Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION OF THE WATERS OF

ST. MARY AND MILK RIVERS

by

J. D. McLEOD
representing Canada

and

E. L. HENDRICKS
representing United States

1970

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representing United States

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

Gentlemen:

In compliance with the provisions of Clause VIII (c) of your Order of October 4, 1921, directing the division of the waters of St. Mary and Milk Rivers between Canada and the United States, we are transmitting herewith a report on the operations during the irrigation season ended October 31, 1970.

Respectfully submitted,

J. D. McLeod,
Accredited Officer of Her Majesty

E. L. Hendricks,
Accredited Officer of the United States

1971.

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Article VI of the Boundary Waters Treaty of 1909 between Great Britain and the United States governs the apportionment of the waters of the St. Mary and Milk Rivers. To comply with this Treaty, representatives of Canada and the United States collected and compiled, co-operatively, hydrometric data at forty-six international gauging stations. Canada operated another twelve non-international gauging stations, the data of which are used in the natural flow computations.

This report summarizes the natural flow computations during 1970, enlarges on the apportionment of the natural flow and explains any unusual occurrences throughout the year as well as any modifications which have been made or are contemplated for increasing the accuracy of the natural flow computations. Summarized natural flow tables are included in the report proper, whereas the detailed computations are included in Appendix A. The daily discharge data for 1970 are included in Appendix B.

Mr. J. D. McLeod, Senior Engineer, Inland Waters Branch, acting in the capacity of Accredited Officer of Her Majesty, was represented in the field by Mr. R. D. May, District Engineer, Calgary, Alberta. Mr. E. L. Hendricks, Chief Hydrologist, United States Geological Survey, as Accredited Officer of the United States, was represented in the field by Mr. G. M. Pike, District Chief, Helena, Montana. This report has been prepared jointly by representatives of Canada and the United States under the supervision of Mr. R. D. May and Mr. G. M. Pike.

The natural flow of the St. Mary River was slightly above average in 1970, whereas that of the Milk River was below average. During the 1970 irrigation season the collective natural flow of the Eastern Tributaries of the Milk River was slightly above average. No problems in the apportionment of flows were encountered.

The annual conference between the staffs of Messrs. R.D. May and G.M. Pike was held in Helena Montana, January 27-28, 1971. Stream flow records collected jointly by the two offices were reviewed and approved. Mutual problems were discussed and a schedule of field operations for 1971 was adopted.

ST. MARY RIVER

During the irrigation season, Canada's share of the natural flow of the St. Mary River at the International Boundary is, as stipulated by the 1921 Order, to be three-quarters of the natural flow up to a total flow of 666 cfs, with anything above that quantity to be divided equally between Canada and the United States. During the non-irrigation season (November 1 to March 31) the entire natural flow is to be divided equally between the two countries.

To comply with the above order, field engineers of both countries made semi-monthly computations of the daily natural flow of St. Mary River during the 1970 irrigation season. Regular interim reports of these computations were sent to all agencies involved in the water use and distribution of the flow of the St. Mary River in order to keep them informed as to the amount of water available as well as to ensure that any appropriation by the United States in excess of her share could be adjusted by a subsequent delivery of an equivalent amount at the earliest opportunity.

Tentative computations and interim reports are not made during the non-irrigation season as the only usage by the United States during this period is storage in Lake Sherburne. The average annual flow into this reservoir is only about one-quarter of the total natural flow at the International Boundary.

Lake Sherburne, the only storage reservoir in the St. Mary River Basin in the United States, is used to store excess flows for diversion to the Milk River. This water is later utilized by the United States, after passing through Canada, for irrigation in the lower Milk River valley. Storage in Lake Sherburne was 7,490 acre-feet on October 31, 1969, and had increased to

19,500 acre-feet just prior to the irrigation season on March 31, 1970. The storage reached a maximum of 66,000 acre-feet on July 4, and declined to 9,640 acre-feet by the end of the irrigation season on October 31.

Water was diverted from the St. Mary River to the North Milk River via the St. Mary Canal from April 13 to May 6 and May 21 to September 18. The total recorded flow past the gauging station on the St. Mary Canal at St. Mary Crossing was 166,000 acre-feet. Any 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 total natural flow of the St. Mary River at the International Boundary for the period November 1, 1969 to October 31, 1970 was 653,000 acre-feet, of which 599,000 acre-feet occurred during the irrigation season, April 1 to October 31, 1970. For the irrigation season the Canadian and United States shares were 351,000 acre-feet and 248,000 acre-feet respectively. The United States used 158,000 acre-feet or 64 per cent of her share. No problems in the apportionment of the natural flow between the two countries were encountered. The natural flow during the irrigation season was 102 per cent of the average of the previous sixty-seven years of record.

Table 1, which follows, summarizes the apportionment of the waters of the St. Mary River.

Table 1

SUMMARY OF DIVISION OF ST. MARY RIVER AND DIVERSION TO MILK RIVER

1970

(quantities in acre-feet)

Month	St.Mary River at Int'l. 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	U. S. Share	Canada Share					
Apr.	12,970	11,572	2,896	8,676	4,294	-14,055r	16,951	12,657	25,530
May	97,527	150,107	65,298	84,809	12,718	37,063	28,235	15,517	43,470
June	214,873	271,236	125,691	145,545	69,328	23,278	102,413	33,085	52,480
July	55,972	87,421	33,452	53,969	2,003	-10,941r	44,393	42,389	40,610
Aug.	28,287	36,344	9,896	26,448	1,839	-34,646r	44,542	42,703	40,240
Sept.	17,504	24,151	6,036	18,115	-611	-12,693r	18,729	19,339	28,400
Oct.	14,065	18,030	4,506	13,524	541	3,965	541	0	3,810
Total Irrig. Season	441,198	598,861	247,775	351,086	90,112	-8,029r	255,804	165,690	234,540
For Yr. Nov. to Oct.	482,919	652,673	274,682	377,991					

r: 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, 1969 = 7,490
March 31, 1970 = 19,480
October 31, 1970 = 9,640

Division Period at International Boundary	Natural Flow cfs*	Canada's Share cfs*	Received by Canada cfs*	Received by Canada	
				Above (+) Share cfs*	Below (-) Share cfs*
Apr. 1 - Apr. 15	2,739	2,054	3,701	1,647	
Apr. 16 - Apr. 30	3,095	2,320	2,838	518	
May 1 - May 15	21,121	12,811	14,859	2,048	
May 16 - May 31	54,557	29,946	34,310	4,364	
June 1 - June 15	69,285	37,145	56,210	19,065	
June 16 - June 30	67,461	36,233	52,120	15,887	
July 1 - July 15	27,038	16,023	16,890	867	
July 16 - July 31	17,036	11,186	11,329	143	
Aug. 1 - Aug. 15	11,419	8,158	8,469	311	
Aug. 16 - Aug. 31	6,904	5,176	5,792	616	
Sept. 1 - Sept.15	5,482	4,112	3,878		234
Sept.16 - Sept.30	6,694	5,021	4,947		74
Oct. 1 - Oct. 15	5,278	3,960	4,125	165	
Oct. 16 - Oct. 31	3,812	2,858	2,966	108	

* CFS DAYS IN THE PERIOD

In order to provide advance information on the probable runoff in the St. Mary River Basin, the forty-ninth annual international snow survey was conducted on May 5 and 6, 1970. The tabulated results of the forecasts and actual discharge or natural flow at three locations are given in Table 2.

TABLE 2

RESULTS OF THE 1970 ST. MARY RIVER BASIN SNOW SURVEY

Location	Period of Correlation	Forecast of 1970 Runoff		Measured Runoff	
		Acre-feet	% of Average	Acre-Feet	% of Average
Swiftcurrent Creek at Many Glacier	1923-65	77,700 (May to July)	(1923-69) 113	76,800 (May to July)	(1923-69) 112
Natural Flow Swiftcurrent Creek at Sherburne	1922-65	132,000 (May to Sept.)	(1922-69) 114	131,100 (May to Sept.)	(1922-69) 114
Natural Flow St. Mary River at International Boundary	1922-65	588,000 (May to Sept.)	(1922-69) 115	569,300 (May to Sept.)	(1922-69) 112

MILK RIVER

The 1921 Order on the division of flow of the Milk River is the converse of that of the St. Mary River. That is, the United States is entitled to three-quarters of the flow up to a total discharge of 666 cfs, with any amount above this total to be divided equally between the two countries. During the non-irrigation season (November 1 to March 31) the entire flow is to be divided equally.

No actual apportionment of the Milk River at Eastern Crossing is made as, except for a few small unmeasured diversions above the eastern crossing of the International Boundary, the entire natural flow of the Milk River was delivered to the United States.

The computed natural flow of the Milk River at its eastern crossing of the International Boundary during the period March 1 to October 31, 1970, was 98,300 acre-feet. This is 83 per cent of the average natural flow of the previous fifty-eight years of record. The United States and Canadian shares were 68,700 acre-feet and 29,600 acre-feet respectively. The natural flow computations of the Milk River at its eastern crossing are given in Table 12 in Appendix A.

The international gauging station on the South Fork Milk River near Babb, Montana was again operated in 1970 to study the utilization of water in the Milk River Basin within the Blackfeet Indian Reservation.

During 1970 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.

EASTERN TRIBUTARIES OF MILK RIVER

The waters of the eastern tributaries of the Milk River were divided in accordance with the Order of the International Joint Commission dated October 4, 1921, which stipulates under Rule III that "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." This rule 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 so compilation of the natural flow at the International Boundary by ten-day periods was begun in 1940.

During the runoff season, March 1 to October 31, field engineers of both countries make ten-day computations of the natural flows of Lodge Creek, Battle Creek and Frenchman River to determine each country's share, so that any appropriation by Canada in excess of her share can be adjusted at the earliest opportunity by a subsequent delivery to the United States of an equivalent amount. Regular interim reports on the progress of the division of the natural flows of Lodge Creek, Battle Creek and Frenchman River at the International Boundary were made to interested agencies throughout the runoff season. No division of flow is made during the winter period as there is usually very little flow and it is impracticable to obtain streamflow records during this period.

Although the total runoff at the eastern tributaries of the Milk River was a little above average during 1970, the runoff from the individual streams ranged from severe drought conditions in the lower portions of the

Lodge and Battle Creek Basins to well above normal in the Frenchman River and Rock Creek Basins. No major problems were encountered in the division of the natural flow of these tributaries, although the refunding of deficits in deliveries which occurred in April was delayed until water was available from snowmelt in the Cypress Hills during May.

During the summer of 1970 a canal was constructed from Middle Creek Reservoir around a large private irrigation project. Previously this irrigation project captured any releases from the reservoir, making it very difficult to refund any deficit deliveries from this reservoir. With the construction of the new canal, however, this irrigation project is bypassed and water is released directly into Middle Creek. Therefore any deficit deliveries in the Lodge Creek Basin can be refunded within a reasonable period of time.

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, 1970 was 148,000 acre-feet or 107 per cent of 138,000 acre-feet, the average of the previous forty-three years. The quantities delivered to the United States by the various tributaries are listed in Table 3.

TABLE 3

MEASURED RUNOFF OF EASTERN TRIBUTARIES OF MILK RIVER AT INTERNATIONAL BOUNDARY

FOR PERIOD MARCH TO OCTOBER 1970

(quantities in acre-feet)

Month	Lodge Creek	Battle Creek	Wood-pile Coulee	East Fork Battle Creek	Lyons Creek	White-water Creek	Frenchman River	Rock Creek below Horse Creek	McEachern Creek
Mar.	0	515	0	0	0	437	1,640	525	32
Apr.	4,890	2,610	0	0	0	64	49,900	17,020	6,700
May	7,390	9,630	0	0	0	90	21,900	3,950	2,280
June	522	2,640	0	0	0	63	5,230	1,340	491
July	285	1,800	0	0	0	6	1,680	178	3
Aug.	0	670	0	0	0	1	2,160	32	0
Sept.	0	46	0	0	0	3	339	39	0
Oct.	0	384	0	0	0	4	271	96	0
Total	13,087	18,295	0	0	0	668	83,120	23,180	9,506

Estimates for a number of small diversions from the eastern tributaries of Milk River in Saskatchewan and Alberta were provided by the Water Resources Commission of the Province of Saskatchewan and the Water Resources Division of the Province of Alberta, and are based on reports from the individual licensed irrigators. The Saskatchewan Water Resources Commission has introduced a system

whereby they receive results from the irrigators at the time of irrigation rather than the end of the season. This has resulted in a greater accuracy in the estimate for usage by the ungauged minor diversions. In order to include these minor diversion usages in the interim reports a total usage for the year was estimated on the basis of the snow survey results. Thus there is some discrepancy between the final and interim division computations. The reported minor diversions as supplied by the Provinces of Saskatchewan and Alberta are contained in Appendix B.

The water levels of the index domestic projects (stock water reservoirs) were again monitored in 1970 and thus domestic project usages for the spring runoff periods of 1966 to 1970 inclusive are available for both the Frenchman River and Battle Creek Basins. To date the computations indicate that the total domestic project water usage is a very small percentage of the total natural flow. The 1970 results indicate a usage in the Battle Creek Basin of 1.6 per cent of the March-to-October computed natural flow, whereas in the Frenchman River Basin the indicated usage was 0.9 per cent of the computed natural flow for the same period. The maximum percentage usage recorded during the period of record was 4.3 per cent of the total natural flow of the Battle Creek Basin in 1969, while the minimum percentage recorded was 0.6 per cent also recorded in the Battle Creek Basin but in 1968.

It was decided at the most recent conference between United States Geological Survey, Helena, Montana and Water Survey of Canada, Calgary, Alberta representatives that a figure for the domestic project water usage be included in both the 1971 Battle Creek and Frenchman River natural flow computations. This usage figure is to be derived from a curve relating minor diversion usage to domestic project usage.

Five of the six supplementary gauging stations which were established

on the Frenchman River in 1965 for the study of channel losses were abandoned in 1970. One station, immediately below Val Marie Reservoir, was operated to aid in determining the return flow from the Val Marie irrigation project. The three supplementary stations on Battle Creek were operated to obtain data on channel losses and return flow.

A change in the method of computing return flow was made this year. A time lag of 2 days was applied to the 20 per cent return flow allowance on Stirling and Nash, McKinnon and Richardson Ditches, and a 4-day time lag was applied to Vidora Ditch. Although this change makes no difference in the total return flow for the season, it does give more realistic natural flows during the ten-day division periods.

The eighteenth annual snow survey in the basins of the eastern tributaries of the Milk River was conducted by the Inland Waters Branch, Canada, during the period February 23 to 27, 1970. The tabulated results of the forecasts and measured discharge or computed natural flow are shown in Table 4. This table shows a great disparity between forecast and actual measured runoff.

TABLE 4

RESULTS OF THE CYPRESS HILLS SNOW SURVEY

Location	Period of Correlation	Forecast of 1970 Runoff		Measured Runoff	
		Acre-Feet	% of Average	Acre-feet	% of Average
Natural Flow Lodge Creek at International Boundary	1953-66	13,900 (Mar. to Apr.)	(1953-69) 74	16,400 (Mar. to Apr.)	(1953-69) 87
Natural Flow Battle Creek at International Boundary	1953-66	17,300 (Mar. 5 to May 4)	(1953-69) 110	13,000 (Mar. 5 to May 4)	(1953-69) 83
Natural Flow Frenchman River at International Boundary	1953-66	63,000 (Mar. to May)	(1940-69) 100	92,900 (Mar. to May)	(1940-69) 147

Lodge Creek

The computed natural flow of Lodge Creek at the International Boundary, for the period March 1 to October 31, 1970, was 23,600 acre-feet or 66 per cent of the average natural flow of the previous twenty years of record. Each country was entitled to 11,800 acre-feet, which is fifty per cent of the natural flow. A total flow of 13,100 acre-feet, or 111 per cent of the United States share, was recorded at the International Boundary.

Deficit deliveries were recorded in seven division periods during the season. Two large deficits during April were refunded by large excess deliveries during May. Four small deficits occurred after the flow in Lodge Creek had ceased and were probably caused by anomalies in the computations of the evaporation from Middle Creek Reservoir.

The division of the Lodge Creek natural flow is summarized in Table 5. The detailed computation of the natural flow is given in Table 13 of Appendix A.

TABLE 5

SUMMARY OF LODGE CREEK DIVISION

1970

Division Period at International Boundary	Natural Flow cfs*	U. S. A. Share cfs*	Received by U. S. A. cfs *	Received by U. S. A.	
				Above (+) Share cfs*	Below (-) Share cfs*
Mar. 1 - Mar. 10	0	0	0		
Mar. 11 - Mar. 20	0	0	0		
Mar. 21 - Mar. 31	0	0	0		
Apr. 1 - Apr. 10	1,645	822	74		748
Apr. 11 - Apr. 20	5,184	2,592	1,480		1,112
Apr. 21 - Apr. 30	1,416	708	910	202	
May 1 - May 10	2,202	1,101	1,217	116	
May 11 - May 20	689	344	1,994	1,650	
May 21 - May 31	82	41	515	474	
June 1 - June 10	0	0	22	22	
June 11 - June 20	146	73	198	125	
June 21 - June 30	254	127	43		84
July 1 - July 10	80	40	127	87	
July 11 - July 20	73	37	17		20
July 21 - July 31	14	7	0		7
Aug. 1 - Aug. 10	83	42	0		42
Aug. 11 - Aug. 20	0	0	0		
Aug. 21 - Aug. 31	0	0	0		
Sept. 1 - Sept. 10	0	0	0		
Sept. 11 - Sept. 20	0	0	0		
Sept. 21 - Sept. 30	0	0	0		
Oct. 1 - Oct. 10	0	0	0		
Oct. 11 - Oct. 20	10	5	0		5
Oct. 21 - Oct. 31	0	0	0		

* cfs days in the period

Battle Creek

The computed natural flow of Battle Creek at the International Boundary, for the period March 1 to October 31, 1970 was 31,000 acre-feet or 108 per cent of the average natural flow of the previous thirty years of record. Each country was entitled to 15,500 acre-feet, which is fifty per cent of the natural flow. A total flow of 18,300 acre-feet was recorded at the International Boundary, which is 118 per cent of the United States share.

Deficit deliveries were recorded in six division periods during the season. All deficits were refunded with excess deliveries in the following division periods.

The division of the Battle Creek natural flow is summarized in Table 6. The detailed computation of the natural flow is given in Table 14 of Appendix A.

TABLE 6

SUMMARY OF BATTLE CREEK DIVISION

1970

Division Period at International Boundary	Natural Flow cfs *	U. S. A. Share cfs *	Received by U. S. A. cfs*	Received by U. S. A.	
				Above (+) Share cfs*	Below (-) Share cfs*
Mar. 1 - Mar. 4	0	0	0		
Mar. 5 - Mar. 14	31	16	29	13	
Mar. 15 - Mar. 25	151	76	143	67	
Mar. 26 - Apr. 4	153	76	139	63	
Apr. 5 - Apr. 14	3,390	1,695	546		1,149
Apr. 15 - Apr. 24	1,786	893	393		500
Apr. 25 - May 4	1,036	518	590	72	
May 5 - May 14	4,677	2,338	3,854	1,516	
May 15 - May 25	1,126	563	508		55
May 26 - June 4	336	168	378	210	
June 5 - June 14	290	145	298	153	
June 15 - June 24	827	413	799	386	
June 25 - July 4	523	262	326	64	
July 5 - July 14	365	182	177		5
July 15 - July 25	289	144	155	11	
July 26 - Aug. 4	248	124	500	376	
Aug. 5 - Aug. 14	110	55	141	86	
Aug. 15 - Aug. 25	33	16	32	16	
Aug. 26 - Sept. 4	0	0	1	1	
Sept. 5 - Sept. 14	3	2	0		2
Sept. 15 - Sept. 24	0	0	0		
Sept. 25 - Oct. 4	71	36	32		4
Oct. 5 - Oct. 14	27	14	20	6	
Oct. 15 - Oct. 25	103	52	99	47	
Oct. 26 - Oct. 31	68	34	65	31	

* cfs days in the period

Frenchman River

The computed natural flow of the Frenchman River at the International Boundary for the period March 1 to October 31, 1970 was 108,000 acre-feet or 141 per cent of the average natural flow of the previous thirty years of record. Each country was entitled to 54,000 acre-feet, which is fifty per cent of the natural flow.

A total flow of 83,100 acre-feet (154 per cent of the United States share) was recorded at the International Boundary.

Deficit deliveries were recorded in six division periods during the season. The deficits in June were refunded with excess deliveries during July and August. A total of 89 acre-feet in deficits were recorded during the last four division periods of the season. Water released from Val Marie Reservoir to refund this deficit did not arrive at the International Boundary until after October 31.

The division of the Frenchman River natural flow is summarized in Table 7. The detailed computation of the natural flow is given in Table 15 of Appendix A.

TABLE 7

SUMMARY OF FRENCHMAN RIVER DIVISION

1970

Division Period at International Boundary	Natural Flow cfs *	U. S. A. Share cfs *	Received by U. S. A. cfs*	Received by U. S. A.	
				Above (+) Share cfs*	Below (-) Share cfs*
Mar. 1 - Mar. 10	124	62	102	40	
Mar. 11 - Mar. 20	190	95	135	40	
Mar. 21 - Mar. 31	950	475	588	113	
Apr. 1 - Apr. 10	9,283	4,642	6,502	1,860	
Apr. 11 - Apr. 20	14,583	7,292	13,520	6,228	
Apr. 21 - Apr. 30	6,451	3,226	5,130	1,904	
May 1 - May 10	8,998	4,499	6,896	2,397	
May 11 - May 20	4,862	2,431	3,414	983	
May 21 - May 31	1,384	692	707	15	
June 1 - June 10	1,014	507	599	92	
June 11 - June 20	2,597	1,298	1,776	478	
June 21 - June 30	945	472	262		210
July 1 - July 10	569	284	283		1
July 11 - July 20	532	266	333	67	
July 21 - July 31	308	154	232	78	
Aug. 1 - Aug. 10	539	270	481	211	
Aug. 11 - Aug. 20	403	202	367	165	
Aug. 21 - Aug. 31	252	126	244	118	
Sept. 1 - Sept. 10	45	22	103	81	
Sept. 11 - Sept. 20	84	42	49	7	
Sept. 21 - Sept. 30	93	46	19		27
Oct. 1 - Oct. 10	65	32	16		16
Oct. 11 - Oct. 20	91	46	45		1
Oct. 21 - Oct. 31	153	76	75		1

* cfs days in the period

APPENDICES

Appendices A and B are submitted with this report under separate cover. Appendix A contains natural flow computations for the St. Mary River, Milk River, Lodge Creek, Battle Creek and Frenchman River. It also contains historical summaries of the mean monthly flows, United States shares and Canadian shares of the St. Mary River. Appendix B contains the daily discharge data for thirty-nine international gauging stations and three semi-international gauging stations. Reservoir contents for seven international and nine semi-international gauging stations are also included. The details of the minor diversions in Canada are also contained in Appendix B.

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

- 1970 -

Map Index	Stream and Location	Remarks
	St. Mary River Basin	
05AE027	St. Mary River at International Boundary	Int. [a]
05AE036	Lake Sherburne at Sherburne, Montana	Int. R[a]
05AE033	Swiftcurrent Creek at Sherburne, Montana	Int. [a]
05AE029	St. Mary Canal at St. Mary Crossing near Babb, Montana	Int. [a]
	Milk River Basin	
11AA025	Milk River at Western Crossing of International Boundary	Int. [a]
11AA005	Milk River at Milk River	Int. [a]
11AA031	Milk River at Eastern Crossing of International Boundary	Int. [a]
11AA033	South Fork Milk River near Babb, Montana	Int. [a]
11AA032	North Fork Milk River above St. Mary Canal near Browning, Montana	Int. [a]
11AA001	North Milk River near International Boundary	Int. [a]
	Lodge Creek Tributary Basin	
11AB089	Altawan Reservoir near Govenlock	Int. R[a]
11AB083	Lodge Creek below McRae Creek at International Boundary	Int. [a]
11AB086	Walburger Coulee below Diversions	Int. [a]
11AB060	Spangler Ditch near Govenlock	Int. [a]
11AB009	Middle Creek near Alberta Boundary	Int. [a]
11AB080	Middle Creek Reservoir	Int. R[a]
11AB087	Middle Creek near Battle Creek	Int. [a]

Map Index	Stream and Location	Remarks
	Battle Creek Tributary Basin	
11AB027	Battle Creek at International Boundary	Int. [a]
11AB078	Cypress Lake West Inflow Canal	Int. [a]
11AB085	Cypress Lake West Inflow Canal Drain	Int. [a]
11AB077	Cypress Lake West Outflow Canal	Int. [a]
11AB084	Vidora Ditch near Consul	Int. [a]
11AB058	Richardson Ditch near Consul	Int. [a]
11AB044	McKinnon Ditch near Consul	Int. [a]
11AB018	Stirling and Nash Ditch near Consul	Int. [a]
11AB105	Woodpile Coulee near International Boundary	Int. [a]
11AB107	East Fork Battle Creek near International Boundary	Int. [a]
11AB075	Lyons Creek at International Boundary	Int. [a]
	Whitewater Creek Tributary Basin	
11AD001	Whitewater Creek near International Boundary	Int. [a]
	Frenchman River Tributary Basin	
11AC055	Eastend Reservoir	Int. R[a]
11AC001	Frenchman River below Eastend Reservoir	Int. [a]
11AC057	Frenchman River below Eastend Irrigation Project	Int. [a]
11AC063	Val Marie West Reservoir	Int. R[a]
11AC056	Val Marie Reservoir	Int. R[a]
11AC051	Frenchman River below Val Marie	Int. [a]
11AC041	Frenchman River at International Boundary	Int. [a]
11AC060	Cypress Lake East Outflow Canal	Int. [a]
11AC037	Cypress Lake	Int. R[a]
11AC064	Belanger Creek Diversion to Cypress Lake	Int. [a]
11AC052	Eastend Canal	Int. [a]
11AC066	Val Marie West Pumping Canal	Int. [a]

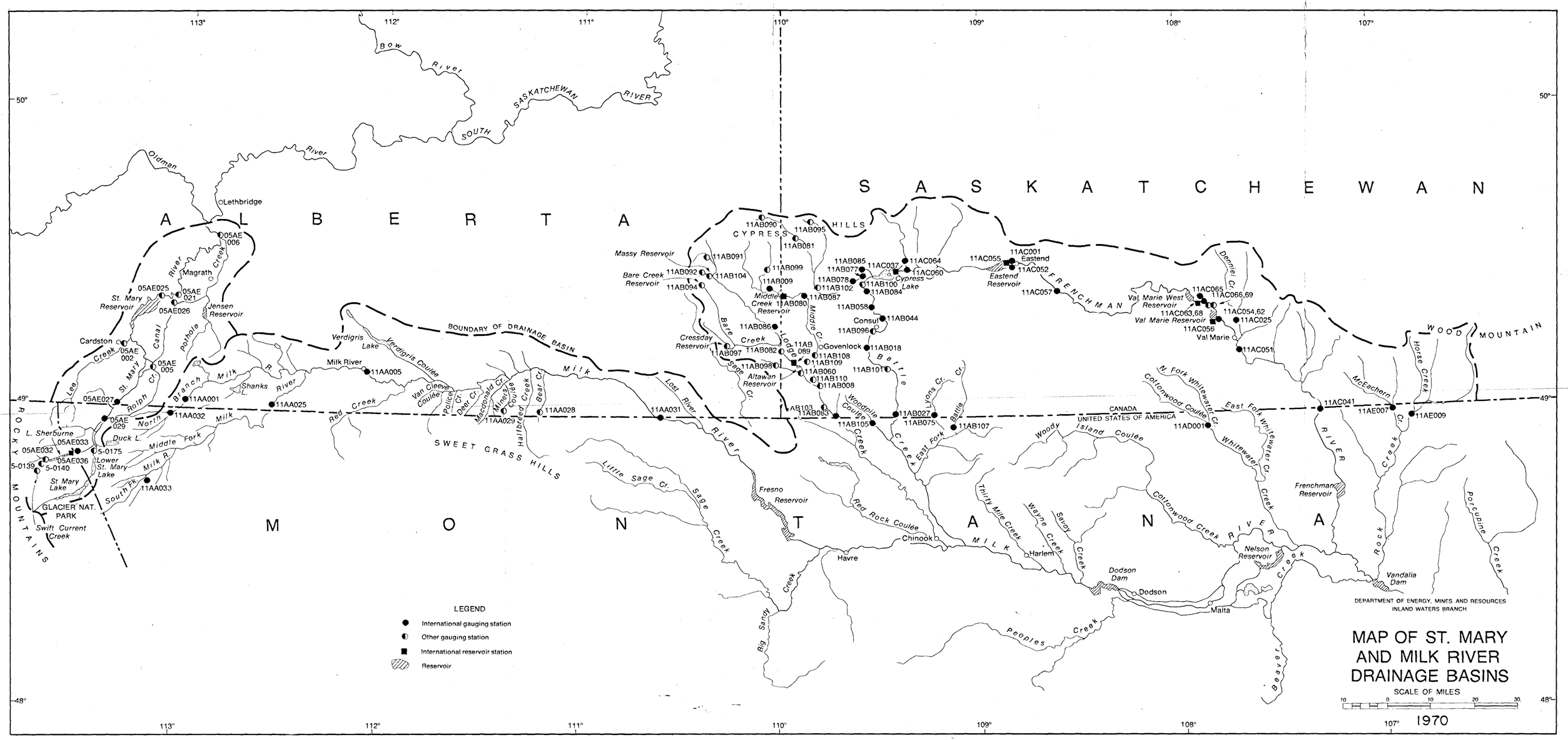
Map Index	Stream and Location	Remarks
11AC065	Val Marie West Gravity Canal	Int. [a]
11AC054	Val Marie Main Canal	Int. [a]
11AC025	Denniel Creek near Val Marie	Int. [a]
	Rock Creek Tributary Basin	
11AE009	Rock Creek below Horse Creek near International Boundary	Int. [a]
11AE007	McEachern Creek at International Boundary	Int. [a]
	St. Mary River Basin	
5-0175	St. Mary River near Babb, Montana	U.S.A. [c]
05AE025	St. Mary Reservoir near Spring Coulee	Canada R[c]
05AE006	St. Mary River near Lethbridge	Canada [c]
5-0139	Grinnell Creek at Grinnell Glacier near Many Glacier, Montana	U.S.A. [c]
5-0140	Grinnell Creek near Many Glacier, Montana	U.S.A. [c]
05AE032	Swiftcurrent Creek at Many Glacier, Montana	U.S.A. [c]
05AE005	Rolph Creek near Kimball	Canada [c]
05AE002	Lee Creek at Cardston	Canada [c]
05AE026	Canadian St. Mary Canal near Spring Coulee	Canada [c]
05AE021	Magrath Irrigation District Canal near Spring Coulee	Canada [c]
	Milk River Basin — Southern Tributaries	
11AA029	Miners Coulee near International Boundary	Canada [c]
11AA028	Bear Creek near International Boundary	Canada [c]

Map Index	Stream and Location	Remarks
	Lodge Creek Tributary Basin	
11AB082	Lodge Creek at Alberta Boundary	Canada [c]
11AB091	Michele Reservoir near Elkwater	Canada R[a]
11AB092	Greasewood Reservoir near Elkwater	Canada R[a]
11AB104	Massy Reservoir near Elkwater	Canada R[a]
11AB094	Bare Creek Reservoir near Elkwater	Canada R[a]
11AB097	Cressday Reservoir near Cressday	Canada R[a]
11AB098	Jaydot Reservoir near Jaydot	Canada R[a]
11AB099	Mitchell Reservoir near Elkwater	Canada R[a]
11AB108	Middle Creek near Govenlock	Canada [c]
11AB109	Buchanan Ditch near Govenlock	Canada [c]
11AB110	Stokke Ditch near Govenlock	Canada [c]
11AB008	Middle Creek above Lodge Creek	Canada [c]
11AB103	Squaw Coulee near Willow Creek	Canada [a]
	Battle Creek Tributary Basin	
11AB081	Battle Creek at Ranger Station	Canada [c]
11AB100	Battle Creek above Cypress Lake West Outflow Canal	Canada [c]
11AB096	Battle Creek near Consul	Canada [c]
11AB101	Battle Creek below Nashlyn Project	Canada [c]
11AB095	Adams Lake	Canada R[a]
11AB090	Reesor Reservoir	Canada R[a]
11AB102	Gaff Ditch near Merryflat	Canada [c]

Map Index	Stream and Location	Remarks
	Frenchman River Tributary Basin	
11AC062	Frenchman River below Val Marie Reservoir	Canada c
11AC068	Val Marie Electric Pump No. 1	Canada a
11AC069	Val Marie Electric Pump No. 2	Canada a

Symbol Code

Int.	-	International Gauging Station
Int. R	-	International Station on Reservoir
U.S.A.	-	Operation by United States Geological Survey
Canada	-	Operation by Inland Waters Branch, Canada
a	-	Monthly and daily discharge data and stream measurements or month-end contents contained in Appendix B
c	-	Data not included in this report or appendices


ALBERTA
SASKATCHEWAN
MONTANA
BOUNDARY OF DRAINAGE BASIN
CANADA
UNITED STATES OF AMERICA
Bow River
SOUTH SASKATCHEWAN RIVER
Oldman River
Lethbridge
Milk River
Red Creek
Verdigris Lake
Verdigris Coulee
Van Cleeve Coulee
Police Cr.
Bear Cr.
Macdonald Cr.
Miners Coulee
Halfbreed Creek
Bear Cr.
Lost River
Sweet Grass Hills
Little Sage Cr.
Sage Creek
Fresno Reservoir
Big Sandy Creek
Havre
Red Rock Coulee
Chinook
Milk River
Thirty Mile Creek
Wayne Creek
Harlem
Savoy Creek
Dodson Dam
Dodson
Peoples Creek
Malta
Beaver Creek
Nelson Reservoir
Vandalia Dam
Rock Creek
Porcupine Creek
Frenchman Reservoir
Frenchman River
Cottonwood Creek
Cottonwood Coulee
N. Fork Whitewater Cr.
East Fork Whitewater Cr.
Whitewater Creek
Woody Island Coulee
Eastend Reservoir
Eastend
Cypress Lake
Cypress Hills
Massy Reservoir
Bare Creek Reservoir
Middle Creek Reservoir
Middle Cr.
Lodge Cr.
Bare Creek
Cressday Reservoir
Govenlock
Consul
Battle Cr.
Lyons Cr.
Woodpile Coulee
Battle Creek
East Fork Battle Creek
Sage Creek
Altawan Reservoir
Val Marie West Reservoir
Val Marie Reservoir
Val Marie
Dennier Cr.
Wood Mountain
Horse Creek
McEachern Cr.
Rock Mountains
Glacier Nat. Park
St. Mary Reservoir
St. Mary Canal
Jensen Reservoir
Magrath
Cardston
Lee Creek
Rolph Cr.
Milk River Pothole
Shanks L.
Milk R. North Branch
Middle Fork Milk R.
South Fk Milk R.
L. Sherburne
Duck L.
Lower St. Mary Lake
St. Mary Lake
Swift Current Creek
05AE025
05AE 021
05AE026
05AE 006
05AE 002
05AE 005
05AE027
05AE 029
05AE033
05AE032
05AE036
5-0135
5-0140
5-0175
11AA001
11AA005
11AA025
11AA032
11AA033
11AA028
11AA029
11AA031
11AB090
11AB095
11AB081
11AB091
11AB092
11AB104
11AB094
11AB099
11AB009
11AB085
11AB077
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11AB102
11AB087
11AB080
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11AB097
11AB082
11AB089
11AB108
11AB109
11AB098
11AB060
11AB110
11AB008
11AB103
11AB083
11AB105
11AB037
11AB100
11AB084
11AB058
11AB044
11AB018
11AB101
11AB027
11AB075
11AB107
11AC064
11AC060
11AC001
11AC055
11AC052
11AC057
11AC065
11AC066,69
11AC063,68
11AC054,62
11AC025
11AC056
11AC051
11AC041
11AE007
11AE009
11AD001
LEGEND
International gauging station
Other gauging station
International reservoir station
Reservoir
DEPARTMENT OF ENERGY, MINES AND RESOURCES
INLAND WATERS BRANCH
MAP OF ST. MARY AND MILK RIVER DRAINAGE BASINS
SCALE OF MILES
10 0 10 20 30
1970
113° 112° 111° 110° 109° 108° 107°
50° 49° 48°

HD
1694
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R424
1970

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