Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION AND USE MADE OF THE WATERS OF

ST. MARY AND MILK RIVERS

by

T. M. PATTERSON
representing Canada

and

C. G. PAULSEN
representing the United States

1954

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

Gentlemen:

In compliance with the Provisions of Clause VIII (c) of your Order of the 4th 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 31, 1954.

Respectfully submitted,

T.M. Patterson
Accredited Officer of Her Majesty.

C.G. Paulsen
Accredited Officer of the United States.

Apr. 4 , 1955.
(~~date~~)

CONTENTS

TABLES

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List of gauging stations with map showing their locations in the river basins.

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 1954 by representatives of the Water Resources Division (Canada) and the United States Geological Survey.

Mr. T. M. Patterson, Director, Engineering and Water Resources Branch, Department of Northern Affairs and National Resources, acting in the capacity of accredited officer of Her Majesty, was represented in the field by Mr. E. P. Collier, District Engineer, Calgary, Alberta. Mr. C. G. Paulsen, Chief Hydraulic Engineer, United States Geological Survey, as accredited officer of the United States, was represented in the field by Mr. C. S. Heidel, Staff Engineer, Helena, Montana.

The waters of the two rivers were divided between the two countries in accordance with the Order of the International Joint Commission dated at Ottawa, Canada, on the 4th day of October, 1921.

The hydrometric data upon which this report is based were collected and compiled jointly for 38 international stations by engineers of the Water Resources Division (Canada) under the direction of Mr. Collier and of the United States Geological Survey under the supervision of Mr. Heidel. Data for another 17 stations in Canada and 8 stations in the United States were collected independently by the same engineers in their respective countries. The United States Bureau of Reclamation furnished data for another 8 canal stations in Montana.

Complete data for 50 of the stations mentioned above are contained in the appendix to this report; monthly quantities only for 11 canal stations in Montana are shown in Table 2, page 2, and Table 5. Data for 5 stations maintained by the United States Geological Survey in the St. Mary River basin and 5 stations maintained by Canada in the St. Mary and Milk River basins are not used for purposes of division and are not included in either this report or its appendix.

This report has been compiled jointly by Mr. E. P. Collier and Mr. C. S. Heidel.

Water Supply

St. Mary River

The thirty-third annual international survey of snow conditions on the headwaters of Swiftcurrent Creek, a mountainous area considered typical of the headwaters of the St. Mary River, showed the average snow cover at the observation points to be 133.2 inches or 216 percent of 61.8 inches, the mean for the previous 32 years of record. The water content was found to be 54.7 inches or 197 percent of 27.7 inches, the mean for the previous 32 years of record. The run-off during May, June and July, measured at the gauging station on Swiftcurrent Creek at Many Glacier was 91,090 acre-feet or 136 percent of 67,102 acre-feet, the average of the previous 31 years of record.

The total natural flow of the St. Mary River at the International Boundary for the year November 1, 1953, to October 31,

1954, was 858,492 acre-feet. Of this total, 795,874 acre-feet occurred during the irrigation season, April 1 to October 31. The natural flow during the irrigation season was 136 percent of 584,432 acre-feet, the average of the previous 51 years of record. Of the total natural flow there was delivered to Canada 751,618 acre-feet, 705,418 acre-feet during the irrigation season and 46,200 acre-feet during the balance of the year.

Milk River

The estimated natural flow of the Milk River at its eastern crossing of the international boundary, during the period March 1 to October 31, 1954, was 147,400 acre-feet or 130 percent of 113,734 acre-feet, the estimated average for the previous 42 years of record.

Eastern Tributaries of Milk River

The second annual snow survey in the basins of the eastern tributaries of the Milk River in Canada was conducted by the Water Resources Division, Canada, between February 27 and March 1, 1954. The average snow cover at the observation points was found to be 4.4 inches as compared to 10.3 inches in 1953. The average water content was found to be 1.2 inches as compared to 2.1 inches in 1953. No attempt will be made to correlate snow cover with subsequent run-off in the eastern tributaries until data for several more years have been obtained.

The total quantity of water delivered to the United States by the eastern tributaries of the Milk River during the period,

March 1 to October 31, 1954, was 158,400 acre-feet or 111 percent of 142,500 acre-feet, the average for the previous 27 years. The quantities delivered to the United States by the various tributaries are listed in Table 6.

During the season a total of 29,850 acre-feet was diverted from the eastern tributaries in Canada to irrigation canals or storage. These diversions are listed in Table 4. The consumptive use was less than the total diversion shown because of return flow from irrigation projects. Measured diversions in Montana amounted to 10,940 acre-feet. These are listed in Table 5.

Division of Water

St. Mary River

The division of the waters of the St. Mary River was carried out in accordance with the Order of the International Joint Commission dated October 4, 1921, which stipulates:

"(a) During the irrigation season, when the natural flow of the St. Mary River at the point where it crosses the international boundary is six hundred and sixty-six (666) cubic feet per second or less, Canada shall be entitled to three-fourths and the United States to one-fourth of such flow.

(b) During the irrigation season, when the natural flow of the St.Mary River at the point where it crosses the international boundary is more than six hundred and sixty-six (666) cubic feet per second, Canada shall be entitled to a prior appropriation of five hundred (500) cubic feet per second and the excess

over six hundred and sixty-six (666) cubic feet per second shall be divided equally between the two countries."

The daily natural flow of the St. Mary River was determined in the following manner:

(1) Daily records were obtained at the following gauging and climatologic stations:

1. Swiftcurrent Creek at Many Glacier (Inflow to Lake Sherburne).
2. Lake Sherburne (formerly called Sherburne Lake Reservoir), Daily Storage or Release.
3. Swiftcurrent Creek at Sherburne (Outflow from Lake Sherburne).
4. United States St.Mary Canal at St.Mary Crossing near Babb (United States Diversion from St.Mary River Basin).
5. St.Mary River near International Boundary (Quantity delivered to Canada.)
6. Evaporation and Precipitation station near Babb, Montana.

(2a) When water was being stored in Lake Sherburne, the natural flow of the St.Mary River at the international boundary was considered to be the sum of the quantities measured at gauging stations 2, 4 and 5 above. This sum is the total of the United States storage and diversion and the quantity delivered to Canada.

(2b) When water was being released from Lake Sherburne, the natural flow of the St. Mary River at the international boundary was computed by adding the quantities measured at gauging stations 4 and 5 above, and subtracting the quantity measured at station 2; that is, the natural flow was considered to be the sum of the quantity diverted in the United States St.Mary Canal and that delivered to Canada reduced by the quantity released from

Lake Sherburne.

(3) In order to synchronize Lake Sherburne operations with flow quantities at the international boundary, a two-day time lag was applied to data from stations 1, 2 and 3.

(4) The natural flow of the St.Mary River having been determined, the division of its waters was carried out in accordance with the above Order.

(5) Computed evaporation losses from Lake Sherburne were treated as storage by the United States.

During the irrigation season, April 1 to October 31, field engineers of both countries made frequent computations of the daily natural flow of the river and each country's share thereof, in order that any appropriation by the United States in excess of their share could be adjusted by a subsequent delivery to Canada of an equivalent amount at the earliest opportunity. No such adjustment was necessary during the 1954 season, largely because of the close co-operation given by the United States Bureau of Reclamation officials at Babb, Montana.

Regular interim reports on the progress of the division of the natural flow at the international boundary were made to interested agencies throughout the irrigation season.

During the non-irrigation season, November 1, 1953, to March 31, 1954, no interim reports were made as the only United States use during this period was storage in Lake Sherburne where the contributing drainage area is only about 13 percent of the total area of the St. Mary River drainage basin in the United States.

The United States St.Mary Canal was operated between May 14 and September 8 and water was delivered to the North Branch of the Milk River from May 16 to September 9.

Seepage from the canal between the point of diversion and the crossing of the St.Mary River is assumed to return to the river and eventually become available to Canada. The discharge of 106,691 acre-feet which passed the gauging station on the United States St. Mary Canal at St.Mary Crossing between May 14 and September 8 was considered to be the quantity diverted from the St.Mary River by the United States. A total of 102,922 acre-feet was delivered to the North Branch of the Milk River at Hudson Bay Divide during the operating season, from where it was conveyed to irrigation projects in Montana via the Milk River. The slight decrease in discharge between the gauging stations at St. Mary River Crossing and at Hudson Bay Divide was probably due to an excess of evaporation and seepage losses over the local run-off entering the canal between the two points.

Storage in Lake Sherburne was 5,066 acre-feet on October 31, 1953, and had increased to 21,410 acre-feet by March 31, 1954, and to 59,536 acre-feet by July 12, 1954. Thereafter, water was released at varying rates of flow until the end of the season. On October 31, 1954, the storage had been reduced to 3,056 acre-feet.

Canada diverted 250,106 acre-feet of water from the St.Mary River Reservoir in 1954 as measured at the Canadian St.Mary Canal and Magrath Irrigation District Canal gauging stations near Spring Coulee.

Milk River

No division of the flow of Milk River at Eastern Crossing was made in 1954. Except for a few small unmeasured diversions above the eastern crossing of the international boundary, the entire natural flow of the Milk River at that point was delivered to the United States.

Eastern Tributaries of Milk River.

Minor Diversions

There are a number of small diversions from the eastern tributaries of Milk River in Saskatchewan for which only estimates of the quantities diverted are available. These estimates were provided by the Water Rights Division of the Province of Saskatchewan and are based on reports from the individual irrigators. It is considered that the quantities diverted do not justify the expense of gauging these small diversions. These estimates, being incomplete and of doubtful value, are not used in the Frenchman River division computations in Table 3. The estimated quantities reported to date for 1954 are, however, shown in Table 4 of this report.

Frenchman River

The Frenchman River was the only one of the Eastern Tributaries on which a formal division was made in 1954. The details of this division are shown in Table 3 of this report.

The computed natural flow of the Frenchman River at the international boundary for the period March 1 to October 31, 1954, was 89,986 acre-feet, of which each country was entitled to fifty percent. Canada used 15,008 acre-feet, including an estimated 1,505 acre-feet in minor diversions as shown in Table 4, and

delivered 74,978 acre-feet to the United States.

Lodge Creek

Canada diverted or stored a total of 4,396 acre-feet in the Lodge Creek basin during the period March 1 to October 31, 1954, and delivered 6,180 acre-feet to the United States. The Canadian use mentioned above includes 1,750 acre-feet diverted into the Spangler ditch near Govenlock, 2,510 acre-feet stored in Middle Creek Reservoir and an additional 136 acre-feet in minor diversions as shown in Table 4. No allowance for return flow from irrigation projects is included in these figures.

Battle Creek

Canada diverted or stored a total of 7,633 acre-feet in the Battle Creek basin during the period March 1 to October 31, 1954, including 803 acre-feet in minor diversions, and delivered 25,550 acre-feet to the United States.

Description of Tables

The six tables accompanying this report show the total water available in the St.Mary and Milk River basins, the manner in which it was divided and the use made by each country of its share.

Table 1 deals with the natural flow of the St.Mary River at the international boundary and its division. It comprises seven pages, one for each month of the irrigation season. The table shows the computed daily natural flow and each country's share thereof. It also shows the recorded flow near international boundary and the quantity diverted by the United States.

Table 2, Page 1, (upper table), shows the monthly discharge of the St.Mary River near the International Boundary, the contributions by Lee and Rolph Creeks in Canada and the total available to Canada at the St.Mary Reservoir near Spring Coulee.

Table 2, Page 1, (lower table), shows the monthly disposition made by Canada of its share of the natural flow of the St. Mary River at the international boundary.

Table 2, Page 2, (upper table), is a summary by months of the disposition of the United States share of the natural flow of the St.Mary River at the international boundary. It shows the quantities stored in or released from Lake Sherburne, the quantity diverted to the United States St. Mary Canal for delivery to the Milk River basin and the unused portion of the United States share. The table also shows, by months, the measured discharge of the Milk River at Eastern Crossing. This discharge is the sum of the natural flow of the Milk River above its eastern crossing of the international boundary and the water diverted from the St. Mary River basin in the United States. Thus it represents the total quantity available to the United States from the two basins during the irrigation season of 1954.

Table 2, Page 2, (lower table), shows the measured diversions, in acre-feet, from the Milk River to several canals in the United States. These records as well as the data for Fresno and Nelson Reservoirs were furnished by the Milk River Project of the United States Bureau of Reclamation.

Table 3 is a compilation, in ten-day periods, of the natural flow of the Frenchman River at the international boundary. This table consists of three pages. Page 1 shows the quantity used by Canada in Cypress Lake and the East End irrigation project; page 2 shows the quantity used by Canada in the Val Marie irrigation projects; Page 3 shows the total quantity used by Canada, the natural flow of Frenchman River at international boundary, the United States share thereof and the quantity delivered to the United States.

Table 4 summarizes the available information on the diversions from the Eastern Tributaries of Milk River in Canada.

Table 5 shows the available information on quantities diverted from the Eastern Tributaries of Milk River in the United States in 1954.

Table 6 shows the measured run-off, in acre-feet, of the Eastern Tributaries of Milk River at the international boundary for the period March 1 to October 31, 1954.

Following the tables is a list of the gauging stations operated jointly by Canada and the United States in the Milk and St. Mary River drainage basins in 1954 and a list of other gauging stations in these basins operated independently by either the United States or Canada. A map showing the location of all these stations is included in this report.

Appendix

An appendix submitted with this report, under separate cover, contains the result of discharge measurements, summary of monthly discharge and the daily gauge height and discharge data for 50 gauging

stations operated during 1954 in the St. Mary and Milk River drainage basins. Details of the Canadian minor diversions, as grouped in Table 4 of the report, are included.

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.) Table 1.

1954 Day APRIL	Computed Nat. Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Nat. Flow	Recorded Flow of St. Mary River nr. Int.Bdry.	Canada rec'd more (+) less (-) than share +	Canada rec'd more (+) less (-) than share -	U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied) Stored	Storage Factors Lake Sherburne (2-day lag applied) Rlsd.	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) less (-) than share. +	U.S. used more (+) less (-) than share. -
1	84	63	34		29	21	50		0	50	29	
2	75	56	30		26	19	45		0	45	26	
3	212	159	167	8		53	45		0	45		8
4	350	262	300	38		88	50		0	50		38
5	436	327	386	59		109	50		0	50		59
6	369	277	319	42		92	50		0	50		42
7	350	262	300	38		88	50		0	50		38
8	350	262	300	38		88	50		0	50		38
9	420	315	375	60		105	45		0	45		60
10	372	279	327	48		93	45		0	45		48
11	350	262	300	38		88	50		0	50		38
12	289	217	254	37		72	35		0	35		37
13	526	394	476	82		132	50		0	50		82
14	764	549	714	165		215	50		0	50		165
15	578	434	475	41		144	103		0	103		41
16	661	496	545	49		165	116		0	116		49
17	776	555	648	93		221	128		0	128		93
18	639	479	589	110		160	50		0	50		110
19	547	410	564	154		137		17	0	- 17		154
20	585	439	596	157		146		11	0	- 11		157
21	532	399	660	261		133		128	0	- 128		261
22	486	364	707	343		122		221	0	- 221		343
23	529	397	776	379		132		247	0	- 247		379
24	454	340	822	482		114		368	0	- 368		482
25	387	290	839	549		97		452	0	- 452		549
26	397	298	857	559		99		460	0	- 460		559
27	415	311	874	563		104		459	0	- 459		563
28	383	287	857	570		96		474	0	- 474		570
29	377	283	839	556		94		462	0	- 462		556
30	371	278	822	544		93		451	0	- 451		544
31												
Total Sec.-ft.	13,064	9,744	15,752	(6,063) 6,008	(55)	3,320	1,062	3,750	0	-2,688	(55)	(6,063) 6,008
Mean	435	325	525	200		111	35.4	125	0	- 89.6		200
Ac.-ft.	25,912	19,327	31,244	11,917		6,585	2,106	7,438	0	-5,332		11,917

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.) Table 1.

1954 Day MAY	Computed Nat. Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Nat. Flow	Recorded Flow of St. Mary River nr. Int.Bdry.	Canada rec'd more (+) less (-) than share +	Canada rec'd more (+) less (-) than share -	U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied) Stored	Storage Factors Lake Sherburne (2-day lag applied) Rlsd.	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) less (-) than share. +	U.S. used more (+) less (-) than share. -
1	347	260	797	537		87		450	0	- 450		537
2	340	255	776	521		85		436	0	- 436		521
3	357	268	776	508		89		419	0	- 419		508
4	441	331	848	517		110		407	0	- 407		517
5	575	431	968	537		144		393	0	- 393		537
6	700	517	1070	553		183		370	0	- 370		553
7	721	527	1060	533		194		339	0	- 339		533
8	893	613	1150	537		280		257	0	- 257		537
9	1119	726	1320	594		393		201	0	- 201		594
10	1512	923	1630	707		589		118	0	- 118		707
11	1856	1095	1860	765		761		4	0	- 4		765
12	2234	1284	2140	856		950	94		0	94		856
13	2559	1446	2290	844		1113	269		0	269		844
14	2912	1623	2460	837		1289	447		5	452		837
15	2984	1659	2620	961		1325	328		36	364		961
16	3212	1773	2890	1117		1439	283		39	322		1117
17	3518	1926	3130	1204		1592	308		80	388		1204
18	4068	2201	3380	1179		1867	422		266	688		1179
19	4997	2665	4070	1405		2332	650		277	927		1405
20	5976	3155	4860	1705		2821	834		282	1116		1705
21	6930	3632	5390	1758		3298	1252		288	1540		1758
22	7027	3680	5730	2050		3347	1014		283	1297		2050
23	6547	3441	5700	2259		3106	568		279	847		2259
24	6030	3182	5420	2238		2848	335		275	610		2238
25	5543	2938	5280	2342		2605		10	273	263		2342
26	5296	2815	5100	2285		2481		72	268	196		2285
27	5094	2714	4840	2126		2380		9	263	254		2126
28	4811	2572	4580	2008		2239		34	265	231		2008
29	4129	2231	4080	1849		1898		223	272	49		1849
30	3861	2097	3840	1743		1764		282	303	21		1743
31	3768	2051	3680	1629		1717		213	301	88		1629
Total Sec.-ft.	100,357	55,031	93,735	38,704		45,326	6,804	4,237	4,055	6,622		38,704
Mean	3,237	1,775	3,024	1,249		1,462	219	137	131	214		1,249
Ac.-ft.	199,055	109,152	185,921	76,768		89,903	13,496	8,404	8,043	13,135		76,768

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.) Table 1.

1954 Day JUNE	Computed Nat. Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Nat. Flow	Recorded Flow of St. Mary River nr. Int.Bdry.	Canada rec'd more (+) or less (-) than share +	-	U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied) Stored	Rlsd.	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) than share. +	-
1	3731	2032	3580	1548		1699		150	301	151		1548
2	3711	2022	3540	1518		1689		129	300	171		1518
3	3523	1928	3400	1472		1595		175	298	123		1472
4	3450	1892	3360	1468		1558		206	296	90		1468
5	3721	2027	3540	1513		1694		113	294	181		1513
6	3830	2082	3520	1438		1748	15		295	310		1438
7	3684	2009	3380	1371		1675	10		294	304		1371
8	3495	1914	3190	1276		1581	11		294	305		1276
9	3139	1736	3000	1264		1403		153	292	139		1264
10	2984	1659	2870	1211		1325		176	290	114		1211
11	2801	1567	2690	1123		1234		175	286	111		1123
12	2937	1635	2520	885		1302	134		283	417		885
13	3296	1815	2570	755		1481	443		283	726		755
14	3751	2042	2740	698		1709	727		284	1011		698
15	3977	2155	2850	695		1822	832		295	1127		695
16	4238	2286	2870	584		1952	990		378	1368		584
17	4081	2207	2830	623		1874	823		428	1251		623
18	3773	2053	2530	477		1720	815		428	1243		477
19	3380	1857	2300	443		1523	642		438	1080		443
20	2955	1644	2000	356		1311	475		480	955		356
21	2767	1550	1920	370		1217	365		482	847		370
22	2922	1628	2060	432		1294	346		516	862		432
23	3514	1924	2400	476		1590	586		528	1114		476
24	4159	2246	2640	394		1913	989		530	1519		394
25	4292	2313	2760	447		1979	1010		522	1532		447
26	4266	2300	2820	520		1966	920		526	1446		520
27	4169	2251	2830	579		1918	813		526	1339		579
28	4274	2304	2940	636		1970	804		530	1334		636
29	4172	2253	2870	617		1919	774		528	1302		617
30	4114	2224	2740	516		1890	848		526	1374		516
31												
Total Sec.-ft.	109,106	59,555	85,260	25,705		49,551	13,372	1,277	11,751	23,846		25,705
Mean	3,637	1,985	2,842	857		1,652	446	42.6	392	795		857
Ac.-ft.	216,409	118,126	169,111	50,985		98,283	26,523	2,533	23,308	47,298		50,985

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.) Table 1.

1954 Day JULY	Computed Nat. Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Nat. Flow	Recorded Flow of St. Mary River nr. Int.Bdry.	Canada rec'd more (+) less (-) or than share +	Canada rec'd more (+) less (-) or than share -	U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied) Stored	Storage Factors Lake Sherburne (2-day lag applied) Rlsd.	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) less (-) or than share. +	U.S. used more (+) less (-) or than share. -
1	3916	2125	2650	525		1791	740		526	1266		525
2	3839	2086	2670	584		1753	645		524	1169		584
3	3854	2094	2570	476		1760	760		524	1284		476
4	3744	2039	2460	421		1705	764		520	1284		421
5	3589	1961	2450	489		1628	619		520	1139		489
6	3742	2038	2570	532		1704	646		526	1172		532
7	4010	2172	2710	538		1838	752		548	1300		538
8	4389	2361	2960	599		2028	865		564	1429		599
9	4197	2265	3070	805		1932	553		574	1127		805
10	4038	2186	3070	884		1852	388		580	968		884
11	4112	2223	3210	987		1889	322		580	902		987
12	4254	2294	3300	1006		1960	372		582	954		1006
13	4121	2227	3360	1133		1894	181		580	761		1133
14	3864	2099	3280	1181		1765	2		582	584		1181
15	3613	1973	3110	1137		1640		77	580	503		1137
16	3382	1858	2920	1062		1524		120	582	462		1062
17	3341	1837	2800	963		1504		43	584	541		963
18	3317	1825	2690	865		1492	45		582	627		865
19	3148	1741	2570	829		1407		4	582	578		829
20	2990	1662	2400	738		1328	2		588	590		738
21	2971	1652	2300	648		1319	79		592	671		648
22	2932	1633	2240	607		1299	102		590	692		607
23	2739	1536	2080	544		1203	73		586	659		544
24	2250	1292	1850	558		958		188	588	400		558
25	2013	1173	1640	467		840		209	582	373		467
26	1883	1108	1420	312		775		111	574	463		312
27	1790	1062	1220	158		728	0		570	570		158
28	1780	1057	1120	63		723	90		570	660		63
29	1693	1013	1010		3	680	105		578	683	3	
30	1626	980	924		56	646	120		582	702	56	
31	1556	945	866		79	611	112		578	690	79	
Total Sec.-ft.	98,693	54,517	73,490	(19,111) 18,973	(138)	44,176	8,337	752	17,618	25,203	(138)	(19,111) 18,973
Mean	3,184	1,759	2,371	612		1,425	269	24.3	568	813		612
Ac.-ft.	195,755	108,133	145,765	37,632		87,622	16,536	1,492	34,945	49,989		37,632

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.) Table 1.

1954 Day AUGUST	Computed Nat. Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Nat. Flow	Recorded Flow of St. Mary River nr. Int. Bdry.	Canada rec'd more (+) or less (-) than share +	Canada rec'd more (+) or less (-) than share -	U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied) Stored	Storage Factors Lake Sherburne (2-day lag applied) Rlsd.	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) less (-) or than share. +	U.S. used more (+) less (-) or than share. -
1	1463	898	813		85	565	68		582	650	85	
2	1415	874	790		84	541	35		590	625	84	
3	1343	838	776		62	505		23	590	567	62	
4	1342	838	783		55	504		35	594	559	55	
5	1277	805	790		15	472		105	592	487	15	
6	1214	774	813	39		440		193	594	401		39
7	1208	771	790	19		437		174	592	418		19
8	1147	740	762	22		407		205	590	385		22
9	1133	733	741	8		400		198	590	392		8
10	1113	723	721		2	390		200	592	392	2	
11	1082	708	700		8	374		210	592	382	8	
12	1026	680	654		26	346		224	596	372	26	
13	1016	675	654		21	341		234	596	362	21	
14	1005	669	641		28	336		232	596	364	28	
15	1059	696	674		22	363		213	598	385	22	
16	973	653	654	1		320		277	596	319		1
17	975	654	634		20	321		255	596	341	20	
18	922	628	615		13	294		287	594	307	13	
19	924	629	608		21	295		278	594	316	21	
20	867	600	622	22		267		349	594	245		22
21	827	580	602	22		247		367	592	225		22
22	855	594	577		17	261		314	592	278	17	
23	805	569	558		11	236		341	588	247	11	
24	860	597	602	5		263		336	594	258		5
25	944	639	641	2		305		289	592	303		2
26	1029	681	721	40		348		292	600	308		40
27	1164	749	830	81		415		268	602	334		81
28	1346	840	874	34		506		132	604	472		34
29	1371	852	892	40		519		127	606	479		40
30	1252	793	874	81		459		226	604	378		81
31	1136	735	874	139		401		347	609	262		139
Total				(555)	(490)						(490)	(555)
Sec.-ft.	34,093	22,215	22,280	65		11,878	103	6,731	18,441	11,813		65
Mean	1,100	717	719	2.1		383	3.3	217	595	381		2.1
Ac.-ft.	67,622	44,063	44,192	129		23,560	204	13,351	36,577	23,431		129

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.) Table 1.

1954 Day SEPTEMBER	Computed Nat. Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Nat. Flow	Recorded Flow of St. Mary River nr. Int.Bdry.	Canada rec'd more (+) or less (-) than share +	-	U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied) Stored	Rlsd.	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) than share. +	-
1	1124	729	924	195		395		382	582	200		195
2	1153	743	1020	277		410		399	532	133		277
3	1125	729	1210	481		396		500	415	- 85		481
4	1088	711	1400	689		377		557	245	- 312		689
5	972	653	1490	837		319		633	115	- 518		837
6	985	659	1630	971		326		662	17	- 645		971
7	515	386	1250	864		129		745	10	- 735		864
8	672	503	946	443		169		283	9	- 274		443
9	950	642	804	162		308	146		0	146		162
10	823	578	714	136		245	109		0	109		136
11	735	534	654	120		201	81		0	81		120
12	704	519	615	96		185	89		0	89		96
13	692	513	583	70		179	109		0	109		70
14	628	471	552	81		157	76		0	76		81
15	604	453	545	92		151	59		0	59		92
16	887	610	830	220		277	57		0	57		220
17	567	425	1160	735		142		593	0	- 593		735
18	399	299	1320	1021		100		921	0	- 921		1021
19	488	366	1390	1024		122		902	0	- 902		1024
20	537	403	1400	997		134		863	0	- 863		997
21	586	440	1420	980		146		834	0	- 834		980
22	710	522	1430	908		188		720	0	- 720		908
23	791	562	1450	888		229		659	0	- 659		888
24	799	566	1450	884		233		651	0	- 651		884
25	800	567	1430	863		233		630	0	- 630		863
26	717	525	1420	895		192		703	0	- 703		895
27	709	521	1390	869		188		681	0	- 681		869
28	829	581	1460	879		248		631	0	- 631		879
29	775	554	1420	866		221		645	0	- 645		866
30	775	554	1360	806		221		585	0	- 585		806
31												
Total Sec.-ft.	23,139	16,318	34,667	18,349		6,821	726	14,179	1,925	- 11,528		18,349
Mean	771	544	1,156	612		227	24.2	473	64.2	- 384		612
Ac.-ft.	45,896	32,366	68,761	36,395		13,529	1,440	28,124	3,818	- 22,865		36,395

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.) Table 1.

1954 Day OCTOBER	Computed Nat. Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Nat. Flow	Recorded Flow of St. Mary River nr. Int.Bdry.	Canada rec'd more (+) less (-) than share +	Canada rec'd more (+) less (-) than share -	U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied) Stored	Storage Factors Lake Sherburne (2-day lag applied) Rlsd.	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) less (-) than share. +	U.S. used more (+) less (-) than share. -
1	660	495	1310	815		165		650	0	- 650		815
2	634	476	1250	774		158		616	0	- 616		774
3	586	440	1210	770		146		624	0	- 624		770
4	538	404	1160	756		134		622	0	- 622		756
5	562	422	1120	698		140		558	0	- 558		698
6	519	389	1080	691		130		561	0	- 561		691
7	497	373	1040	667		124		543	0	- 543		667
8	437	328	978	650		109		541	0	- 541		650
9	764	549	1010	461		215		246	0	- 246		461
10	536	402	1010	608		134		474	0	- 474		608
11	522	392	1020	628		130		498	0	- 498		628
12	563	422	1020	598		141		457	0	- 457		598
13	583	437	968	531		146		385	0	- 385		531
14	605	454	903	449		151		298	0	- 298		449
15	580	435	822	387		145		242	0	- 242		387
16	609	457	762	305		152		153	0	- 153		305
17	630	472	721	249		158		91	0	- 91		249
18	672	503	707	204		169		35	0	- 35		204
19	678	506	700	194		172		22	0	- 22		194
20	696	515	714	199		181		18	0	- 18		199
21	735	534	741	207		201		6	0	- 6		207
22	747	540	783	243		207		36	0	- 36		243
23	966	650	924	274		316	42		0	42		274
24	1386	860	1080	220		526	306		0	306		220
25	1457	895	1170	275		562	287		0	287		275
26	1131	732	1180	448		399		49	0	- 49		448
27	1009	671	1170	499		338		161	0	- 161		499
28	975	654	1120	466		321		145	0	- 145		466
29	910	622	1010	388		288		100	0	- 100		388
30	840	587	924	337		253		84	0	- 84		337
31	774	554	857	303		220		83	0	- 83		303
Total Sec.-ft.	22,801	16,170	30,464	14,294		6,631	635	8,298	0	- 7,663		14,294
Mean	736	522	983	461		214	20.5	268	0	- 247		461
Ac.-ft.	45,225	32,073	60,424	28,352		13,152	1,260	16,459	0	- 15,199		28,352

DIVISION OF ST. MARY RIVER
1954

Water Available to Canada at Spring Coulee
(Acre-feet)

Month	St. Mary River Int. Boundary	Rolph Creek Kimball	Lee Creek Cardston	Total Available at Spring Coulee
April	31,244	3,880	6,900	42,024
May	185,921	1,700	21,450	209,071
June	169,111	687	10,960	180,758
July	145,765	97	3,830	149,692
August	44,192	291	1,180	45,663
September	68,761	455	1,240	70,456
October	60,424	351	1,870	62,645
Total	705,418	7,461	47,430	760,309

DISPOSITION OF CANADIAN SHARE

Water Used in St. Mary and Milk Rivers Development
(Acre-feet)

Month	Canada's Share Natural Flow: Int. Boundary	Canadian St. Mary Canal: Spring Coulee	Magrath I.D. Canal: Spring Coulee	Total Diverted to S.M.R.D.	Available Storage from Canada's Share
April	19,327	478	0	478	18,849
May	109,152	24,790	345	25,135	84,017
June	118,126	50,070	1,370	51,440	66,686
July	108,133	92,080	2,520	94,600	13,533
August	44,063	43,180	2,740	45,920	- 1,857
September	32,366	19,440	359	19,799	12,567
October	32,073	12,420	314	12,734	19,339
Total	463,240	242,458	7,648	250,106	213,134

Storage in St. Mary Reservoir March 31, Elev. 3,599.84 = 178,000 acre-feet.
October 31, Elev. 3,605.25 = 210,000 acre-feet.

DIVISION OF ST. MARY AND MILK RIVERS
1954

Water Available to the United States in Milk River at Eastern Crossing
including Diversion from St. Mary River
(Acre-feet)

Month	St. Mary River Basin						Milk River Basin
	United States Share Nat. Flow	Lake Sherburne Stored	Lake Sherburne Rlsd.	Total Available for Diversion	Diverted to Milk River Basin	Unused	Measured Flow at Eastern Crossing*
April	6,585	2,106	7,438	11,917	0	11,917	44,303
May	89,903	13,496	8,404	84,811	8,043	76,768	48,103
June	98,283	26,523	2,533	74,293	23,308	50,985	42,964
July	87,622	16,536	1,492	72,578	34,945	37,633	38,340
Aug.	23,560	204	13,351	36,707	36,577	130	39,562
Sept.	13,529	1,440	28,124	40,213	3,818	36,395	18,647
Oct.	13,152	1,260	16,459	28,351	0	28,351	7,192
Total	332,634	61,565	77,801	348,870	106,691	242,179	239,111*

*Represents natural flow of Milk River and diversion from St. Mary River Basin. Lake Sherburne quantities are corrected for evaporation.

Storage in Lake Sherburne on March 31 = 21,410 acre-feet.
October 31 = 3,056 acre-feet.
Storage in Fresno Reservoir on March 31 = 86,129 acre-feet.
October 31 = 83,140 acre-feet.

DIVERSIONS FROM MILK RIVER
UNITED STATES
1954

(Acre-feet)

Month	Fort Belknap Canal	Paradise Canal	Harlem Canal	Harlem No. 2	Agency Canal	Dodson North	Dodson South	Vandalia Canal	Total
April	—	—	—	—	—	—	6,940	—	6,940
May	—	—	—	—	—	1,050	12,560	3,350	16,960
June	—	—	—	—	—	2,720	8,630	5,620	16,970
July	16,310	6,460	4,170	1,090	4,960	5,340	13,120	8,480	59,930
Aug.	15,160	5,780	3,250	565	2,970	3,870	15,530	2,590	49,720
Sept.	9,750	4,410	1,510	377	357	3,170	9,820	—	29,390
Oct.	4,580	—	1,230	—	—	238	1,540	—	7,590
Nov.	1,190	—	476	—	—	—	2,910	—	4,580
Total	46,990	16,650	10,640	2,030	8,290	16,390	71,050	20,040	192,080

Storage in Nelson Reservoir on March 31, 38,094 acre-feet.
on October 31, 55,095 acre-feet.

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY
1954

Water used by Canada at Cypress Lake and East End
Quantities in Second-foot-Days

Date at Int'l Boundary	Used at Cypress		Used at East End				Total Used
	Stored	Released	Stored	Released	Diverted	Return Flow	
March							
1 - 10	0.0	20.0		42.0	0.0	0.0	- 62.0
11 - 20	0.0	21.0	20.0		0.0	0.0	- 1.0
21 - 31	0.0	24.0	22.0		0.0	0.0	- 2.0
April							
1 - 10	0.0	20.0		2.0	0.0	0.0	- 22.0
11 - 20	270.0	87.0	185.0		0.0	0.0	+ 368.0
21 - 30	644.0	101.5	249.0		0.0	0.0	+ 791.5
May							
1 - 10	106.7	81.2	270.0		0.0	0.0	+ 295.5
11 - 20	163.7	82.8	204.0		0.0	0.0	+ 284.9
21 - 31	184.9	59.9		5.0	0.0	0.0	+ 120.0
June							
1 - 10	34.3	74.2	114.0		0.0	0.0	+ 74.1
11 - 20	54.4	97.1		1.0	0.0	0.0	- 43.7
21 - 30	24.1	114.2		80.0	90.7	27.2	- 106.6
July							
1 - 10	0.0	2.3	52.0		213.2	64.0	+ 198.9
11 - 20	0.0	8.5	33.0		196.6	59.0	+ 162.1
21 - 31	0.0	6.5		295.0	348.7	104.6	- 57.4
Aug.							
1 - 10	0.0	6.6		123.0	307.1	92.1	+ 85.4
11 - 20	0.0	88.9		324.0	0.0	0.0	- 412.9
21 - 31	0.0	20.0		30.0	0.0	0.0	- 50.0
Sept.							
1 - 10	0.0	42.4	1.0		2.7	0.8	- 39.5
11 - 20	0.0	33.9	4.0		0.0	0.0	- 29.9
21 - 30	0.0	61.7	13.0		0.0	0.0	- 48.7
Oct.							
1 - 10	0.0	36.2	4.0		0.0	0.0	- 32.2
11 - 20	0.0	50.0		5.0	0.0	0.0	- 55.0
21 - 31	0.0	32.6		0.0	0.0	0.0	- 32.6
Total	1482.1	1172.5	1171.0	907.0	1159.0	347.7	+ 1384.9
Mean	6.05	4.79	4.78	3.70	4.73	1.42	+ 5.65
Acre-feet	2940	2326	2323	1799	2299	690	+ 2747

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY 1954

Water used by Canada at Val Marie
Quantities in Second-foot Days

Date at Int'l Boundary	Used at Upper Val Marie			Used at Lower Val Marie			Return Flow	Total Used
	Stored	Rls'd	Diverted	Stored	Rls'd	Diverted		
March								-
1 - 10	13	0	0.0	94		0.0	0.0	+ 107.0
11 - 20	0		0.0	199		0.0	0.0	+ 199.0
21 - 31		9	0.0		8	0.0	0.0	- 17.0
April								-
1 - 10	392		0.0	1797		0.0	0.0	+ 2189.0
11 - 20		40	0.0	1057		0.0	0.0	+ 1017.0
21 - 30	241		0.0	214		0.0	0.0	+ 455.0
May								-
1 - 10		4	0.0	114		0.0	0.0	+ 110.0
11 - 20	66		0.0	580		0.0	0.0	+ 646.0
21 - 31		21	0.0		415	144.5	43.4	- 334.9
June								-
1 - 10	68		9.1	388		157.1	49.9	+ 572.3
11 - 20	20		104.6		173	296.4	120.3	+ 127.7
21 - 30		91	191.6		291	119.2	93.2	- 164.4
July								-
1 - 10	19		107.9		295	220.9	98.6	- 45.8
11 - 20		2	66.2		387	334.9	120.3	- 108.2
21 - 31		155	197.3		908	644.4	252.5	- 473.8
Aug.								-
1 - 10	54		203.0	185		372.1	172.6	+ 641.5
11 - 20		388	131.1	1293		209.6	102.2	+ 1143.5
21 - 31		390	15.3		392	14.3	8.9	- 761.3
Sept.								-
1 - 10	372		0.0		62	8.2	2.5	+ 315.7
11 - 20	31		0.0	94		7.1	2.1	+ 130.0
21 - 30	27		0.0	78		0.0	0.0	+ 105.0
Oct.								-
1 - 10	11		0.0	30		4.7	1.4	+ 44.3
11 - 20	4		0.0		117	0.0	0.0	- 113.0
21 - 31		202	0.0		164	6.4	1.9	- 361.5
Total	1318	1302	1026.1	6123	3212	2539.8	1069.8	+ 5423.1
Mean	5.38	5.31	4.19	25.0	13.1	10.4	4.37	22.1
Acre-feet	2614	2582	2035	12145	6371	5038	2122	10757

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY 1954

Quantities in Second-foot Days

Date at Int'l Boundary	Used by Canada: Cypress East End.	Used by Canada: Val Marie	Total Used by Canada	Frenchman River: Flow at Bdy.	Frenchman River: Natural Flow	United States: Share	United States: Received +or-
March							
1 - 10	- 62.0	+ 107.0	+ 45.0	195.0	240.0	120.0	+ 75.0
11 - 20	- 1.0	+ 199.0	+ 198.0	179.0	377.0	188.5	- 9.5
21 - 31	- 2.0	- 17.0	- 19.0	253.0	234.0	117.0	+ 136.0
April							
1 - 10	- 22.0	+2189.0	+ 2167.0	8403.0	10570.0	5285.0	+ 3118.0
11 - 20	+ 368.0	+1017.0	+ 1385.0	11118.0	12503.0	6251.5	+ 4866.5
21 - 30	+ 791.5	+ 455.0	+ 1246.5	2512.0	3758.5	1879.2	+ 632.8
May							
1 - 10	+ 295.5	+ 110.0	+ 405.5	857.0	1262.5	631.2	+ 225.8
11 - 20	+ 284.9	+ 646.0	+ 930.9	725.0	1655.9	828.0	- 103.0
21 - 31	+ 120.0	- 334.9	- 214.9	1239.0	1024.1	512.0	+ 727.0
June							
1 - 10	+ 74.1	+ 572.3	+ 646.4	842.1	1488.5	744.2	+ 97.9
11 - 20	- 43.7	+ 127.7	+ 84.0	3023.0	3107.0	1553.5	+ 1469.5
21 - 30	- 106.6	- 164.4	- 271.0	1072.0	801.0	400.5	+ 671.5
July							
1 - 10	+ 198.9	- 45.8	+ 153.1	525.1	678.2	339.1	+ 186.0
11 - 20	+ 162.1	- 108.2	+ 53.9	335.3	389.2	194.6	+ 140.7
21 - 31	- 57.4	- 473.8	- 531.2	454.0	- 77.2	- 38.6	+ 492.6
Aug.							
1 - 10	+ 85.4	+ 641.5	+ 726.9	955.7	1682.6	841.3	+ 114.4
11 - 20	- 412.9	+1143.5	+ 730.6	998.8	1729.4	864.7	+ 134.1
21 - 31	- 50.0	- 761.3	- 811.3	1131.0	319.7	159.8	+ 971.2
Sept.							
1 - 10	- 39.5	+ 315.7	+ 276.2	215.2	491.4	245.7	- 30.5
11 - 20	- 29.9	+ 130.0	+ 100.1	152.3	252.4	126.2	+ 26.1
21 - 30	- 48.7	+ 105.0	+ 56.3	319.8	376.1	188.0	+ 131.8
Oct.							
1 - 10	- 32.2	+ 44.3	+ 12.1	986.0	998.1	499.0	+ 487.0
11 - 20	- 55.0	- 113.0	- 168.0	964.0	796.0	398.0	+ 566.0
21 - 31	- 32.6	- 361.5	- 394.1	346.0	- 48.1	- 24.0	+ 370.0
Total	+ 1384.9	+5423.1	+ 6808.0	37801.3	44609.3	22304.4	+ 15496.9
Mean	+ 5.65	+ 22.1	+ 27.8	154	182	91.0	+ 63.3
Acre-feet	+ 2747	+10757	+13503	74978	88481	44240	+ 30738
Estimated Acre-feet Total of Minor Diversions shown in Table 4			+ 1505		1505	752	- 752
			+15008	74978	89986	44992	+ 29986

DIVERSIONS FROM THE EASTERN TRIBUTARIES OF MILK RIVER IN CANADA

Quantities in Acre-feet

Lodge Creek Tributary Basin

Spangler Ditch near Govenlock		1750
Middle Creek near Alberta Boundary	+	2510
Total of 12 Minor Diversions Detailed in Appendix	#	136
Total Diverted by Canada		4396

450 acre-feet diverted by Mitchell Ranching Company and listed as a Minor Diversion in Appendix is included in Middle Creek near Alberta Boundary.

\+ Total flow of this station stored in Middle Creek Reservoir. (Lodge Creek at International Boundary = 6,180 acre-feet)

Battle Creek Tributary Basin

Diverted by Cypress Lake West Inflow Canal	4580	
Returned by Cypress Lake West Outflow Canal	3210	1370
Vidora Ditch near Consul		1590
Richardson Ditch near Consul		1490
McKinnon Ditch near Consul		1240
Stirling and Nash Ditch near Consul		1140
Total of 39 Minor Diversions Detailed in Appendix		803
Total Diverted by Canada		7633

(Battle Creek at International Boundary = 25,550 acre-feet)

Frenchman River Tributary Basin

7633
33183

Belanger Creek Diversion to Cypress Lake	2940	
Returned by Cypress Lake East Outflow Canal	2326	614
Diverted to East End Reservoir	2323	
Released from East End Reservoir	1799	524
Diverted to Val Marie Reservoirs	14759	
Released from Val Marie Reservoirs	8953	5806
East End Irrigation District Canal	2299	
Val Marie Irrigation District West Canals	2035	
Val Marie Main Canal	5038	
	9372	
Estimated Return Flow	2812	6560
Total of 42 Minor Diversions Detailed in Appendix		1505
Total Diverted by Canada		15009

(Frenchman River at International Boundary = 74,978 acre-feet)

MEASURED DIVERSIONS FROM THE EASTERN TRIBUTARIES

OF MILK RIVER IN THE UNITED STATES

1954

(Quantities in Acre-feet)

Irrigator	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
				Lodge Creek					
North Chinook Canal	0	2,010	350	763	0	41	6	0	3,170
				Battle Creek					
Matheson Canal	0	0	0	298	87	253	0	0	638
Pumping	-	-	-	-	-	-	-	-	a200
				Frenchman River					
Frenchman Canal	0	b2,670	258	1,600	1,260	789	110	240	6,930
Total	-	-	-	-	-	-	-	-	10,940

a Estimated use by pumping from Battle Creek to land under the Matheson canal.

b Approximately 1,870 acre-feet of this amount returned to Frenchman River through breaks in canal bank below gage.

Table 6

Measured Run-off in Acre-feet of Eastern Tributaries of Milk River at International Boundary for period March to October, 1954.

STATION	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Lodge Creek	0	4870	431.0	801.0	7.7	0	0	68.0	6180
Woodpile Coulee	0	753	6.1	3.4	0.2	3.0	13.0	22.0	801
Battle Creek	1300.0	9280	3430.0	4020.0	1260.0	2160.0	1860.0	2240.0	25550
Lyons Coulee	0	1980	13.0	0	0	0	0	0	1990
East Br. Battle Cr.	13.0	3610	4.8	63.0	0	57.0	5.4	24.0	3780
Whitewater Creek	12.0	4310	46.0	48.0	11.0	8.5	5.4	7.7	4450
Frenchman River	1240.0	43700	5600.0	9790.0	2610.0	6120.0	1360.0	4550.0	74970
McEachern Creek	273.0	11580	82.0	824.0	2.6	319.0	0.4	0	13080
Horse Creek	260.0	3720	57.0	467.0	25.0	308.0	26.0	7.9	4870
Rock Creek	1900.0	14330	1010.0	3060.0	548.0	1080.0	413.0	379.0	22720
									158,400
Monthly Totals	4998.0	98133	10679.9	19076.4	4464.5	10055.5	3683.2	7298.6	

GAUGING STATIONS OPERATED JOINTLY BY
CANADA AND UNITED STATES
IN ST. MARY AND MILK RIVER DRAINAGE BASINS

- 1954 -

Map Index	Stream and Location	Remarks
	St. Mary River Basin	
$5AE_1$	St. Mary River near International Boundary	Int.[a]
$5AE_{0.5}$	Swiftcurrent Creek at Many Glacier, Mont.	Int.[a]
$5AE_{0.9}$	Lake Sherburne at Sherburne, Montana	Int.R[a]
$5AE_{0.6}$	Swiftcurrent Creek at Sherburne, Mont.	Int.[a]
$5AE_{0.2}$	United States St. Mary Canal at St. Mary Crossing, near Babb, Mont.	Int.[a]
$5AE_{0.3}$	United States St. Mary Canal at Hudson Bay Divide near Browning, Mont.	Int.[a]
	Milk River Basin	
$11AA_5$	Milk River at Milk River, Alberta.	Int.[a]
$11AA_{0.2}$	Milk River at Eastern Crossing of International Boundary	Int.[a]
$11AA_{0.3}$	North Branch of Milk River above St. Mary Canal, near Browning, Mont.	Int.[a]
$11AA_1$	North Branch of Milk River near Int. Bdy.	Int.[a]
$11AA_{25}$	South Branch of Milk River near Int. Bdy.	Int.[a]
$11AD_{0.1}$	Whitewater Creek near International Bdy.	Int.[a]
	Lodge Creek Tributary Basin	
$11AB_{83}$	Lodge Creek below McRae Coulee at Int. Bdy.	Int.[a]
	Battle Creek Tributary Basin	
$11AB_{76}$	Battle Creek above Cypress Lake West Inflow Canal near West Plains, Sask.	Int.[a]
$11AB_{27}$	Battle Creek at International Boundary	Int.[a]
$11AB_{0.1}$	Woodpile Coulee near International Bdy.	Int.[a]

Map Index	Stream and Location	Remarks
	Battle Creek Tributary Basin	
$11AB_{0.3}$	East Branch of Battle Creek near Int. Bdy.	Int.[a]
$11AB_{75}$	Lyons Coulee at International Boundary	Int.[a]
$11AB_{78}$	Cypress Lake West Inflow Canal	Int.[a]
$11AB_{77}$	Cypress Lake West Outflow Canal	Int.[a]
	Frenchman River Tributary Basin	
$11AC_{37}$	Cypress Lake Reservoir near Vidora, Sask.	Int. R[a]
$11AC_{64}$	Belanger Creek Diversion to Cypress Lake	Int.[a]
$11AC_{60}$	Cypress Lake East Outflow Canal	Int.[a]
$11AC_{18}$	Frenchman River above East End Reservoir	Int.[a]
$11AC_{55}$	East End Reservoir at East End, Sask.	Int. R[a]
$11AC_{52}$	East End Canal at East End, Sask.	Int.[a]
$11AC_{1}$	Frenchman River below East End Reservoir	Int.[a]
$11AC_{57}$	Frenchman River at Morrison's near East End, Saskatchewan.	Int.[a]
$11AC_{23}$	Frenchman River at 50 Mile near Bracken, Sask.	Int.[a]
$11AC_{63}$	Val Marie West Reservoir, near Val Marie, Sask.	Int. R[a]
$11AC_{65}$	Val Marie West Gravity Canal	Int.[a]
$11AC_{56}$	Val Marie Reservoir near Val Marie, Sask.	Int. R[a]
$11AC_{54}$	Val Marie Main Canal	Int.[a]
$11AC_{51}$	Frenchman River below Val Marie, Sask.	Int.[a]
$11AC_{41}$	Frenchman River at International Boundary	Int.[a]

Map Index	Stream and Location	Remarks
	Rock Creek Tributary Basin	
$11AE_{0.2}$	Rock Creek at International Boundary	Int.[a]
$11AE_{0.3}$	Horse Creek near International Boundary	Int.[a]
$11AE_{0.4}$	McEachern Creek near International Boundary	Int.[a]

GAUGING STATIONS OPERATED INDEPENDENTLY
BY CANADA OR UNITED STATES
IN ST. MARY AND MILK RIVER DRAINAGE BASINS
- 1954 -

	St. Mary River Basin	
	Grinnell Creek near Many Glacier	U.S.[c]
	St. Mary River near Babb, Montana	U.S.[c]
	St. Mary Lake near St. Mary, Montana	U.S.[c]
	Lower St. Mary Lake near Babb, Montana	U.S.[c]
$5AE_{0.1}$	United States St. Mary Canal at Intake near Babb, Montana	U.S.[c]
$5AE_{6}$	St. Mary River near Lethbridge	Canada[c]
$5AE_{5}$	Rolph Creek near Kimball, Alberta	Canada[a]
$5AE_{2}$	Lee Creek at Cardston, Alberta	Canada[a]
$5AE_{25}$	St. Mary Reservoir near Spring Coulee, Alta.	Canada R[a]
$5AE_{26}$	Canadian St. Mary Canal near Spring Coulee	Canada[a]
$5AE_{21}$	Magrath Irrigation District Canal near Spring Coulee, Alberta	Canada[a]
$5AE_{16}$	Pothole Creek at Russells Ranch	Canada[c]
$5AD_{20}$	Six Mile Coulee Spillway near Lethbridge	Canada[c]

Map Index	Stream and Location	Remarks
	Milk River Basin	
	Lodge Creek Tributary Basin	
$11AB_{82}$	Lodge Creek near Alberta Boundary	Canada[c]
$11AB_{9}$	Middle Creek near Alberta Boundary	Canada[a]
$11AB_{60}$	Spangler Ditch near Govenlock, Sask.	Canada[a]
2	North Chinook Canal near Havre, Montana	U.S.[b]
	Battle Creek Tributary Basin	
$11AB_{81}$	Battle Creek at Ranger Station	Canada[c]
$11AB_{84}$	Vidora Ditch near Consul, Sask.	Canada[a]
$11AB_{58}$	Richardson Ditch near Consul, Sask.	Canada[a]
$11AB_{44}$	McKinnon Ditch near Consul, Sask.	Canada[a]
$11AB_{18}$	Stirling and Nash Ditch near Consul, Sask.	Canada[a]
3	Matheson Canal near Chinook, Montana	U.S.[b]
	Frenchman River Tributary Basin	
$11AC_{66}$	Val Marie West Pumping Canal near Val Marie, Saskatchewan	Canada[a]
4	Frenchman Canal near Saco, Montana	U.S.[b]

Int. - International Gauging Station

Int.R - International Station on Reservoir

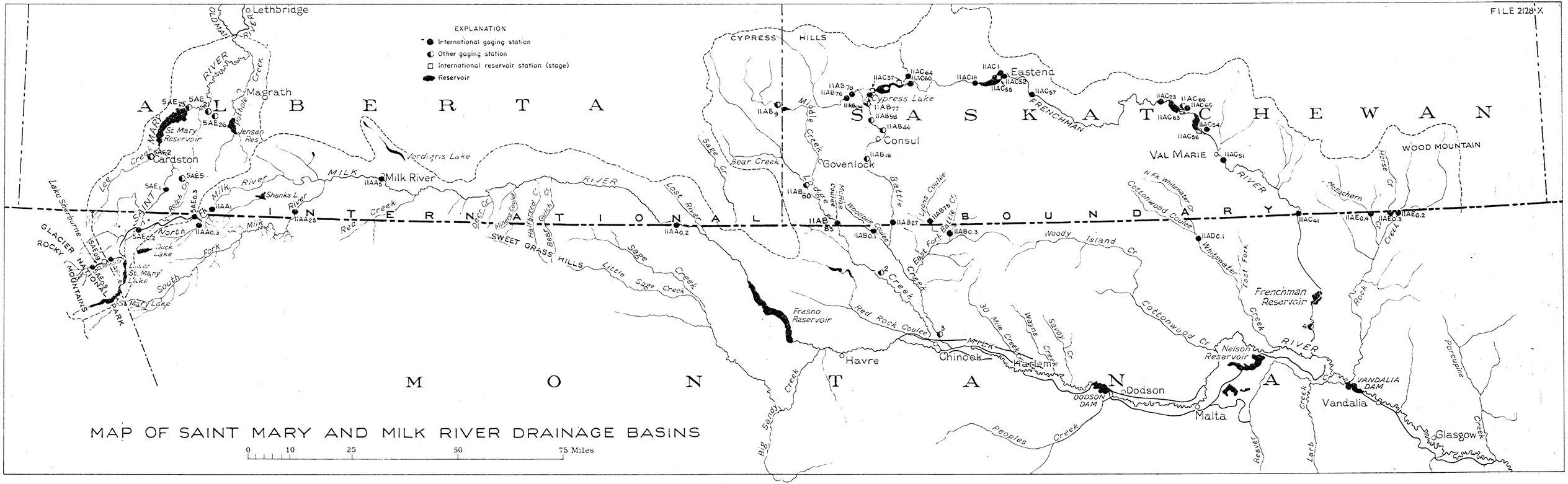
United States - Denotes operation by United States Geological Survey.

Canada - Denotes operation by Water Resources Division, Canada.

a - Monthly and daily discharge data and stream measurements contained in Appendix.

b - Monthly Discharge data only tabulated in report.

c - Data not used for division purposes and not included in report or appendix.



MAP OF SAINT MARY AND MILK RIVER DRAINAGE BASINS