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

L. B. LEOPOLD
representing United States

1964

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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, 1964.

Respectfully submitted,

J. D. McLeod
Accredited Officer of Her Majesty.

L. B. Leopold
Accredited Officer of the United States

March 19 , 1965.
(date)

CONTENTS

LIST OF TABLES

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 1964 by representatives of the Water Resources Branch of Canada and the United States Geological Survey.

Mr. J. D. McLeod, Deputy Director, 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. R. D. May, District Engineer, Calgary, Alberta. Dr. L. B. Leopold, Chief Hydrologist, United States Geological Survey, as accredited officer of the United States, was represented in the field by Mr. F. Stermitz, Branch District Chief, Surface Water, Helena, Montana.

This report has been prepared jointly by Mr. R. D. May and Mr. F. Stermitz.

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 was collected and compiled jointly for 50 international stations. Data for another 27 stations in Canada and 7 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 8 canal and 2 reservoir stations and the United States Bureau of Indian Affairs furnished data for one other canal station in Montana.

St. Mary River

Although irrigation season flow of the St. Mary River proved to be well above average as forecast through snow surveys, early flow was low. Severe floods followed intense rains on June 7 and 8. Peak flows in the United States were generally the highest since 1908 and were probably greatest on tributaries near the steep mountain fronts. The natural flow of the St. Mary River during the irrigation season 1 April to 31 October was 763,900 acre-feet or 131 per cent of average of the previous 61 years of record.

The United States St. Mary Canal was placed in operation on April 8 and deficits in delivery to Canada arose in the latter half of April. The June flood caused canal washouts above the St. Mary Crossing. Kennedy Creek was the sole source for diversion until normal service was restored in mid-July. A combination of poorly defined rating for the St. Mary River at International Boundary and an apparent desire to partially offset the large prior excess deliveries to Canada resulted in four continuous deficit periods to Canada during August and September. Following the closure of the canal on October 2, large excess delivery to Canada prevailed.

Milk River

The floods of June 1964 were severe in the Milk River basin above the western crossing. Peak flow diminished in a downstream direction. Irrigation supply was adequate and well sustained. The estimated natural flow of Milk River at its eastern crossing of the International Boundary during the period 1 March to 31 October was 125,000 acre-feet or 112 per cent of average of the previous 52 years of record.

Eastern Tributaries of the Milk River

The water supply was generally low. The greater number of minor diversions and minor storage works and the lack of full information on their

effect upon water supply increased the difficulty of achieving reasonable division, particularly on a current basis. The acceptance of responsibility to provide fuller information and willingness of water users to co-operate in overcoming deficits of delivery to the United States appears to be improving.

Lodge Creek: A revised division formula incorporating channel loss, minor diversion and minor storage was used in the 1964 season. Due to misunderstanding regarding the relative obligation of various parties to release storage or reduce water usage, early deficits of delivery to the United States were not fully corrected until mid-season. Some over-correction followed. The parties concerned were informed during 1964 of the commitments to the United States and this situation should not recur in future years. The natural flow of Lodge Creek during the March to October irrigation season was 7,940 acre-feet or 70 per cent of average of the previous 3 years of record.

Battle Creek: Heavy precipitation on the basin in the first week of May produced an increase in the flow of Battle Creek, part of which was diverted to Cypress Lake. This operation, combined with laxity of personnel control of a private irrigation scheme, led to a deficit to the United States which was not fully offset until late June. The natural flow of Battle Creek during the irrigation season was 10,620 acre-feet or 61 per cent of average of the previous 7 years of record.

Frenchman River: The natural flow of Frenchman River during the irrigation season was 20,320 acre-feet or 26 per cent of average of the previous 24 years of record. The desire to fully utilize the runoff led to Canadian overuse during the brief periods of substantial flow and a need to release storage in subsequent periods to overcome deficits to the United States.

TABLE 1

SUMMARY OF DIVISIONS DURING 1964 IRRIGATION SEASON

Lodge Creek during 1964 (March to October)

Period at International Boundary	Natural Flow cfs	United States Share cfs	Received by United States cfs	Amount Received by U.S. Above (+) share cfs	Amount Received by U.S. Below (-) share cfs
Mar. 1 - Mar. 10	0	0	0	0	
Mar. 11 - Mar. 20	14	7	0		7
Mar. 21 - Mar. 31	183	92	0		92
Apr. 1 - Apr. 10	1,262	631	205		426
Apr. 11 - Apr. 20	773	386	403	17	
Apr. 21 - Apr. 30	216	108	296	188	
May 1 - May 10	524	262	397	135	
May 11 - May 20	756	378	377		1
May 21 - May 31	104	52	145	93	
June 1 - June 10	0	0	10	10	
June 11 - June 20	0	0	161	161	
June 21 - June 30	121	61	99	38	
July 1 - July 10	14	7	3		4
July 11 - July 20	6	3	0		3
July 21 - July 31	4	2	0		2
Aug. 1 - Aug. 10	25	12	0		12
Aug. 11 - Aug. 20	0	0	0	0	
Aug. 21 - Aug. 31	0	0	0	0	
Sep. 1 - Sep. 10	0	0	0	0	
Sep. 11 - Sep. 20	0	0	0	0	
Sep. 21 - Sep. 30	0	0	0	0	
Oct. 1 - Oct. 10	0	0	0	0	
Oct. 11 - Oct. 20	0	0	0	0	
Oct. 21 - Oct. 31	0	0	0	0	

Battle Creek during 1964 (March to October)

Period at International Boundary	Natural Flow cfs	United States Share cfs	Received by United States cfs	Amount Received by U.S. Above (+) share cfs	Amount Received by U.S. Below (-) share cfs
Feb. 23 - Mar. 4	0	0	0	0	
Mar. 5 - Mar. 14	0	0	0	0	
Mar. 15 - Mar. 25	0	0	0	0	
Mar. 26 - Apr. 4	139	70	93	23	
Apr. 5 - Apr. 14	730	365	401	36	
Apr. 15 - Apr. 24	544	272	201		71
Apr. 25 - May 4	272	136	138	2	
May 5 - May 14	2,036	1,018	798		220
May 15 - May 25	709	355	386	31	
May 26 - June 4	224	112	210	98	
June 5 - June 14	0	0	10	10	
June 15 - June 24	118	59	169	110	
June 25 - July 4	370	185	203	18	
July 5 - July 14	108	54	53		1
July 15 - July 25	21	10	17	7	
July 26 - Aug. 4	0	0	0	0	
Aug. 5 - Aug. 14	0	0	0	0	
Aug. 15 - Aug. 25	0	0	0	0	
Aug. 26 - Sep. 4	1	0	0	0	
Sep. 5 - Sep. 14	0	0	0	0	
Sep. 15 - Sep. 24	0	0	0	0	
Sep. 25 - Oct. 4	0	0	0	0	
Oct. 5 - Oct. 14	34	17	16		1
Oct. 15 - Oct. 25	20	10	7		3
Oct. 26 - Oct. 31	30	15	26	11	

Frenchman River during 1964 (March to October

Period at International Boundary	Natural Flow cfs	United States Share cfs	Received by United States cfs	Amount Received by U.S. Above (+) share cfs	Amount Received by U.S. Below (-) share cfs
Mar. 1 - Mar. 10	58	29	55	26	
Mar. 11 - Mar. 20	230	115	192	77	
Mar. 21 - Mar. 31	337	168	103		65
Apr. 1 - Apr. 10	662	331	207		124
Apr. 11 - Apr. 20	2,902	1,451	200		1,251
Apr. 21 - Apr. 30	973	487	961	474	
May 1 - May 10	1,132	566	1,468	902	
May 11 - May 20	1,185	592	717	125	
May 21 - May 31	514	257	108		149
June 1 - June 10	197	99	129	30	
June 11 - June 20	542	271	365	94	
June 21 - June 30	932	466	257		209
July 1 - July 10	248	124	294	170	
July 11 - July 20	291	146	253	107	
July 21 - July 31	0	0	7	7	
Aug. 1 - Aug. 10	0	0	7	7	
Aug. 11 - Aug. 20	0	0	0	0	
Aug. 21 - Aug. 31	0	0	0	0	
Sep. 1 - Sep. 10	33	16	105	89	
Sep. 11 - Sep. 20	7	4	7	3	
Sep. 21 - Sep. 30	0	0	0	0	
Oct. 1 - Oct. 10	0	0	0	0	
Oct. 11 - Oct. 20	0	0	0	0	
Oct. 21 - Oct. 31	0	0	0	0	

St. Mary River during 1964 (April to October)

Period at International Boundary	Natural Flow cfs	Canada's Share cfs	Received by Canada cfs	Amount Rec'd by Canada Above (+) share cfs	Amount Rec'd by Canada Below (-) share cfs
Apr. 1 - Apr. 15	1,408	1,056	2,151	1,095	
Apr. 16 - Apr. 30	4,551	3,413	2,511		902
May 1 - May 15	20,397	12,688	12,009		679
May 16 - May 31	40,961	23,151	24,737	1,586	
June 1 - June 15	129,053	67,030	106,990	39,960	
June 16 - June 30	63,314	34,158	55,690	21,532	
July 1 - July 15	40,883	22,943	30,830	7,887	
July 16 - July 31	24,219	14,776	18,582	3,806	
Aug. 1 - Aug. 15	12,423	8,710	6,239		2,471
Aug. 16 - Aug. 31	8,309	6,233	5,924		309
Sep. 1 - Sep. 15	9,088	6,800	6,475		325
Sep. 16 - Sep. 30	8,729	6,533	6,442		91
Oct. 1 - Oct. 15	12,168	8,585	12,426	3,841	
Oct. 16 - Oct. 31	9,650	7,016	11,670	4,654	

WATER SUPPLY

St. Mary River

The total natural flow of the St. Mary River at the International Boundary for the year 1 Nobember 1963 to 31 October 1964 was 808,300 acre-feet. Of this total, 763,900 acre-feet occurred during the irrigation season 1 April to 31 October. The natural flow during the irrigation season was 131 per cent of 585,200 acre-feet, the average of the previous 61 years of record. 632,400 acre-feet were delivered to Canada during the year, with 600,300 being delivered during the irrigation season.

The forty-third annual international survey of snow conditions in the St. Mary River drainage basin was conducted on 29 and 30 April, 1964. The survey provided advance information on the probable runoff during the irrigation season. The tabulated results of the forecasts and measured discharge at three locations are shown below.

Location	Period of Correlation	Forecast of 1964 Runoff		Measured Runoff	
		Acre-feet	% of Average	Acre-feet	% of Average
Swiftcurrent Creek at Many Glacier	1923-60	81,700 (May to July)	(1923-63) 119	82,380 (May to July)	(1923-63) 120
Natural Flow Swiftcurrent Creek at Sherburne	1922-60	139,000 (May to Sept.)	(1922-63) 122	146,200 (May to Sept.)	(1922-63) 128
Natural Flow St. Mary River at International Boundary	1922-60	621,000 (May to Sept.)	(1922-63) 124	708,800 (May to Sept.)	(1922-63) 142

Milk River

The estimated natural flow of Milk River at its eastern crossing of the International Boundary, during the period 1 March to 31 October 1964, was 125,000 acre-feet or 112 per cent of 112,000 acre-feet, the average of estimated natural flows of the previous 52 years of record.

Eastern Tributaries of Milk River

The total quantity of water delivered to the United States by the eastern tributaries of Milk River during the period 1 March to 31 October 1964 was 22,860 acre-feet or 16 per cent of 138,900 acre-feet, the average of the previous 37 years. The quantities delivered to the United States by the various tributaries are listed on Page 2 of Table 3.

During the season, water was diverted from the eastern tributaries or stored in reservoirs in Canada as listed in Tables 8, 9 and 10 of Appendix A. Measured diversions in Montana were 11,660 acre-feet as listed in Page 1 of Table 3.

The twelfth annual snow survey in the basins of the eastern tributaries of Milk River was conducted by the Water Resources Branch, Canada during the period 25 to 27 February 1964. The average snow cover for 1964 was 7.8 inches compared to the twelve-year average of 7.9 inches. The average water content for 1964 was 1.9 inches compared to the twelve-year average of 2.1 inches.

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.

The daily natural flow of the St. Mary River was determined in the following manner. Daily records were obtained at St. Mary Canal at St. Mary Crossing near Babb, St. Mary River at International Boundary, Lake Sherburne at Sherburne and an Evaporation and Precipitation station near Babb, Montana.

The natural flow of the St. Mary River at the International Boundary was considered to be the sum of the quantities measured at St. Mary Canal at St. Mary Crossing near Babb, St. Mary River at International Boundary and addition of storage or subtraction of release corrected for evaporation at Lake Sherburne.

A one-day time lag was applied to stored and released quantities from Lake Sherburne to synchronize the flow with flow quantities at the International Boundary.

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.

During the irrigation season, 1 April to 31 October, field engineers of both countries made semimonthly 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.

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, 1 November 1963 to 31 March 1964, 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 about 14 per cent of the total area of the St. Mary River drainage basin in the United States.

Storage in Lake Sherburne was 6,400 acre-feet on 31 October 1963 and had increased to 18,590 acre-feet by 31 March 1964 and to 66,510 acre-feet by 15 July 1964. On 31 October 1964 the storage was 6,630 acre-feet.

The St. Mary Canal was operated between 8 April and 2 October and water was delivered to the North Milk River from 10 April to 3 October.

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 173,100 acre-feet which passed the gauging station on the St. Mary Canal at St. Mary Crossing near Babb between 8 April and 2 October was considered to be the quantity diverted from the St. Mary River by the United States. A total of 168,900 acre-feet was delivered to the North Milk River at Hudson Bay Divide during the season, from where it was conveyed to irrigation projects in Montana via the Milk River.

Canada diverted 365,000 acre-feet of water from the St. Mary River Reservoir in 1964 as measured at the Canadian St. Mary Canal and Magrath Irrigation District Canal gauging stations near Spring Coulee. (See Table 2.)

Milk River

No division of the flow of Milk River at Eastern Crossing was made in 1964. 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.

The United States Geological Survey began stream flow record collection in 1961 on the South Fork Milk River near Babb to assist in studying the utilization of waters in the Milk River Basin within the Blackfeet Indian Reservation.

The expressed concern and complaint within Canada has been the occasional and sometimes prolonged lack of adequate supply for stock-watering along the Milk River above the mouth of the North Milk River.

During 1964 a substantial flow was recorded in the Milk River at the western crossing of the International Boundary for the entire season. Consequently, there were no complaints by Canadian ranchers this year.

A report to the International Joint Commission has been prepared by the United States Geological Survey on the Utilization of Waters in the Milk River Basin within the Blackfeet Reservation, Montana.

Stream gauging stations within the area were operated jointly by the United States and Canada during the 1964 season.

Eastern Tributaries of Milk River

The division of the waters of the eastern tributaries of the Milk River was carried out in accordance with the Order of the International Joint Commission dated October 4, 1921, which stipulates under Rule III, "The natural flow of the eastern (otherwise known as the Saskatchewan or northern) tributaries of the Milk River at the points where they cross the International Boundary shall be divided equally between the two countries."

The rule concerning this subject might well be interpreted as requiring that the division of water be made on a daily basis. It was recognized early in operation under this rule that daily division was impracticable and compilation of the natural flow at the International Boundary by ten-day periods was begun many years ago. Any shortage in the share received by the downstream country in any ten-day period is adjusted, if possible, by the upstream country in the succeeding ten-day period.

Minor Diversions: Estimates for a number of small diversions from the eastern tributaries of Milk River in Saskatchewan and Alberta were provided by the Water Rights Divisions of the Provinces of Saskatchewan and Alberta and are based on reports from the individual licensed irrigators. The Saskatchewan Water Rights Division reports are received after the irrigation season and often lead to a discrepancy between the interim reports on division and the final reports. The remedy for this would be to have minor diversion quantities submitted on a ten-day basis. The estimated quantities reported to date for 1964 are detailed in Appendix B to this report.

Lodge Creek: The computed natural flow of Lodge Creek at the International Boundary for the period 1 March to 31 October 1964 was 7,940 acre-feet, of which each country was entitled to fifty per cent (3,970). The details of this division are summarized on Page 4, and shown in Table 8 of Appendix A.

A total of 4,160 acre-feet was recorded at the International boundary, which is 105 per cent of the United States share.

Battle Creek: The computed natural flow of Battle Creek at the International Boundary for the period 1 March to 31 October 1964 was 10,620 acre-feet, of which each country was entitled to fifty per cent (5,310). The details of this division are summarized on Page 4, and shown in Table 9 of Appendix A.

A total of 5,410 acre-feet was recorded at the International Boundary, which is 102 per cent of the United States share.

During 1964 return flow stations were established on Battle Creek near Consul, below the Nashlyn project and above Cypress Lake West Outflow Canal to check return flow quantities from the four irrigation ditches, Vidora, Richardson, McKinnon, and Stirling and Nash which operate along this reach of the creek. The return flow percentage established for the 1964 season was slightly below the average figure of 20 per cent used for the past several years.

Frenchman River: The computed natural flow of the Frenchman River at the International Boundary for the period 1 March to 31 October 1964 was 20,320 acre-feet, of which each country was entitled to fifty per cent (10,160). The details of this division are summarized on Page 4 and shown in Table 10 of Appendix A.

A total of 10,780 acre-feet was recorded at the International

Boundary, which is 106 per cent of the United States share.

The synoptic measurement program started in 1963 was continued in 1964 and was augmented by the establishment of four recorder gauging stations. Two more temporary recorder stations will be established in 1965, which will give a series of stations between Eastend and the Boundary that should provide data for the assessment of return flow and channel loss percentage allowances now used in the computation of the natural flow.

Appendices

Appendices, submitted with this report under separate cover, contain in Appendix A, Natural Flow of St. Mary and its Division, Summary of mean monthly, United States, and Canadian share of St. Mary River, Determination of natural flow of Lodge Creek, Battle Creek, and Frenchman River at International Boundary. Appendix B contains the result of discharge measurements, summary of monthly discharge and the daily gauge height and discharge data for 66 gauging stations operated during 1964 in the St. Mary and Milk River drainage basins. Details of the Canadian minor diversions are also included.

Table 2
Form 1

Summary of Division of St. Mary River
and Diversion to Milk River

1964

Quantities in acre-feet

Month	St. Mary River at Int. Boundary				Excess Received by Canada	Storage Lake Sherburne	Total Available for Diversion	St. Mary Canal at St. Mary Crossing	Milk River at Eastern Crossing
	Recorded Flow	Natural Flow	United States Share	Canadian Share					
April	9,247	11,820	2,955	8,864	+383	-16,219[t]	19,174	18,791	31,230
May	72,885	121,702	50,616	71,086	+1,799	+13,387	37,229	35,431	73,170
June	322,671	381,554	180,851	200,703	+121,968	+37,646	143,205	21,237	65,120
July	98,007	129,128	54,313	74,815	+23,193	+8,694	45,619	22,427	26,090
Aug.	24,125	41,121	11,482	29,639	-5,514	-25,639[t]	37,121	42,635	42,370
Sept.	25,620	35,340	8,894	26,446	-825	-22,893[t]	31,787	32,612	42,210
Oct.	47,794	43,275	12,331	30,944	+16,850	-4,519[t]	16,850	0	6,790
Total Irrig. Season	600,349	763,940	321,442	442,497	+157,854	-9,543[t]	330,985	173,133	286,980
For Year Nov. to Oct.	632,444	808,300	343,622	464,677					

t Negative sign indicates a release from Lake Sherburne.

* 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 October 31, 1963 = 6,400 acre-feet.
March 31, 1964 = 18,590 acre-feet.
October 31, 1964 = 6,630 acre-feet.

Storage in Fresno Reservoir on October 31, 1963 = 50,750 acre-feet.
March 31, 1964 = 36,550 acre-feet.
October 31, 1964 = 72,760 acre-feet.

DIVISION OF FLOW OF ST. MARY RIVER
1964

Water Available to Canada at Spring Coulee from St. Mary River

Quantities in acre-feet

Month	St. Mary River Int. Boundary	Rolph Creek Kimball	Lee Creek Cardston	Total Available at Spring Coulee
April	9,247	822	2,550	12,619
May	72,885	3,140	22,210	98,235
June	322,671	3,560	41,720	367,951
July	98,007	343	4,440	102,790
August	24,125	180	1,200	25,505
September	25,620	457	1,550	27,627
October	47,794	300	1,350	49,444
Total	600,349	8,802	75,020	684,171

DISPOSITION OF WATER AVAILABLE TO CANADA

Water Used in St. Mary and Milk Rivers Development

Quantities in 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.
April	8,864	1,840	17	1,857
May	71,086	19,220	316	19,536
June	200,703	75,140	617	75,757
July	74,815	110,200	2,800	113,000
August	29,639	106,500	2,760	109,260
September	26,446	34,910	371	35,281
October	30,944	9,880	546	10,426
Total	442,497	357,690	7,427	365,117

Storage in St. Mary Reservoir October 31, 1963 = 192,500 acre-feet.
March 31, 1964 = 232,500 acre-feet.
October 31, 1964 = 234,700 acre-feet.

MAJOR DIVERSIONS FROM MILK RIVER
IN THE UNITED STATES

1964

Quantities in acre-feet

Month	Fort Belknap Canal	Paradise Canal	Harlem Canal	Harlem No. 2	Agency Canal	Dodson North	Dodson South	Vandalia Canal	Winter Pumping Plant
March	0	0	0	0	0	0	0	0	0
April	0	0	0	0	1,060	0	1,520	2,080	558
May	14,800	6,890	3,570	750	6,160	4,320	19,290	6,510	732
June	15,750	6,190	4,440	900	6,940	5,440	21,220	7,190	1,020
July	21,000	9,290	4,880	1,090	5,640	7,350	18,400	8,410	630
Aug.	19,800	9,140	5,280	1,210	6,640	4,090	20,580	12,380	461
Sept.	8,410	3,710	2,220	40	2,040	1,270	17,370	9,860	0
Oct.	2,580	0	0	0	0	810	10,520	7,310	824
Nov.	0	0	0	0	0	0	6,370	3,580	50
Total	82,340	35,220	20,390	3,990	28,480	23,280	115,270	57,320	4,275

Total of Major Diversions from Milk River
in the United States = 370,600

Storage in Nelson Reservoir on October 31, 1963 = 37,020 acre-feet.
on March 31, 1964 = 29,990 acre-feet.
on October 31, 1964 = 36,310 acre-feet.

Table 3
Page 1

MEASURED DIVERSIONS FROM THE EASTERN TRIBUTARIES
OF MILK RIVER IN THE UNITED STATES

1964

Quantities in acre-feet

Month	Lodge Creek Basin	Battle Creek Basin	Frenchman River Basin
	North Chinook Canal	Matheson Canal Pumping	Frenchman Canal
March	0	--	0
April	1,220	--	182
May	1,800	--	1,500
June	71	--	1,630
July	0	--	1,140
Aug.	0	--	1,340
Sept.	0	--	19
Oct.	0	--	0
Total	3,091	2,760a	5,811

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

Total of Measured Diversions from the Eastern Tributaries of Milk River in the United States = 11,660 acre-feet

Measured Run-off of Eastern Tributaries of Milk River
at International Boundary for period March to October

1964

Quantities in acre-feet

Month	Lodge Creek	Battle Creek	Woodpile Coulee	East Fork Battle Creek	Lyons Creek	Whitewater Creek	Frenchman River	Rock Cr. below Horse Cr.	McEachern Creek
March	0	57	0	0	0	3	694	240	0
April	1,790	1,460	0	0	0	18	2,710	1,280	0
May	1,820	2,860	0	0	0	23	4,550	363	1
June	536	637	0	0	0	5	1,490	407	4
July	5	300	0	0	0	2	1,100	112	0
Aug.	0	0	0	0	0	0	14	0	0
Sept.	0	0	0	0	0	6	223	1	0
Oct.	0	98	0	0	0	6	0	40	0
Totals	4,151	5,412	0	0	0	63	10,781	2,443	5

Total measured run-off of Eastern Tributaries of Milk River
at International Boundary from March to October = **22,860 acre-feet.**

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

-1964 -

Map Index	Stream and Location	Remarks
	St. Mary River Basin	
5AE-27	St. Mary River at International Boundary	Int.[a]
5AE-0.5	Swiftcurrent Creek at Many Glacier, Montana	Int.[a]
5AE-0.9	Lake Sherburne at Sherburne, Montana	Int.R[a]
5AE-0.6	Swiftcurrent Creek at Sherburne, Montana	Int.[a]
5AE-0.2	St. Mary Canal at St. Mary Crossing, near Babb, Montana	Int.[a]
5AE-0.3	St. Mary Canal at Hudson Bay Divide, near Browning, Mont.	Int.[a]
	Milk River Basin	
11AA-25	Milk River at Western Crossing of International Boundary	Int.[a]
11AA-5	Milk River at Milk River	Int.[a]
11AA-0.2	Milk River at Eastern Crossing of International Boundary	Int.[a]
11AA-0.4	South Fork Milk River near Babb, Montana	Int.[a]
11AA-0.3	North Fork Milk River above St. Mary Canal, near Browning, Montana	Int.[a]
11AA-1	North Milk River near International Boundary	Int.[a]
	Lodge Creek Tributary Basin	
11AB-82	Lodge Creek at Alberta Boundary	Int.[a]
11AB-88	Lodge Creek below Spangler Project	Int.[a]
11AB-83	Lodge Creek below McRae Creek at International Boundary	Int.[a]
11AB-86	Walburger Coulee below Diversions	Int.[a]

Map Index	Stream and Location	Remarks
11AB-9	Middle Creek near Alberta Boundary	Int.[a]
11AB-87	Middle Creek near Battle Creek	Int.[a]
11AB-8	Middle Creek above Lodge Creek	Int.[a]
	Battle Creek Tributary Basin	
11AB-76	Battle Creek above Cypress Lake West Inflow Canal	Int.[a]
11AB-27	Battle Creek at International Boundary	Int.[a]
11AB-78	Cypress Lake West Inflow Canal	Int.[a]
11AB-85	Cypress Lake West Inflow Canal Drain	Int.[a]
11AB-77	Cypress Lake West Outflow Canal	Int.[a]
11AB-84	Vidora Ditch near Consul	Int.[a]
11AB-58	Richardson Ditch near Consul	Int.[a]
11AB-44	McKinnon Ditch near Consul	Int.[a]
11AB-18	Stirling and Nash Ditch near Consul	Int.[a]
11AB-0.1	Woodpile Coulee near International Boundary	Int.[a]
11AB-0.3	East Fork Battle Creek near International Boundary	Int.[a]
11AB-75	Lyons Creek at International Boundary	Int.[a]
	Whitewater Creek Tributary Basin	
11AD-0.1	Whitewater Creek near International Boundary	Int.[a]
	Frenchman River Tributary Basin	
11AC-18	Frenchman River above Eastend Reservoir	Int.[a]
11AC-55	Eastend Reservoir	Int. R[a]
11AC-1	Frenchman River below Eastend Reservoir	Int.[a]
11AC-57	Frenchman River below Eastend Irrigation Project	Int.[a]
11AC-63	Val Marie West Reservoir	Int. R[a]

Map Index	Stream and Location	Remarks
11AC-56	Val Marie Reservoir	Int.R[a]
11AC-51	Frenchman River below Val Marie	Int.[a]
11AC-41	Frenchman River at International Boundary	Int.[a]
11AC-60	Cypress Lake East Outflow Canal	Int.[a]
11AC-37	Cypress Lake	Int. R[a]
11AC-64	Belanger Creek Diversion to Cypress Lake	Int.[a]
11AC-52	Eastend Canal	Int.[a]
11AC-66	Val Marie West Pumping Canal	Int.[a]
11AC-65	Val Marie West Gravity Canal	Int.[a]
11AC-54	Val Marie Main Canal	Int.[a]
11AC-25	Denniel Creek near Val Marie	Int.[a]
	Rock Creek Tributary Basin	
11AE-0.6	Rock Creek below Horse Creek near International Boundary	Int.[a]
11AE-0.4	McEachern Creek at International Boundary	Int.[a]

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

- 1964 -

Map Index	Stream and Location	Remarks
	St. Mary River Basin	
175	St. Mary River near Babb, Montana	U.S.[c]
5AE-25	St. Mary Reservoir near Spring Coulee	Canada R[a]
5AE-6	St. Mary River near Lethbridge	Canada[c]
139	Grinnell Creek at Grinnell Glacier near Many Glacier, Montana	U.S.[c]
140	Grinnell Creek near Many Glacier, Montana	U.S.[c]
5AE-5	Rolph Creek near Kimball	Canada[a]
5AE-2	Lee Creek at Cardston	Canada[a]
5AE-26	Canadian St. Mary Canal near Spring Coulee	Canada[a]
5AE-21	Magrath Irrigation District Canal near Spring Coulee	Canada[a]
	Milk River Basin	
1327	Milk River near Del Bonita	U.S.[c]
	Lodge Creek Tributary Basin	
11AB-89	Altawan Reservoir near Govenlock	Canada R[a]
11AB-91	Michele Reservoir near Elkwater	Canada R[a]
11AB-92	Greasewood Reservoir near Elkwater	Canada R[a]
11AB-93	Yeast Reservoir near Elkwater	Canada R[a]
11AB-94	Bare Creek Reservoir near Elkwater	Canada R[a]
11AB-97	Cressday Reservoir near Cressday	Canada R[a]
11AB-60	Spangler Ditch near Govenlock	Canada[a]

Map Index	Stream and Location	Remarks
11AB-98	Jaydot Reservoir near Jaydot	Canada R[a]
11AB-80	Middle Creek Reservoir	Canada R[a]
11AB-99	Mitchell Reservoir near Elkwater	Canada R[c]
1460	North Chinook Canal near Havre, Montana	U.S.[b]
	Battle Creek Tributary Basin	
11AB-81	Battle Creek at Ranger Station	Canada[c]
11AB-100	Battle Creek above Cypress Lake West Outflow Canal	Canada[c]
11AB-96	Battle Creek near Consul	Canada[c]
11AB-101	Battle Creek below Nashlyn Project	Canada[c]
11AB-95	Adams Lake	Canada R[a]
11AB-90	Reesor Reservoir	Canada R[a]
11AB-102	Gaff Ditch near Merryflat	Canada[c]
1525	Matheson Canal near Chinook, Montana	U.S.[b]
	Frenchman River Tributary Basin	
11AC-67	Frenchman River at No. 37 Highway	Canada[c]
11AC-71	Frenchman River below Mule Creek	Canada[c]
11AC-23	Frenchman River at 50 Mile	Canada[c]
11AC-70	Frenchman River near Rosefield	Canada[c]
1645	Frenchman Canal near Saco, Montana	U.S.[b]

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Int. - International Gauging Station.

Int.R - International Station on Reservoir.

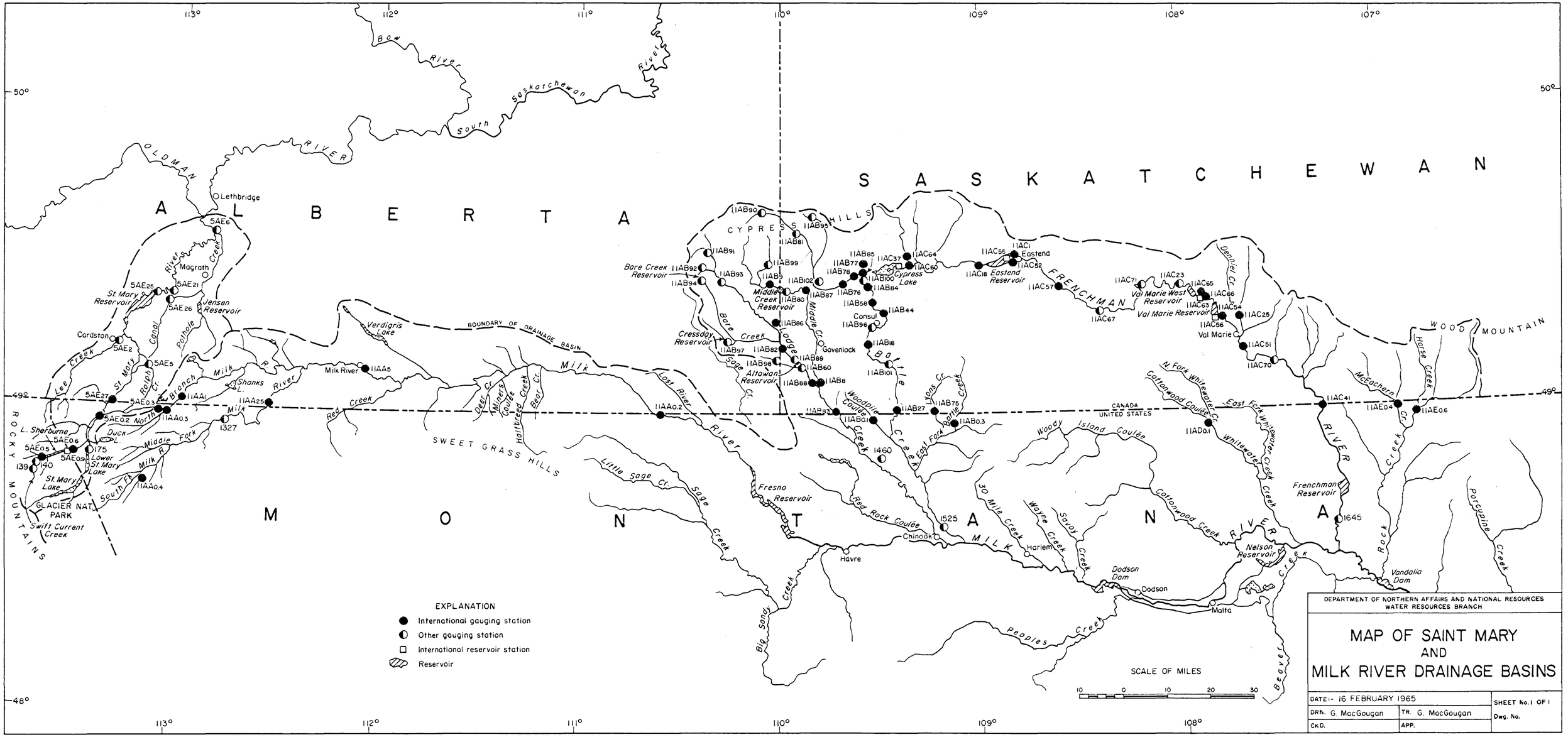
U.S. - Denotes operation by United States Geological Survey.

Canada - Denotes operation by Water Resources Branch, Canada.

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

b - Monthly discharge data only tabulated in this report.

c - Data not included in this report or appendix


ALBERTA
SASKATCHEWAN
MONTANA
Bow River
South Saskatchewan River
OLDMAN RIVER
Lethbridge
BOUNDARY OF DRAINAGE BASIN
CANADA
UNITED STATES
ROCKY MOUNTAINS
SWEET GRASS HILLS
CYPRESS HILLS
WOOD MOUNTAIN
MILK RIVER
FRENCHMAN RIVER
Verdigris Lake
Milk River
Red Creek
Deer Cr.
Miners Coulee
Halfbreed Creek
Beer Cr.
Lost River
Cardston
Lee Creek
St. Mary Reservoir
St. Mary Canal
Ralph Cr.
Pothole
Magrath
Jensen Reservoir
Shanks L.
Middle Fork
L. Sherburne
Duck L.
Lower St. Mary Lake
St. Mary Lake
South Fk Milk R.
GLACIER NAT. PARK
Swift Current Creek
Bare Creek Reservoir
Cressday Reservoir
Middle Creek Reservoir
Middle Cr.
Lodge Creek
Sage Cr.
Altawan Reservoir
Consul
Govenlock
Bottle Creek
Yons Cr.
Woodpile Coulee
Fresno Reservoir
Little Sage Cr.
Sage Creek
Big Sandy Creek
Red Rock Coulee
Havre
Chinook
Harlem
30 Mile Creek
Wayne Creek
Savoy Creek
Peoples Creek
Woody Island Coulee
Cypress Lake
Eastend
Eastend Reservoir
Val Marie West Reservoir
Val Marie Reservoir
Val Marie
Govenlock
Consul
Deerfield Cr.
Horse Creek
McEachern
N. Fork Whitewater Cr.
Cottonwood Coulee
East Fork Whitewater Creek
Whitewater Creek
Cottonwood Creek
Frenchman Reservoir
Nelson Reservoir
Rock Creek
Porcupine Creek
Beaver Creek
Dodson Dam
Dodson
Malta
Vandalia Dam
EXPLANATION
International gauging station
Other gauging station
International reservoir station
Reservoir
SCALE OF MILES
10 0 10 20 30
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
WATER RESOURCES BRANCH
MAP OF SAINT MARY
AND
MILK RIVER DRAINAGE BASINS
DATE:- 16 FEBRUARY 1965
DRN. G. MacGougan
TR. G. MacGougan
CKD.
APP.
SHEET No. 1 OF 1
Dwg. No.

Report to the International Joint Commission on the division and use of the waters of the St. Mary and Milk Rivers...

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1964

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