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

by
J. D. McLEOD
representing Canada

and
C. G. PAULSEN
representing United States

1956

WATER SURVEY OF CANADA
CALGARY DISTRICT OFFICE

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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, 1956.

Respectfully submitted,

J. D. McLeod
Accredited Officer of Her Majesty.

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

March 22 , 1957.
(date)

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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 1956 by representatives of the Water Resources Branch (Canada) and the United States Geological Survey.

Mr. J. D. McLeod, Chief Engineer, 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 35 international stations by engineers of the Water Resources Branch (Canada) under the direction of Mr. Collier and of the United States Geological Survey under the supervision of Mr. Heidel. Data for another 20 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-fifth 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 104.4 inches or 162 percent of 64.4 inches, the mean for the previous 34 years of record. The water content was found to be 41.2 inches or 144 percent of 28.7 inches, the mean for the previous 34 years of record. The run-off during May, June and July, measured at the gauging station on Swiftcurrent Creek at Many Glacier was 75,360 acre-feet or 111 percent of 67,906 acre-feet, the average of the previous 33 years of record.

The total natural flow of the St. Mary River at the International Boundary for the year November 1, 1955, to October 31, 1956, was 741,415 acre-feet. Of this total, 652,395 acre-feet occurred during the irrigation

season, April 1 to October 31. The natural flow during the irrigation season was 111 percent of 588,500 acre-feet, the average of the previous 53 years of record. Of the total natural flow there was delivered to Canada 541,300 acre-feet, 470,470 acre-feet during the irrigation season and 70,830 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, 1956, was 112,800 acre-feet or 98 percent of 115,500 acre-feet, the estimated average for the previous 44 years of record.

Eastern Tributaries of Milk River

The fourth annual snow survey in the basins of the eastern tributaries of the Milk River in Canada was conducted by the Water Resources Branch, Canada, between February 27 and March 1, 1956. The average snow cover at the observation points was found to be 13.0 inches as compared to 10.4 inches in 1955, 4.4 inches in 1954 and 10.3 inches in 1953. The average water content was found to be 3.4 inches as compared to 2.8 inches in 1955, 1.2 inches in 1954 and 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, 1956, was 79,600 acre-feet or 52 percent of 151,900 acre-feet, the average for the previous 29 years. The quantities delivered to the United States by the various tributaries are listed in Table 6.

During the season a total of 29,878 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 11,060 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. Lake Sherburne (formerly called Sherburne Lake Reservoir), Daily Storage or Release.
2. United States St. Mary Canal at St. Mary Crossing near Babb (United States Diversion from St. Mary River Basin).
3. St. Mary River at International Boundary (Quantity delivered to Canada).
4. 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 1, 2 and 3 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 2 and 3 above, and subtracting the quantity measured at station 1; 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 station 1.

- (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 made during the 1956 season.

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, 1955, to March 31, 1956, 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 April 20 and October 18 and water was delivered to the North Branch of the Milk River from April 22 to October 25.

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 eventu-

ally become available to Canada. The discharge of 195,072 acre-feet which passed the gauging station on the United States St. Mary Canal at St. Mary Crossing between April 20 and October 18 was considered to be the quantity diverted from the St. Mary River by the United States. A total of 191,448 acre-feet was delivered to the North Branch of Milk River at Hudson Bay Divide during the season, from where it was conveyed to irrigation projects in Montana via the Milk River.

Storage in Lake Sherburne was 4,930 acre-feet on October 31, 1955, and had increased to 22,840 acre-feet by March 31, 1956, and to 61,530 acre-feet by July 25, 1956. Thereafter, water was released at varying rates of flow until the end of the season. On October 31, 1956, the storage had been reduced to 8,450 acre-feet.

Canada diverted 218,369 acre-feet of water from the St. Mary River Reservoir in 1956 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 1956. 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 except as an adjustment to the totals for the season. The estimated quantities reported to date for 1956 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 1956. 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, 1956, was 49,532 acre-feet, of which each country was entitled to fifty percent. Canada used 15,521 acre-feet, including an estimated 1,546 acre-feet in minor diversions as shown in Table 4, and delivered 34,012 acre-feet to the United States.

Lodge Creek

Canada diverted or stored a total of 4,421 acre-feet in the Lodge Creek basin during the period March 1 to October 31, 1956, and delivered 12,750 acre-feet to the United States. The Canadian use mentioned above includes 2,040 acre-feet diverted into the Spangler ditch near Govenlock, 2,150 acre-feet stored in Middle Creek Reservoir and an additional 231 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 delivered 20,180 acre-feet to the United States, during the period March 1 to October 31, 1956, which included a net release from Canadian storage in Cypress Lake of 3,319 acre-feet. During this period Canada diverted 7,850 acre-feet to the various irrigation projects in the basin and an additional 903 acre-feet in minor diversions. No allowance for return flow from irrigation projects is included in these figures which are detailed in Table 4.

Description of Tables

The seven 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 during the irrigation season.

Table A is a summary of the mean monthly natural flow of the St. Mary River at International Boundary.

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 at 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 at 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 1956.

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 the 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 in 1956.

Table 5 shows the available information on quantities diverted from the Eastern Tributaries of Milk River in the United States in 1956.

Table 6 shows the measured monthly run-off, in acre-feet, of the Eastern Tributaries of Milk River at the international boundary for the period March 1 to October 31, 1956.

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 1956 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 1956 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.

Summary of Mean Monthly Natural Flow in Second-feet
of
St. Mary River at International Boundary

	Year	April	May	June	July	August	September	October	Total Acre-Ft. Apr.-Oct.
	1902						604 ^d	477 ^d	65,235 ^e
	1903	568	1726	5200	2924	1404	1109	917	837,816
	1904	724	2022	2936	1903	933	420	221	555,162
	1905	304	1215	2461	1642	847	371	772	461,845
	1906	481	1504	2285	1826	946	628	756	511,287
	1907	489	1932	4259	3117	1335	1214	632	786,048
	1908	844	2485	6390	2488	785	462	485	841,793
	1909	606 ^e	1907	5646	3097	1466	645	453	836,023
	1910	1068	2240	2208	1200	562	544	1114	541,914
	1911	527	2070	3651	1783	1044	1377	676	673,261
	1912	527	1984	2295	1644	882	547	423	503,732
	1913	749	1913	4519	2024	1162	574	448	688,735
	1914	637	2230	2298	1430	719	584	841	530,307
	1915	575	1644	2251	1722	969	842	739	530,287
	1916	664	1707	4634	3463	1229	947	391	789,108
	1917	453	2215	4104	2427	759	470	378	654,520
	1918	661	1875	3093	1185	763	489	394	511,779
	1919	340	1978	2116	919	498	336	189	386,479
	1920	429	1720	3133	2355	800	572	557	579,973
	1921	646	2664	3713	1809	755	416	499	636,167
	1922	282	2293	3835	1578	642	420	301	565,880
	1923	422	2286	3359	1726	788	482	560	583,224
	1924	393	2080	3152	1534	728	397	302	520,145
	1925	1272	3461	3512	1893	807	542	406	720,710
	1926	670	1264	1078	818	405	751	1142	371,849
	1927	600	2685	5434	2812	1274	1509	1143	935,423
	1928	546	3695	2940	2594	921	513	863	734,376
	1929	314	1837	2558	1272	493	291	288	427,377
	1930	1477	2425	2489	1264	511	370	314	535,575
	1931	224	1957	1838	796	592	464	291	373,888
	1932	567	2497	2896	1409	595	307	240	515,819
	1933	416	1764	4339	2169	766	492	685	643,242
	1934	1734	3441	2929	1155	540	323	269	629,044
	1935	392	1841	2716	1516	630	387	235	467,568
	1936	617	2417	2153	823	420	252	162	414,845
	1937	267	1797	3752	1409	475	298	285	500,701
	1938	696	2611	3323	1622	510	360	322	571,983
	1939	640	2271	1721	1069	459	292	188	402,996
	1940	381	1860	1802	737	382	427	415	364,056
	1941	364	1333	1429	879	359	520	635	334,846
	1942	676	1890	2773	1824	754	526	397	535,668
	1943	1240	1996	3722	2691	810	376	328	675,767
	1944	197	1273	1634	809	536	424	374	318,121
	1945	153	2000	3382	1455	457	486	421	505,676

(Continued on next page)

Summary of Mean Monthly Natural Flow in Second-feet
of
St. Mary River at International Boundary

Year	April	May	June	July	August	September	October	Total Acre-ft. Apr.-Oct.
1946	658	2361	2731	1500	571	495	521	535,571
1947	913	2729	2585	1634	657	526	1250	624,962
1948	621	2963	5486	1576	758	329	266	725,024
1949	526	2337	2272	991	471	532	404	456,637
1950	462	1969	4537	3159	1100	492	929	766,778
1951	819	3366	3431	3230	1128	1209	1390	885,233
1952	969	2408	2204	1433	839	409	264	517,093
1953	635	2716	5534	2519	887	438	283	786,960
1954	435	3237	3637	3184	1100	771	736	795,874
1955	267	1491	3755	2248	799	363	810	589,739
Average	606	2181	3248	1817	774	553	534	588,500
Average Ac-ft.	36,060	134,104	193,269	111,723	47,591	32,906	32,834	588,500

This table contains revisions to formerly reported data. d - 1902 data not used.
e - Average of 1903 to 1955 Aprils used. z - partial record not included in average.

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

1956 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 (+) or less (-) or than share		U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) or than share.	
				+	-		Stored	Reled.			+	-
1	259	194	215	21		65	44		0	44		21
2	245	184	195	11		61	50		0	50		11
3	240	180	185	5		60	55		0	55		5
4	203	152	170	18		51	33		0	33		18
5	198	148	165	17		50	33		0	33		17
6	198	148	165	17		50	33		0	33		17
7	199	149	160	11		50	39		0	39		11
8	224	168	180	12		56	44		0	44		12
9	244	183	200	17		61	44		0	44		17
10	269	202	225	23		67	44		0	44		23
11	254	190	210	20		64	44		0	44		20
12	254	190	210	20		64	44		0	44		20
13	280	210	225	15		70	55		0	55		15
14	277	208	210	2		69	67		0	67		2
15	336	252	264	12		84	72		0	72		12
16	415	311	310		1	104	105		0	105	1	
17	543	407	360		47	136	183		0	183	47	
18	565	424	380		44	141	185		0	185	44	
19	618	464	426		38	154	192		0	192	38	
20	694	514	475		39	180	217		2	219	39	
21	854	594	477		117	260	288		89	377	117	
22	952	643	392		251	309	266		294	560	251	
23	1024	679	489		190	345	205		330	535	190	
24	1000	667	538		129	333	72		390	462	129	
25	1008	671	612		59	337	0		396	396	59	
26	978	656	658	2		322		78	398	320		2
27	890	612	658	46		278		166	398	232		46
28	888	611	642	31		277		150	396	246		31
29	826	580	635	55		246		205	396	191		55
30	825	579	612	33		246		183	396	213		33
31												
Total Sec.-ft.	15,760	11,170	10,643	(388)	(915) 527	4,590	2,414	782	3,485	5,117	(915) 527	(388)
Mean	525	372	355		17.6	153	80	26.1	116	171	17.6	
Ac.-ft.	31,260	22,155	21,110		1,045	9,104	4,788	1,551	6,912	10,149	1,045	

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

1956 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 (+) or less (-) or 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 (-) or than share. + -	
1	824	579	605	26		245		181	400	219		26
2	793	563	590	27		230		197	400	203		27
3	758	546	545		1	212		182	395	213	1	
4	696	515	517	2		181		216	395	179		2
5	659	494	510	16		165		244	393	149		16
6	670	502	517	15		168		238	391	153		15
7	699	516	538	22		183		244	405	161		22
8	734	534	496		38	200		231	469	238	38	
9	966	650	695	45		316		217	488	271		45
10	1003	668	695	27		335		182	490	308		27
11	1077	705	665		40	372		86	498	412	40	
12	1083	708	650		58	375		71	504	433	58	
13	1114	724	642		82	390		30	502	472	82	
14	1090	712	628		84	378		40	502	462	84	
15	1112	723	665		58	389		71	518	447	58	
16	1285	809	775		34	476		34	544	510	34	
17	1647	990	1060	70		657	22		565	587		70
18	2403	1368	1570	202		1035	239		594	833		202
19	3350	1842	2050	208		1508	685		615	1300		208
20	4276	2305	2690	385		1971	958		628	1586		385
21	4982	2658	3690	1032		2324	664		628	1292		1032
22	5915	3124	4580	1456		2791	713		622	1335		1456
23	6394	3364	5160	1796		3030	616		618	1234		1796
24	6083	3209	5350	2141		2874	134		599	733		2141
25	5678	3006	5320	2314		2672		241	599	358		2314
26	5513	2923	5270	2347		2590		353	596	243		2347
27	5368	2851	5110	2259		2517		336	594	258		2259
28	5328	2831	5000	2169		2497		264	592	328		2169
29	5220	2777	4950	2173		2443		318	588	270		2173
30	4998	2666	4740	2074		2332		330	588	258		2074
31	4878	2606	4580	1974		2272		296	594	298		1974
Total Sec.-ft.	86,596	48,468	70,853	(22,780) 22,385	(395)	38,128	4,031	4,602	16,314	15,743	(395)	(22,780) 22,385
Mean	2,793	1,563	2,286	722		1,230	130	148	526	508		722
Ac.-ft.	171,761	96,135	140,535	44,400		75,626	7,995	9,128	32,358	31,226		44,400

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

1956 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 (-) or than share		U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) or than share.	
				+	-		Stored	Reled.			+	-
1	4926	2630	4580	1950		2296		250	596	346		1950
2	5147	2741	4740	1999		2406		187	594	407		1999
3	5514	2924	4790	1866		2590	128		596	724		1866
4	5595	2964	4740	1776		2631	256		599	855		1776
5	5437	2886	4740	1854		2551	96		601	697		1854
6	5125	2729	4500	1771		2396	26		599	625		1771
7	4770	2552	4180	1628		2218		4	594	590		1628
8	3967	2150	3580	1430		1817		205	592	387		1430
9	3357	1845	3110	1265		1512		352	599	247		1265
10	3008	1671	2770	1099		1337		365	603	238		1099
11	3441	1887	2730	843		1554	110		601	711		843
12	3984	2159	2650	491		1825	733		601	1334		491
13	3864	2099	2480	381		1765	781		603	1384		381
14	3500	1917	2330	413		1583	565		605	1170		413
15	3303	1818	2250	432		1485	450		603	1053		432
16	3407	1870	2370	500		1537	430		607	1037		500
17	3404	1869	2390	521		1535	413		601	1014		521
18	3349	1841	2230	389		1508	520		599	1119		389
19	3259	1796	2080	284		1463	578		601	1179		284
20	3301	1817	2060	243		1484	642		599	1241		243
21	3336	1835	2060	225		1501	675		601	1276		225
22	3412	1873	2000	127		1539	811		601	1412		127
23	3096	1715	1850	135		1381	650		596	1246		135
24	2879	1606	1790	184		1273	561		528	1089		184
25	2754	1544	1620	76		1210	538		596	1134		76
26	2592	1463	1500	37		1129	493		599	1092		37
27	2419	1376	1360		16	1043	465		594	1059	16	
28	2244	1289	1300	11		955	354		590	944		11
29	2220	1277	1300	23		943	328		592	920		23
30	2316	1325	1280		45	991	437		599	1036	45	
31												
Total				(21,953)	(61)						(61)	(21,953)
Sec.-ft.	108,926	59,468	81,360	21,892		49,458	11,040	1,363	17,889	27,566		21,892
Mean	3,631	1,982	2,712	730		1,649	368	45.4	596	919		730
Ac.-ft.	216,052	117,953	161,375	43,422		98,099	21,898	2,703	35,482	54,676		43,422

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

1956 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 (+) or less (-) than share		U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) than share.	
				+	-		Stored	Reled.			+	-
1	2297	1315	1240		75	982	458		599	1057	75	
2	2065	1199	1150		49	866	319		596	915	49	
3	2452	1393	1490	97		1059	344		618	962		97
4	2556	1445	1680	235		1111	269		607	876		235
5	2552	1443	1510	67		1109	439		603	1042		67
6	2495	1414	1410		4	1081	482		603	1085	4	
7	2449	1391	1330		61	1058	518		601	1119	61	
8	2334	1334	1280		54	1000	455		599	1054	54	
9	2212	1273	1230		43	939	386		596	982	43	
10	2184	1259	1190		69	925	398		596	994	69	
11	2292	1313	1280		33	979	416		596	1012	33	
12	2334	1334	1330		4	1000	408		596	1004	4	
13	2314	1324	1300		24	990	420		594	1014	24	
14	2258	1296	1290		6	962	376		592	968	6	
15	2310	1322	1280		42	988	434		596	1030	42	
16	2212	1273	1220		53	939	393		599	992	53	
17	2161	1247	1170		77	914	395		596	991	77	
18	2035	1184	1120		64	851	321		594	915	64	
19	1963	1148	1050		98	815	323		590	913	98	
20	1881	1107	980		127	774	311		590	901	127	
21	1802	1068	940		128	734	276		586	862	128	
22	1855	1094	950		144	761	319		586	905	144	
23	1792	1063	970		93	729	234		588	822	93	
24	1695	1014	940		74	681	167		588	755	74	
25	1684	1009	920		89	675	174		590	764	89	
26	1628	981	910		71	647	126		592	718	71	
27	1603	968	910		58	635	99		594	693	58	
28	1452	893	860		33	559		0	592	592	33	
29	1410	872	818		54	538		0	592	592	54	
30	1329	831	769		62	498		30	590	560	62	
31	1222	778	711		67	444		75	586	511	67	
Total Sec.-ft.	62,828	36,585	35,228	(399)	(1756) 1,357	26,243	9,260	105	18,445	27,600	(1756) 1,357	(399)
Mean	2,027	1,180	1,136		43.8	847	299	3.4	595	890	43.8	
Ac.-ft.	124,618	72,565	69,874		2,692	52,052	18,367	208	36,585	54,744	2,692	

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

1956 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 (-) or than share		U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) or than share.	
				+	-		Stored	Reled.			+	-
1	1200	767	655		112	433		41	586	545	112	
2	1220	777	655		122	443		25	590	565	122	
3	1170	752	632		120	418		52	590	538	120	
4	1121	727	566		161	394		29	584	555	161	
5	1199	766	504		262	433	113		582	695	262	
6	1003	668	452		216	335		25	576	551	216	
7	1049	691	458		233	358	18		573	591	233	
8	1039	686	478		208	353		17	578	561	208	
9	908	621	524		97	287		198	582	384	97	
10	954	644	610		34	310		244	588	344	34	
11	806	570	640	70		236		424	590	166		70
12	860	597	671	74		263		403	592	189		74
13	854	594	679	85		260		419	594	175		85
14	811	572	671	99		239		454	594	140		99
15	749	541	663	122		208		506	592	86		122
16	727	530	632	102		197		491	586	95		102
17	726	530	610	80		196		468	584	116		80
18	723	528	602	74		195		463	584	121		74
19	752	543	595	52		209		425	582	157		52
20	702	518	580	62		184		458	580	122		62
21	671	502	559	57		169		468	580	112		57
22	636	477	545	68		159		485	576	91		68
23	603	452	531	79		151		504	576	72		79
24	558	418	497	79		140		508	569	61		79
25	588	441	458	17		147		435	565	130		17
26	638	478	452		26	160		379	565	186	26	
27	681	507	504		3	174		390	567	177	3	
28	682	508	504		4	174		391	569	178	4	
29	640	480	510	30		160		441	571	130		30
30	662	496	510	14		166		421	573	152		14
31	729	531	524		7	198		371	576	205	7	
Total Sec.-ft.	25,661	17,912	17,471	(1164)	(1605) 441	7,749	131	9,935	17,994	8,190	(1605) 441	(1164)
Mean	828	578	564		14.2	250	4.2	320	580	264	14.2	
Ac.-ft.	50,898	35,528	34,653		875	15,370	260	19,706	35,691	16,245	875	

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

1956 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 (-) or than share		U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) or than share.	
				+	-		Stored	Reled.			+	-
1	722	528	510		18	194		364	576	212	18	
2	675	504	504	0		171		402	573	171		0
3	620	465	497	32		155		446	569	123		32
4	591	443	471	28		148		447	567	120		28
5	573	430	452	22		143		444	565	121		22
6	559	419	426	7		140		428	561	133		7
7	486	364	406	42		122		477	557	80		42
8	492	369	380	11		123		442	554	112		11
9	466	350	356	6		116		442	552	110		6
10	471	353	338		15	118		417	550	133	15	
11	431	323	320		3	108		437	548	111	3	
12	427	320	314		6	107		431	544	113	6	
13	443	332	314		18	111		415	544	129	18	
14	384	288	308	20		96		470	546	76		20
15	432	324	314		10	108		428	546	118	10	
16	391	293	296	3		98		449	544	95		3
17	342	256	290	34		86		492	544	52		34
18	379	284	284		0	95		449	544	95	0	
19	398	298	284		14	100		430	544	114	14	
20	321	241	278	37		80		501	544	43		37
21	319	239	290	51		80		513	542	29		51
22	405	304	278		26	101		415	542	127	26	
23	372	279	272		7	93		442	542	100	7	
24	379	284	260		24	95		421	540	119	24	
25	340	255	249		6	85		449	540	91	6	
26	386	290	278		12	96		438	546	108	12	
27	330	248	296	48		82		512	546	34		48
28	328	246	314	68		82		534	548	14		68
29	364	273	314	41		91		500	550	50		41
30	407	305	320	15		102		463	550	87		15
31												
Total Sec.-ft.	13,233	9,907	10,213	(465) 306	(159)	3,326		13,498	16,518	3,020	(159)	(465) 306
Mean	441	330	340	10.2		111		450	551	101		10.2
Ac.-ft.	26,247	19,650	20,257	607		6,597		26,773	32,763	5,990		607

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

1956 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 (+) or less (-) or than share		U.S. share of St. Mary River.	Storage Factors Lake Sherburne (2-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. used more (+) or less (-) or than share.	
				+	-		Stored	Rlsd.			+	-
1	451	338	320		18	113		423	554	131	18	
2	508	381	260		121	127		300	548	248	121	
3	473	355	266		89	118		341	548	207	89	
4	529	397	260		137	132		265	534	269	137	
5	539	404	320		84	135		299	518	219	84	
6	519	389	386		3	130		395	528	133	3	
7	503	377	400	23		126		427	530	103		23
8	502	376	386	10		126		414	530	116		10
9	573	430	368		62	143		323	528	205	62	
10	526	394	362		32	132		366	530	164	32	
11	253	190	249	59		63		510	514	4		59
12	312	234	222		12	78		400	490	90	12	
13	532	399	302		97	133		222	452	230	97	
14	517	388	374		14	129		237	380	143	14	
15	600	450	393		57	150		67	274	207	57	
16	634	476	497	21		158		33	170	137		21
17	433	325	559	234		108		200	74	- 126		234
18	300	225	559	334		75		261	2	- 259		334
19	512	384	478	94		128	34		0	34		94
20	821	577	458		119	244	363		0	363	119	
21	746	540	406		134	206	340		0	340	134	
22	600	450	393		57	150	207		0	207	57	
23	549	412	374		38	137	175		0	175	38	
24	551	413	374		39	138	177		0	177	39	
25	518	388	374		14	130	144		0	144	14	
26	508	381	362		19	127	146		0	146	19	
27	472	354	344		10	118	128		0	128	10	
28	486	364	356		8	122	130		0	130	8	
29	492	369	362		7	123	130		0	130	7	
30	468	351	338		13	117	130		0	130	13	
31	484	363	332		31	121	152		0	152	31	
Total Sec.-ft.	15,911	11,874	11,434	(775)	(1215) 440	4,037	2,256	5,483	7,704	4,477	(1215) 440	(775)
Mean	513	383	369		14.2	130	73	177	249	144	14.2	
Ac.-ft.	31,559	23,552	22,679		873	8,007	4,475	10,875	15,281	8,880	873	

DIVISION OF FLOW OF ST. MARY RIVER
1956

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

Month	St. Mary River Int. Boundary	Rolph Creek Kimball	Lee Creek Cardston	Total Avail- able at Spring Coulee
April	21,110	967	4,560	26,637
May	140,500	804	12,420	153,724
June	161,400	419	6,260	168,079
July	69,870	1,150	4,870	75,890
August	34,650	372	1,590	36,612
September	20,260	285	822	21,367
October	22,680	258	579	23,517
Total	470,470	4,255	31,101	505,826

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	22,155	0	0	0	22,155
May	96,135	30,050	277	30,327	65,808
June	117,953	69,160	2,010	71,170	46,783
July	72,565	30,850	891	31,741	40,824
August	35,528	47,690	1,420	49,110	- 13,582
September	19,650	20,400	395	20,795	- 1,145
October	23,552	14,800	426	15,226	8,326
Total	387,538	212,950	5,419	218,369	169,169

Storage in St. Mary Reservoir March 31, Elev. 3593.88 = 149,568 acre-feet
October 31, Elev. 3594.18 = 150,843 acre-feet

DIVISION OF FLOWS OF ST. MARY AND MILK RIVERS
1956

Table 2
Page 2

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	Lake Sherburne		Total Available for Diversion	Diverted to (4) Milk River Basin	(10) Unused	Measured Flow at Eastern Crossing*
	Nat. Flow	Stored	Reled.				
April	9,104	4,788	1,551	5,867	6,912	- 1,045	31,311
May	75,626	7,995	9,128	76,759	32,358	44,401	52,427
June	98,099	21,898	2,703	78,904	35,482	43,422	46,506
July	52,052	18,367	208	33,893	36,585	- 2,692	49,202
Aug.	15,370	260	19,706	34,816	35,691	- 875	41,550
Sept.	6,597	0	26,773	33,370	32,763	607	34,167
Oct.	8,007	4,475	10,875	14,407	15,281	- 874	24,778
Total	264,855	57,783	70,944	278,016	195,072	82,944	279,941*

* 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 = 22,840 acre-feet

October 31 = 8,450 acre-feet

Storage in Fresno Reservoir on March 31 = 93,515 acre-feet

October 31 = 84,635 acre-feet

DIVERSIONS FROM MILK RIVER
UNITED STATES
1956

(Acre-feet)

Month	Fort Belknap Canal	Paradise Canal	Harlem Canal	Harlem No. 2	Agency Canal	Dodson North	Dodson South	Van- alia Canal	Total
April	3,620	635	833	-	1,350	1,330	8,200	2,380	18,348
May	12,410	4,500	4,280	1,020	4,090	4,130	13,320	5,490	49,240
June	19,000	8,210	4,720	1,130	6,190	5,290	13,740	5,880	64,160
July	17,550	6,100	3,250	1,130	3,710	5,120	18,840	7,190	62,890
Aug.	16,430	9,180	3,810	980	1,680	4,310	19,980	6,990	63,360
Sept.	10,650	7,650	1,630	603	327	2,980	16,960	4,760	45,560
Oct.	5,930	4,680	1,030	830	-	1,590	16,950	4,920	35,930
Nov.	-	-	-	-	-	-	5,890	1,110	7,000
Total	85,590	40,955	19,553	5,693	17,347	24,750	113,880	38,720	346,488

Storage in Nelson Reservoir on March 31, 38,455 acre-feet.
on October 31, 54,274 acre-feet.

DETERMINATION OF NATURAL FLOW OF PRESCOTT RIVER
AT INTERNATIONAL BOUNDARY
1956

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	30.0		0	0	0	- 30.0
11 - 20	0	27.0		1	0	0	- 28.0
21 - 31	0	22.0		4	0	0	- 26.0
April							
1 - 10	12.0	13.0	2		0	0	+ 1.0
11 - 20	74.4	16.0	134		0	0	+ 192.4
21 - 30	303.3	512.3	429		0	0	+ 220.0
May							
1 - 10	181.9	26.0	174		0	0	+ 329.9
11 - 20	281.0	46.3	68		0	0	+ 302.7
21 - 31	301.7	30.4	48		59.1	17.7	+ 360.7
June							
1 - 10	154.1	119.5	61		336.7	101.0	+ 331.3
11 - 20	75.2	385.8		136	399.8	119.9	- 166.7
21 - 30	17.8	432.5	112		387.4	116.2	- 31.5
July							
1 - 10	15.0	29.7	49		146.8	44.0	+ 137.1
11 - 20	10.0	31.1		44	0	0	- 65.1
21 - 31	1.0	15.7		135	129.8	38.9	- 58.8
Aug.							
1 - 10	0	8.1		61	233.3	70.0	+ 94.2
11 - 20	0	9.9		51	206.3	61.9	+ 83.5
21 - 31	0	9.2		61	221.2	66.4	+ 84.6
Sept.							
1 - 10	0	10.6		65	28.4	8.5	- 55.7
11 - 20	0	14.2		21	36.1	10.8	- 9.9
21 - 30	0	14.6		91	60.3	18.1	- 63.4
Oct.							
1 - 10	0	17.4		146	0	0	- 163.4
11 - 20	0	17.3	2		0	0	- 15.3
21 - 31	0	27.0	4		0	0	- 23.0
Total	1427.4	1865.6	1083	816	2245.2	673.4	+ 1400.6
Mean	5.83	7.61	4.42	3.33	9.16	2.75	5.72
acre-feet	2831	3700	2148	1619	4453	1336	+ 2778

498
-869
48113
13
22

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER
AT INTERNATIONAL BOUNDARY
1956

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	6		0		36	0	0	- 30.0
11 - 20	9		0	44		0	0	+ 53.0
21 - 31	20		0	927		0	0	+ 947.0
April								
1 - 10	15		0	1317		0	0	+ 1332.0
11 - 20	557		0	1273		0	0	+ 1830.0
21 - 30		205	0		158	0	0	- 363.0
May								
1 - 10		8	0	168		0	0	+ 160.0
11 - 20	42		24.3	221		4.2	8.6	+ 282.9
21 - 31	298		252.1		218	289.0	162.3	+ 458.8
June								
1 - 10		18	317.0		363	514.2	249.4	+ 200.8
11 - 20	23		263.5		568	571.0	250.4	+ 39.1
21 - 30	71		120.4		371	293.2	124.1	- 10.5
July								
1 - 10	26		55.5	206		39.9	28.6	+ 298.8
11 - 20	21		78.9	7		145.9	67.4	+ 185.4
21 - 31		121	294.3		393	407.3	210.5	- 22.9
Aug.								
1 - 10		117	289.3		451	419.8	212.7	- 71.6
11 - 20		177	173.1		186	182.6	106.7	- 114.0
21 - 31		67	126.8		76	95.0	66.5	+ 12.3
Sept.								
1 - 10	130		87.2	31		8.8	28.8	+ 228.2
11 - 20	37		92.5		52	5.9	29.5	+ 53.9
21 - 30	34		47.8		221	28.3	22.8	- 133.7
Oct.								
1 - 10	228		18.4		19	30.1	14.6	+ 242.9
11 - 20		24	0	137		33.8	10.1	+ 136.7
21 - 31		412	0	331		14.1	4.2	- 71.1
Total	1517	1149	2241.1	4662	3112	3083.1	1597.2	+ 5645.0
Mean	6.19	4.69	9.15	19.0	12.7	12.6	6.52	23.0
Acre-feet	3009	2279	4445	9247	6173	6115	3168	+11197

DETERMINATION OF NATURAL FLOW OF FRENCHMAN RIVER
AT INTERNATIONAL BOUNDARY
1956

quantities in Second-foot Days

Date at Int'l Boundary	Used by Canada		Total Used by Canada	Frenchman River		United Share	States Received + or -
	Cypress East End.	Val Marie		Flow at Bdy.	Natural Flow		
March							
1 - 10	- 30.0	- 30.0	- 60.0	100.0	40.0	20.0	+ 80.0
11 - 20	- 28.0	+ 53.0	+ 25.0	351.0	376.0	188.0	+ 163.0
21 - 31	- 26.0	+ 947.0	+ 921.0	2445.0	3366.0	1683.0	+ 762.0
April							
1 - 10	+ 1.0	+1332.0	+1333.0	1930.0	3263.0	1631.5	+ 298.5
11 - 20	+ 192.4	+1830.0	+2022.4	2497.0	4519.4	2259.7	+ 237.3
21 - 30	+ 220.0	- 363.0	- 143.0	3184.0	3041.0	1520.5	+ 1663.5
May							
1 - 10	+ 329.9	+ 160.0	+ 489.9	899.0	1388.9	694.4	+ 204.6
11 - 20	+ 302.7	+ 282.9	+ 585.6	1399.0	1984.6	992.3	+ 406.7
21 - 31	+ 360.7	+ 458.8	+ 819.5	597.5	1417.0	708.5	- 111.0
June							
1 - 10	+ 331.3	+ 200.8	+ 532.1	272.4	804.5	402.2	- 129.8
11 - 20	- 166.7	+ 39.1	- 127.6	397.4	269.8	134.9	+ 262.5
21 - 30	- 31.5	- 10.5	- 42.0	1211.0	1169.0	584.5	+ 626.5
July							
1 - 10	+ 137.1	+ 298.8	+ 435.9	224.4	660.3	330.2	- 105.8
11 - 20	- 65.1	+ 185.4	+ 120.3	153.6	273.9	137.0	+ 16.6
21 - 31	- 58.8	- 22.9	- 81.7	403.7	322.0	161.0	+ 242.7
Aug.							
1 - 10	+ 94.2	- 71.6	+ 22.6	324.5	347.1	173.6	+ 150.9
11 - 20	+ 83.5	- 114.0	- 30.5	132.5	102.0	51.0	+ 81.5
21 - 31	+ 84.6	+ 12.3	+ 96.9	89.7	186.6	93.3	- 3.6
Sept.							
1 - 10	- 55.7	+ 228.2	+ 172.5	40.9	213.4	106.7	- 65.8
11 - 20	- 9.9	+ 53.9	+ 44.0	80.0	124.0	62.0	+ 18.0
21 - 30	- 63.4	- 133.7	- 197.1	221.5	24.4	12.2	+ 209.3
Oct.							
1 - 10	- 163.4	+ 242.9	+ 79.5	91.8	171.3	85.6	+ 6.2
11 - 20	- 15.3	+ 136.7	+ 121.4	44.0	165.4	82.7	- 38.7
21 - 31	- 23.0	- 71.1	- 94.1	57.6	- 36.5	- 18.2	+ 75.8

Total + 1400.6 +5645.0 +7045.6 17147.5 24193.1 12096.6 + 5050.9
 Mean 5.72 23.0 28.8 70.0 98.7 49.4 20.6
 Acre-feet + 2778.7 +11191.0 +13975.3 34012 47986 23993 +10018
 Estimated Acre-feet Total of Minor Diversions
 shown in Table 4 1546 1546
 Detailed in the Appendix 1546 49532 24766 + 9246

Table 4

DIVERSIONS FROM THE EASTERN TRIBUTARIES
OF MILK RIVER IN CANADA - 1956

Quantities in Acre-feet

Lodge Creek Tributary Basin

Spangler Ditch near Govenlock		2,040
Middle Creek near Alberta Boundary	+3,450	
Released to Lodge Creek from Middle Creek Reservoir via Bedford Slough	<u>1,300</u>	2,150
Total of 6 Minor Diversions Detailed in Appendix		# 231
Total Diverted by Canada		<u>4,421</u>

450 acre-feet diverted by Mitchell Ranching Co. 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 = 12,750 acre-feet)

Battle Creek Tributary Basin

Diverted by Cypress Lake West Inflow Canal	4,580	
Returned by Cypress Lake West Outflow Canal	- 7,110	
Returned by Cypress Lake West Inflow Canal Drain	<u>- 789</u>	- 3,319
Vidora Ditch near Consul		2,600
Richardson Ditch near Consul		2,150
McKinnon Ditch near Consul		1,390
Stirling and Nash Ditch near Consul		1,710
Total of 17 Minor Diversions Detailed in Appendix		<u>903</u>
Total Diverted by Canada		5,434

(Battle Creek at International Boundary = 20,180 acre-feet)

Frenchman River Tributary Basin

Belanger Creek Diversion to Cypress Lake (includes natural overflow stored)	2,831	
Returned by Cypress Lake East Outflow Canal	<u>3,700</u>	- 869
Diverted to East End Reservoir	2,148	
Released from East End Reservoir	<u>1,619</u>	529
Diverted to Val Marie Reservoirs	12,256	
Released from Val Marie Reservoirs	<u>8,452</u>	3,804
East End Irrigation District Canal	4,453	
Val Marie Irrigation District West Canals	4,445	
Val Marie Main Canal	<u>6,115</u>	
	15,013	
Estimated Return Flow	<u>4,504</u>	10,509
Total of 51 Minor Diversions Detailed in Appendix		<u>1,546</u>
Total Diverted by Canada		15,519

(Frenchman River at International Boundary = 34,012 acre-feet)

Table 5

MEASURED DIVERSIONS FROM THE EASTERN TRIBUTARIES

OF MILK RIVER IN THE UNITED STATES

1956

(Quantities in Acre-feet)

Irrigator	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
<u>Lodge Creek</u>									
North Chinook Canal	530	3,440	972	35	1,330	0	0	0	6,310
<u>Battle Creek</u>									
Matheson Canal	-	-	-	-	-	-	-	-	^a 340
Pumping	-	-	-	-	-	-	-	-	^b 210
<u>Frenchman River</u>									
Frenchman Canal	0	365	695	1,400	837	818	54	30	4,200
Total	-	-	-	-	-	-	-	-	11,060

a - Stage discharge relation indefinite; discharge, estimated on basis of 7 discharge measurements, engineer's notes, and appearance of the gage-height graph.

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

Table 6

Measured Run-off of Eastern Tributaries of Milk River
at International Boundary for period March to October, 1956
(Quantities in Acre-feet)

STREAM	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Lodge Creek	715	7,160	1,840	193	2,680	139	16	4.4	12,750
Woodpile Coulee	71	88	87	9.3	3.4	0.0	0.0	0.0	259
Battle Creek	4,080	5,400	3,690	1,640	2,110	1,400	927	938	20,180
Lyons Coulee	70	185	9.1	0	0	0	0	0	264
East Br. Battle Cr.	101	193	5.6	0	0	0	0	0	300
Whitewater Creek	22	43	52	4.8	1.0	0.4	1.0	0.4	125
Frenchman River	5,740	15,100	5,740	3,730	1,550	1,080	679	384	34,000
McEachern Creek	722	1,000	19.0	1.0	0	0	0	0	1,740
Horse Creek	451	581	52	12	6.0	0	0	0	1,100
Rock Creek	4,340	2,090	900	1,020	223	43	79	184	8,880
Totals	16,312	31,840	12,394.7	6,610.1	6,573.4	2,662.4	1,702.0	1,510.8	79,600

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

- 1956 -

Map Index	Stream and Location	Remarks
<u>St. Mary River Basin</u>		
5AE ₁	St. Mary River near International Boundary	Int. ^a
5AE _{0.5}	Swiftcurrent Creek at Many Glacier, Montana	Int. ^a
5AE _{0.9}	Lake Sherburne at Sherburne, Montana	Int. ^a
5AE _{0.6}	Swiftcurrent Creek at Sherburne, Montana	Int. ^a
5AE _{0.2}	United States St. Mary Canal at St. Mary Crossing, near Babb, Montana	Int. ^a
5AE _{0.3}	United States St. Mary Canal at Hudson Bay Divide near Browning, Montana	Int. ^a
<u>Milk River Basin</u>		
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, Montana	Int. ^a
11AA ₁	North Branch of Milk River near International Boundary	Int. ^a
11AA ₂₅	South Branch of Milk River near International Boundary	Int. ^a
11AD _{0.1}	Whitewater Creek near International Boundary	Int. ^a
<u>Lodge Creek Tributary Basin</u>		
11AB ₈₃	Lodge Creek below McRae Coulee at International Boundary	Int. ^a
<u>Battle Creek Tributary Basin</u>		
11AB ₇₆	Battle Creek above Cypress Lake West Inflow Canal near West Plains, Saskatchewan	Int. ^a

Map Index	Stream and Location	Remarks
<u>Battle Creek Tributary Basin</u>		
11AB ₂₇	Battle Creek at International Boundary	Int. ^a
11AB _{0.1}	Woodpile Coulee near International Boundary	Int. ^a
11AB _{0.3}	East Branch of Battle Creek near International Boundary	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
<u>Frenchman River Tributary Basin</u>		
11AC ₃₇	Cypress Lake Reservoir near Vidora, Saskatchewan	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, Saskatchewan	Int.R ^a
11AC ₅₂	East End Canal at East End, Saskatchewan	Int. ^a
11AC ₁	Frenchman River below East End Reservoir	Int. ^a
11AC ₆₃	Val Marie West Reservoir, near Val Marie, Saskatchewan	Int.R ^a
11AC ₆₅	Val Marie West Gravity Canal	Int. ^a
11AC ₅₆	Val Marie Reservoir near Val Marie, Saskatchewan	Int.R ^a
11AC ₅₄	Val Marie Main Canal	Int. ^a
11AC ₄₁	Frenchman River at International Boundary	Int. ^a
<u>Rock Creek Tributary Basin</u>		
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

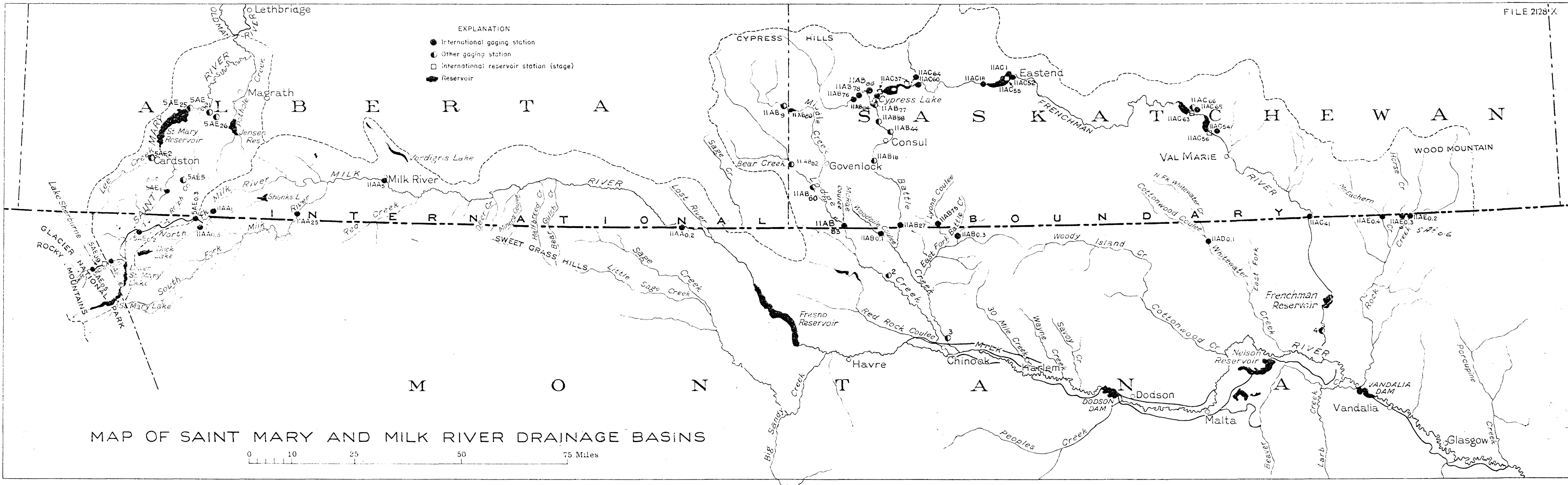
GAUGING STATIONS OPERATED INDEPENDENTLY
BY CANADA OR UNITED STATES
IN ST. MARY AND MILK RIVER DRAINAGE BASINS

- 1956 -

Map Index	Stream and Location	Remarks
<u>St. Mary River Basin</u>		
	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, Alberta	Canada R ^a ✓
5AE ₂₆	Canadian St. Mary Canal near Spring Coulee, Alberta	Canada ^a ✓
5AE ₂₁	Magrath Irrigation District Canal near Spring Coulee, Alberta	Canada ^a ✓
5AE ₁₆	Pothole Creek at Russell's Ranch	Canada ^c ✓
5AD ₂₀	Six Mile Coulee Spillway near Lethbridge	Canada ^c
<u>Milk River Basin</u>		
<u>Lodge Creek Tributary Basin</u>		
11AB ₈₂	Lodge Creek near Alberta Boundary	Canada ^a
11AB ₉	Middle Creek near Alberta Boundary	Canada ^a
11AB ₈₀	Middle Creek Reservoir	Canada R ^a ✓
11AB ₆₀	Spangler Ditch near Govenlock, Saskatchewan	Canada ^a ✓
2	North Chinook Canal near Havre, Montana	U.S. ^b

Map Index	Stream and Location	Remarks
<u>Battle Creek Tributary Basin</u>		
11AB ₈₁	Battle Creek at Ranger Station	Canada ^c
11AB ₈₅	Cypress Lake West Inflow Canal Drain	Canada ^a ✓
11AB ₈₄	Vidora Ditch near Consul, Saskatchewan	Canada ^a ✓
11AB ₅₈	Richardson Ditch near Consul, Saskatchewan	Canada ^a
11AB ₄₄	McKinnon Ditch near Consul, Saskatchewan	Canada ^a
11AB ₁₈	Stirling and Nash Ditch near Consul, Saskatchewan	Canada ^a
3	Matheson Canal near Chinook, Montana	U.S. ^b
<u>Frenchman River Tributary Basin</u>		
11AC ₅₁	Frenchman River below Val Marie, Saskatchewan	Canada ^c
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
- U.S. - Denotes operation by United States Geological Survey.
- Canada - Denotes operation by Water Resources Branch, Canada.
- a - Monthly and daily discharge data and stream measurements contained in Appendix.
- b - Monthly Discharge data only tabulated in this report.
- c - Data not included in this report or appendix.



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