada's share Available	St.Mary R. at Kimball Delivered	Diverted by Canada Used	Excess of share	Deficit of share delivered
1	780	557	500	480	--	57
2	776	555	510	478	--	45
3	668	501	495	480	--	6
4	646	484	466	437	--	18
5	595	446	452	428	6	--
6	572	429	461	436	32	--
7	531	398	461	432	63	--
8	552	414	457	428	43	--
9	541	406	442	413	36	--
10	513	385	438	411	53	--
11	489	367	419	394	52	--
12	450	338	415	386	77	--
13	473	355	397	369	42	--
14	478	358	410	382	52	--
15	461	346	401	375	55	--
16	460	345	388	367	43	--
17	420	315	384	360	69	--
18	441	331	384	355	53	--
19	447	335	415	388	80	--
20	487	365	415	396	50	--
21	525	394	406	382	12	--
22	511	383	388	362	5	--
23	471	353	393	373	40	--
24	456	342	388	364	46	--
25	487	365	384	356	19	--
26	443	332	367	348	35	--
27	471	353	363	339	10	--
28	425	319	354	336	35	--
29	445	334	354	331	20	--
30	380	285	346	320	61	--
31	407	305	346	322	41	--
Total sec-ft.	15801	11795	12799	12028	1130	126
Mean	510	381	413	388	36	4
Ac-ft.	31330	23400	25390	23860	2215	245

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
SEPTEMBER - 1938.

Day	Inflow to Sherburne Reservoir: Recorded inflow: Swiftcurrent Creek	Un-recorded inflow est'd	Total inflow	Outflow Swiftcurrent Creek at Sherburne	Stored in Reservoir sec-ft. Gross	Released from Reservoir sec-ft. Net
1	74	31	105	831	--	726
2	74	47	121	877	--	756
3	74	36	110	821	--	711
4	72	50	122	792	--	670
5	74	59	133	750	--	617
6	68	43	111	546	--	435
7	59	6	65	357	--	292
8	59	50	109	264	--	155
9	61	98	159	221	--	62
10	59	40	99	146	--	47
11	57	64	121	148	--	27
12	55	43	98	124	--	26
13	55	61	116	114	2	--
14	59	18	77	104	--	27
15	59	11	70	99	--	29
16	55	15	70	97	--	27
17	55	42	97	94	3	--
18	53	24	77	89	--	12
19	52	22	74	86	--	12
20	50	21	71	83	--	12
21	52	15	67	79	--	12
22	53	20	73	77	--	4
23	50	26	76	75	1	--
24	49	13	62	75	--	13
25	47	18	65	77	--	12
26	44	30	74	73	1	--
27	42	30	72	69	3	--
28	44	24	68	66	2	--
29	44	22	66	65	1	--
30	45	25	70	68	2	--
Total sec-ft.	1694	1004	2698	7367	15	4684
Mean	56	34	90	264	0.5	156
Ac-ft.	3360	1990	5350	14610	30	9280

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
SEPTEMBER - 1938.

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	346	680	--	1026	598	428
2	367	688	--	1055	614	441
3	379	692	--	1071	726	345
4	371	692	--	1063	756	307
5	375	690	--	1065	711	354
6	422	585	--	1007	670	337
7	879	49	--	928	617	311
8	775	11	--	786	435	351
9	699	4	--	703	292	411
10	618	--	--	618	155	463
11	551	--	--	551	62	489
12	500	--	--	500	47	453
13	461	--	--	461	27	434
14	438	--	--	438	26	412
15	419	--	2	421	--	421
16	406	--	--	406	27	379
17	388	--	--	388	29	359
18	367	--	--	367	27	340
19	363	--	3	366	--	366
20	346	--	--	346	12	334
21	342	--	--	342	12	330
22	330	--	--	330	12	318
23	323	--	--	323	12	311
24	323	--	--	323	4	319
25	319	--	1	320	--	320
26	307	--	--	307	13	294
27	304	--	--	304	12	292
28	292	--	1	293	--	293
29	285	--	3	288	--	288
30	300	--	2	302	--	302
Total sec-ft.	12595	4091 (1-9)	12	16698	5896	10802
Mean	420	455	0.4	557	197	360
Ac-ft.	24980	8110	24	33110	11720	21390

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A
SEPTEMBER - 1938.

Day	Natural Flow St.Mary river	AVAILABLE FOR USE BY U.S.A. U.S. Share	Released Storage Net	Total Available	USED BY U.S.A. Diverted	Stored Gross	Total Used	Excess of share used	Deficit
1	428	107	598	705	680	--	680	--	25
2	441	110	614	724	688	--	688		36
3	345	86	726	812	692	--	692		120
4	307	77	756	833	692	--	692		141
5	354	88	711	799	690	--	690		109
6	337	84	670	754	585	--	585		169
7	311	78	617	695	49	--	49		646
8	351	88	435	523	11	--	11		512
9	411	103	292	395	4	--	4		391
10	463	116	155	271	--	--	--		271
11	489	122	62	184	--	--	--		184
12	453	113	47	160	--	--	--		160
13	434	108	27	135	--	--	--		135
14	412	103	26	129	--	--	--		129
15	421	105	--	105	--	2	2		103
16	379	95	27	122	--	--	--		122
17	359	90	29	119	--	--	--		119
18	340	85	27	112	--	--	--		112
19	366	92	--	92	--	3	3		89
20	334	84	12	96	--	--	--		96
21	330	82	12	94	--	--	--		94
22	318	80	12	92	--	--	--		92
23	311	78	12	90	--	--	--		90
24	319	80	4	84	--	--	--		84
25	320	80	--	80	--	1	1		79
26	294	74	13	87	--	--	--		87
27	292	73	12	85	--	--	--		85
28	293	73	--	73	--	1	1		72
29	288	72	--	72	--	3	3		69
30	302	76	--	76	--	2	2	--	74
Total sec-ft.	10802	2702	5896	8598	4091 (1-9)	12	4103	--	4495
Mean	360	90	197	287	455	0.4	137	--	150
Ac-ft.	21390	5360	11720	17080	8110	24	8130	--	8950

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
SEPTEMBER - 1938.

Day	Natural flow of St.Mary R. at boundary	Canada's share Available	St.Mary R. at Kimball Delivered	Diverted by Canada Used	Excess or Deficit of share delivered	
1	428	321	346	320	25	--
2	441	331	367	341	36	
3	345	259	379	358	120	
4	307	230	371	349	141	
5	354	266	375	351	109	
6	337	253	422	329	169	
7	311	233	879	284	646	
8	351	263	775	311	512	
9	411	308	699	306	391	
10	463	347	618	276	271	
11	489	367	551	306	184	
12	453	340	500	307	160	
13	434	326	461	311	135	
14	412	309	438	306	129.	
15	421	316	419	320	103	
16	379	284	406	309	122	
17	359	269	388	301	119	
18	340	255	367	298	112	
19	366	274	363	298	89	
20	334	250	346	306	96	
21	330	248	342	314	94	
22	318	238	330	306	92	
23	311	233	323	303	90	
24	319	239	323	298	84	
25	320	240	320	292	79	
26	294	220	307	289	87	
27	292	219	304	282	85	
28	293	220	292	274	72	
29	288	216	285	268	69	
30	302	226	300	280	74	--
Total sec-ft.	10802	8100	12595	9193	4495	--
Mean	360	270	420	306	150	--
Ac-ft.	21390	16030	24980	18230	8950	--

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
WATER STORED OR RELEASED FROM SHERBURNE RESERVOIR
OCTOBER - 1938.

Day	Inflow to Sherburne Reservoir: Recorded inflow: Swiftcurrent Creek	Un-recorded inflow est'd	Total inflow	Outflow Swiftcurrent Creek at Sherburne	Stored in Reservoir sec-ft. Gross	Released from Reservoir sec-ft. Net
1	44	23	67	65	2	--
2	41	26	67	65	2	--
3	39	37	76	66	10	--
4	41	35	76	67	9	--
5	39	36	75	67	8	--
6	37	39	76	67	9	--
7	34	41	75	67	8	--
8	31	43	74	65	9	--
9	32	43	75	65	10	--
10	32	45	77	68	9	--
11	41	35	76	66	10	--
12	59	23	82	75	7	--
13	106	23	129	80	49	--
14	106	11	117	97	20	--
15	89	16	105	105	--	--
16	76	38	114	114	--	--
17	63	49	112	112	--	--
18	53	56	109	109	--	--
19	50	54	104	104	--	--
20	50	52	102	102	--	--
21	52	43	95	95	--	--
22	55	40	95	95	--	--
23	55	44	99	99	--	--
24	55	53	108	108	--	--
25	55	53	108	108	--	--
26	55	8	63	93	--	30
27	52	47	99	99	--	--
28	57	57	114	84	30	--
29	55	38	93	93	--	--
30	55	34	89	89	--	--
31	55	34	89	89	--	--
Total sec-ft.	1668	1174	2842	2678	192	30
Mean	54	38	92	86	6	1
Ac-ft.	3310	2330	5640	5310	381	61

DETERMINATION OF NATURAL FLOW OF ST.MARY RIVER
OCTOBER - 1938.

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	292	--	1	293	--	293
2	282	--	2	284	--	284
3	285	--	2	287	--	287
4	285	--	2	287	--	287
5	285	--	10	295	--	295
6	285	--	9	294	--	294
7	282	--	8	290	--	290
8	274	--	9	283	--	283
9	271	--	8	279	--	279
10	271	--	9	280	--	280
11	274	--	10	284	--	284
12	285	--	9	294	--	294
13	304	--	10	314	--	314
14	304	--	7	311	--	311
15	285	24	49	358	--	358
16	311	34	20	365	--	365
17	319	34	--	353	--	353
18	303	59	--	362	--	362
19	195	154	--	349	--	349
20	189	157	--	346	--	346
21	189	156	--	345	--	345
22	183	156	--	339	--	339
23	180	157	--	337	--	337
24	183	158	--	341	--	341
25	192	158	--	350	--	350
26	198	161	--	359	--	359
27	198	158	--	356	--	356
28	183	156	--	339	30	309
29	186	156	--	342	--	342
30	178	153	30	361	--	361
31	180	154	--	334	--	334
Total sec-ft.	7631	2185 (15-31)	195	10011	30	9981
Mean	246	128	6	323	1	322
Ac-ft.	15140	4330	380	19850	60	19790

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY U.S.A.
OCTOBER - 1938.

Day	Natural Flow St.Mary river	AVAILABLE FOR USE BY U.S.A. U.S. Share	Released Storage Net	Total Available	USED BY U.S.A. Diverted	Stored Gross	Total Used	Excess of share	Deficit used
1	293	73	--	73	--	1	1	--	72
2	284	71	--	71	--	2	2	--	69
3	287	72	--	72	--	2	2	--	70
4	287	72	--	72	--	2	2	--	70
5	295	74	--	74	--	10	10	--	64
6	294	74	--	74	--	9	9	--	65
7	290	72	--	72	--	8	8	--	64
8	283	71	--	71	--	9	9	--	62
9	279	70	--	70	--	8	8	--	62
10	280	70	--	70	--	9	9	--	61
11	284	71	--	71	--	10	10	--	61
12	294	74	--	74	--	9	9	--	65
13	314	78	--	78	--	10	10	--	68
14	311	78	--	78	--	7	7	--	71
15	358	90	--	90	24	49	73	--	17
16	365	91	--	91	34	20	54	--	37
17	353	88	--	88	34	--	34	--	54
18	362	90	--	90	59	--	59	--	31
19	349	87	--	87	154	--	154	67	--
20	346	86	--	86	157	--	157	71	--
21	345	86	--	86	156	--	156	70	--
22	339	85	--	85	156	--	156	71	--
23	337	84	--	84	157	--	157	73	--
24	341	85	--	85	158	--	158	73	--
25	350	88	--	88	158	--	158	70	--
26	359	90	--	90	161	--	161	71	--
27	356	89	--	89	158	--	158	69	--
28	309	77	30	107	156	--	156	49	--
29	342	86	--	86	156	--	156	70	--
30	361	90	--	90	153	30	183	93	--
31	334	84	--	84	154	--	154	70	--
Total sec-ft.	9981	2496	30	2526	2185 (15-31)	195	2380	917	1063
Mean	322	81	1	82	128	6	77	29	34
Ac-ft.	19790	4950	60	5010	4330	380	4710	1820	2100

DIVISION OF WATER OF ST.MARY RIVER
WATER AVAILABLE FOR USE AND USED BY CANADA
OCTOBER - 1938.

Day	Natural flow of St.Mary R. at boundary	Canada's share Available	St.Mary R. at Kimball Delivered	Diverted by Canada Used	Excess or Deficit of share delivered	
1	293	220	292	272	72	--
2	284	213	282	265	69	--
3	287	215	285	270	70	--
4	287	215	285	271	70	--
5	295	221	285	268	64	--
6	294	220	285	266	65	--
7	290	218	282	266	64	--
8	283	212	274	259	62	--
9	279	209	271	256	62	--
10	280	210	271	256	61	--
11	284	213	274	113	61	--
12	294	220	285	---	65	--
13	314	236	304	---	68	--
14	311	233	304	---	71	--
15	358	268	285	---	17	--
16	365	274	311	---	37	--
17	353	265	319	---	54	--
18	362	272	303	---	31	--
19	349	262	195	---	--	67
20	346	260	189	---	--	71
21	345	259	189	---	--	70
22	339	254	183	---	--	71
23	337	253	180	---	--	73
24	341	256	183	---	--	73
25	350	262	192	---	--	70
26	359	269	198	---	--	71
27	356	267	198	---	--	69
28	309	232	183	---	--	49
29	342	256	186	---	--	70
30	361	271	178	---	--	93
31	334	250	180	---	--	70
Total sec-ft.	9981	7485	7631	2762 (1-11)	1063	917
Mean	322	241	246	251	34	29
Ac-ft.	19790	14840	15140	5480	2100	1820

Table 2

DIVISION OF ST.MARY RIVER

CANADA

Water Available in Acre-feet

1938

Month	St.Mary R. at Kimball	Rolph Creek	Lee Creek	Pothole Creek	Combined Flow
April	23,630	1,450	5,240	1,580	31,900
May	114,300	1,140	13,580	443	129,463
June	145,700	152	7,760	119	153,731
July	66,010	212	3,960	97	70,279
August	25,390	198	609	---	26,197
September	24,980	87	393	---	25,460
October	15,140	50	419	---	15,609
Total	415,150	3,280	31,961	2,239	452,639[a]

DISPOSITION

Month	Diverted by A.R. & I. Co.	Gain or Loss	Wasted by A.R. & I. Co.	Applied to Land	St.Mary R. Lethbridge
April	12,870	+ 3,131	4,041	10,380	22,590
May	26,640	+ 2,884	6,871	22,210	100,700
June	51,600	+ 356	5,054	46,783	116,600
July	46,340	+ 635	5,078	41,800	32,940
August	23,860	+ 539	300	24,099	2,860
September	18,230	- 78	867	17,285	7,720[e]
October	5,480	+ 602	309	5,773	10,000
Total	185,020[b]	+ 8,069[c]	22,520[d]	168,330[f]	293,410[x]

a - Computed. b - Diverted by A.R.&I.Co. at Kimball.
c - Loss or Gain between Kimball and Magrath.
d - Wasted in Pinepound and Pothole Creeks.
e - Estimated.
f - Flow in canal at Magrath plus diversions by laterals.
x - Below all points of diversion.

Table 2 (Cont.)

DIVISION OF ST.MARY RIVER

UNITED STATES

Water available in Acre-Feet

1938

Month	St.Mary River U. S. Share	St.Mary River Sherburne Res. Stored	St.Mary River Sherburne Res. Released	Total Available for Diversion	Diverted	Unused	Total Flow Milk River Eastern Crossing
April	13,390	12,800		13,390	4,980	8,410	25,770
May	70,030	22,210		70,030	24,100	45,930	51,190
June	88,950	15,300	676	89,626	37,370	52,256	42,390
July	37,610	430	8,480	46,090	41,740	4,350	47,850
Aug.	7,950		36,640	44,590	42,590	2,000	40,400
Sept.	5,360	24	11,690	17,050	8,110	8,940	18,020
Oct.	4,950	387	60	5,010	4,330	680	3,150
Total	228,240	51,151	57,546	285,786	163,229	122,566	228,770

DIVERSIONS FROM MILK RIVER IN THE UNITED STATES

(Quantities in Acre-Feet)

Month	Ft. Belknap Canal	Paradise Canal	Harlem Canal	Agency Canal	Dodson North Canal	Dodson South Canal	Van-alia Canal	Total
March						7,805		7,805
April	260		781			10,304		11,345
May	659		1,736		1,010	22,592	2,420	28,417
June	5,378	250	1,496		1,406	9,640	5,365	23,535
July	2,862	1,587	71		2,227	21,798	3,600	32,145
Aug.	8,079	4,471	2,275		3,195	15,723	5,435	39,178
Sept.	4,728	1,075	1,902		893	13,686	2,916	25,200
Oct.	1,589						1,970	3,559
Nov.	1,010							1,010
Total	24,565	7,383	8,261		8,731	101,548	21,706	172,194

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER AT THE INTERNATIONAL BOUNDARY 1938

Quantities in Second-Feet

Date at Intern'l Boundary	Frenchman River above East End	Used by Canada at East End: Corrected for Evaporation: Store	Release	Divert-ed	Total Used	Frenchman River below East End	Gain or loss East End - 50 Mile
April							
1 - 10	314.0	144	0	0	144.0	298.0	128.0
11 - 20	2059.0	543	0	8.2	551.2	2602.0	1094.2
21 - 30	1598.0	52	0	38.5	90.5	1196.3	- 311.2
May							
1 - 10	895.0	0	512	17.7	-494.3	1143.8	- 245.5
11 - 20	762.8	342	0	7.8	349.8	393.5	- 19.5
21 - 31	442.8	200	0	7.5	207.5	377.6	142.3
June							
1 - 10	263.3	0	142	59.8	- 82.2	252.2	- 93.3
11 - 20	171.2	78	0	67.8	145.8	98.4	73.0
21 - 30	332.9	0	20	87.0	67.0	774.9	509.0
July							
1 - 10	588.8	0	33	38.1	5.1	570.8	- 12.9
11 - 20	240.3	0	401	24.2	-376.8	721.2	104.1
20 - 31	134.7	0	3	29.5	26.5	186.9	78.7
August							
1 - 10	56.4	0	35	5.0	- 30.0	8.8	- 77.6
11 - 20	33.8	0	51	5.0	- 46.0	5.5	- 74.3
21 - 31	72.5	0	33	5.0	- 28.0	17.3	- 22.0
Sept.							
1 - 10	34.9	13	0	0	0	0	- 21.9
11 - 20	52.3	4	0	0	0	0	- 48.3
21 - 30	46.6	10	0	0	0	0	- 36.6
Oct.							
1 - 10	49.1	14	0	0	0	0	- 35.1
11 - 20	81.6	0	58	0	- 58.0	0	- 139.6
21 - 31	78.9	0	55	0	- 55.0	58.9	- 75.0
Total sec-ft.	8308.9	1400	1343	401.1	458.1	8706.1	855.3
Daily Mean	38.8	6.5	6.3	1.9	2.1	40.7	4.0
Ac-ft.	16480	2780	2660	795	908	17260	1700

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER AT THE INTERNATIONAL BOUNDARY 1938

Quantities in Second-Feet

Date at Intern'l Boundary	Frenchman River at 50 Mile	Used by Canada at Val Marie: Corrected for Evaporation: Store	Release	Divert-ed	Total Used	Frenchman River below Val Marie	Gain or loss 50 Mile - Val Marie
April							
1 - 10	298.0	23	0	6.0	29.0	165.8	- 103.2
11 - 20	2602.0	1516	0	93.4	1609.4	2240.0	1247.4
21 - 30	1196.3	288	0	125.7	413.7	745.5	- 37.1
May							
1 - 10	1143.8	294	0	160.3	454.3	594.9	- 94.6
11 - 20	393.5	106	0	223.6	329.6	227.8	163.9
21 - 31	377.6	113	0	118.0	231.0	158.0	11.4
June							
1 - 10	252.2	58	0	216.6	274.6	31.7	54.1
11 - 20	98.4	0	218	207.8	- 10.2	44.6	- 64.0
21 - 30	774.9	431	0	88.6	519.6	157.9	- 97.4
July							
1 - 10	570.8	0	31	0	- 31.0	742.0	140.2
11 - 20	721.2	0	82	6.7	- 75.3	861.8	65.3
21 - 31	186.9	0	74	50.0	- 24.0	291.1	80.2
August							
1 - 10	8.8	0	66	48.1	- 17.9	34.7	8.0
11 - 20	5.5	0	87	46.2	- 40.8	32.0	- 14.3
21 - 31	17.3	0	71	49.0	- 22.0	30.4	- 8.9
Sept.							
1 - 10	0	0	55	45.0	- 10.0	13.4	3.4
11 - 20	0	0	60	34.8	- 25.2	17.7	- 7.5
21 - 30	0	0	113	16.0	- 97.0	65.0	- 32.0
Oct.							
1 - 10	0	0	90	40.0	- 50.0	40.0	- 10.0
11 - 20	0	0	98	40.0	- 58.0	40.0	- 18.0
21 - 31	58.9	0	71	50.0	- 21.0	44.0	- 35.9
Total sec-ft.	8706.1	2829	1116	1365.8	3378.8	6578.3	1251.0
Daily Mean	40.7	13.2	5.2	7.8	15.8	30.7	5.8
Ac-ft.	17260	5610	2210	3300	6700	13040	2480

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER AT THE INTERNATIONAL BOUNDARY 1938

Quantities in Second-Feet

Date at Intern'l Boundary	Frenchman River above East End	Gain or Loss East End to 50 Mile	Gain or Loss 50 Mile to Val Marie	Gain or Loss Val Marie to Boundary	Natural flow at Intern'l Boundary
April					
1 - 10	314.0	128.0	- 103.2	326.5	665.3
11 - 20	2059.0	1094.2	1247.4	1494.0	5894.6
21 - 30	1598.0	- 311.2	- 37.1	- 289.8	959.9
May					
1 - 10	895.0	- 245.5	- 94.6	- 24.0	530.9
11 - 20	762.8	- 19.5	163.9	22.3	929.5
21 - 31	442.8	142.3	11.4	72.1	668.6
June					
1 - 10	263.3	- 93.3	54.1	- 18.8	205.3
11 - 20	171.2	73.0	- 64.0	457.3	637.5
21 - 30	332.9	509.0	- 97.4	933.0	1677.5
July					
1 - 10	588.8	- 12.9	140.2	2591.0	3307.1
11 - 20	240.3	104.1	65.3	290.9	700.6
21 - 31	134.7	78.7	80.2	- 151.2	142.4
August					
1 - 10	56.4	- 77.6	8.0	- 26.4	0
11 - 20	33.8	- 74.3	- 14.3	- 32.0	0
21 - 31	72.5	- 83.2	- 8.9	- 30.4	0
Sept.					
1 - 10	34.9	- 21.9	3.4	22.1	38.5
11 - 20	52.3	- 48.3	- 7.5	- 7.0	0
21 - 30	46.6	- 36.6	- 32.0	- 62.3	0
Oct.					
1 - 10	49.1	- 35.1	- 10.0	- 39.9	0
11 - 20	81.6	- 139.6	- 18.0	- 40.0	0
21 - 31	78.9	- 75.0	- 35.9	- 44.0	0
Total sec-ft.	8308.9	855.3	1251.0	5443.4	16357.7
Daily Mean	38.8	4.0	5.8	25.4	76.4
Ac-ft.	16480	1700	2480	10790	32440

Table 4

DISPOSITION OF THE WATERS OF THE NORTHERN TRIBUTARIES
OF MILK RIVER IN CANADA
1938

Quantities in Acre-Feet

Irrigator	Source of Supply	Estimated Diversion
Lodge Creek Drainage Basin		
Roth, R.L.	Lodge Creek	30
Mitchell, Wm.	Lodge Creek	No data available
Spangler, J.M.	Lodge Creek	No data available
Spangler, C.B.	Lodge Creek	No data available
Hillman, W.	Thelma Creek	No data available
Hartt, J.E.	Thelma Creek	No data available
Mitchell, Wm.	Shell Creek	No data available
Hartt, J.E.	Suiste Coulee	No data available
Hartt, J.E.	Cobblestone Coulee	No data available
Shock, J.J.	Shock Coulee	No data available
Read, J.	Read Creek	No data available
Mudie, H.A.	Sexton Creek	No data available
Clarke, T.S.	Sexton Creek	No data available
Sturm, A.	Middle Creek	No data available
Mitchell Bros.	Middle Creek	No data available
Legge, G.A.	Middle Creek	No data available
Jahn, B.A.	Middle Creek	No data available
Legge, G.A.	Grant Creek	No data available
	Total from Lodge Creek Basin	30
Battle Creek Drainage Basin		
Lindner Bros.	Battle Creek	200
Patterson, W.G.	Battle Creek	100
Marshall & Gaff	Battle Creek	100
Gaff, J.A.	Battle Creek	15
Shepherd Bros.	Battle Creek	No diversion
Fondrick, G.	Battle Creek	30
Wilkes Bros.	Battle Creek	No data available
Wylie & Lindner	Battle Creek	No data available
McKinnon, J.	Battle Creek	200
Stirling & Nash	Battle Creek	50
Wood & Anderson	Fort Walsh Creek	No diversion
Wood & Anderson	Whitemud Coulee	No diversion
Leslie, J.	Sixmile	No diversion
Spangler, J.M.	Sixmile Coulee	100
Shepherd Bros.	Halfway Coulee	30
	Total from Battle Creek Basin	825

Table 4 (Cont'd)

Irrigator	Source of Supply	Estimated Diversion
<u>Frenchman River Drainage Basin</u>		
Wylie, D.J.	Oxarart Creek	400
Gilchrist Bros.	Davis Creek	50
Gilchrist Bros.	Belanger Creek	350
Caton, W.E.	Fairwell Creek	75
Hensman, S.A.	N.B. Frenchman River	100
Armstrong	Armstrong Creek	No diversion
Armstrong	Clarence Coulee	75
Kokott, T.	Calf Creek	20
Pearse, S.	Concrete Coulee	50
Bolingbroke	Bolingbroke Creek	5
Bate, A.E.	Garden Creek	25
East End Irrigation	Frenchman River	726
Val Marie Irrigation	Frenchman River	3510
Total from Frenchman River Basin		5386

Table 5

MEASURED DIVERSIONS FROM THE NORTHERN TRIBUTARIES

OF MILK RIVER IN THE UNITED STATES

1938

(Quantities in Acre-Feet)

Irrigator	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
				Lodge Creek					
N. Chinook Canal	1,930	4,200	508	559	1,580	0	1,120	0	9,897
				Battle Creek					
Matheson Canal	0	320	348	247#	0	0	0	0	915
				Frenchman River					
Frenchman Canal	448	839	598	513	73	0	0	0	2,471

#Diversion dam washed out June 23.