Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION OF THE WATERS OF

ST. MARY AND MILK RIVERS

by

J. S. CRAGWALL, Jr.

representing United States

and

D. A. DAVIS

representing Canada

1979

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March, 1980

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 the United States and Canada, we are transmitting herewith a report on the operations during the irrigation season ended October 31, 1979.

Respectfully submitted,

J. S. Cragwall, Jr.

J.S. Cragwall, Jr.,
Accredited Officer of the United States

D. A. Davis

D.A. Davis
Accredited Officer of Her Majesty

SYNOPSIS

During the 1979 irrigation season the natural flow of the St. Mary River was slightly below normal and the Milk River was well above normal being 84% and 170% of the average long term natural flow.

The natural flow of the St. Mary River during the irrigation season, April 1 to October 31, 1979 was 612 000 cubic decametres (dam^3) (496,000 acre-feet). Under the terms of the Treaty the Canadian share was 371 000 dam^3 (301,000 acre-feet). The total runoff recorded at the International Boundary during the irrigation season was 124% of the Canadian allotment.

The natural flow of the Milk River at its eastern crossing of the International Boundary was 248 000 dam^3 (201,000 acre-feet) during the period March 1, 1979 to October 31, 1979. Under the terms of the Treaty the United States' allotment was 153 000 dam^3 (124,000 acre-feet). The total runoff recorded at the International Boundary was 260% of the United States allotment. Apportionment of the Milk River has not been made as Canadian usage in 1979, as in most years, is considered to be less than its share.

The natural flow of the three eastern tributaries of the Milk River that are apportioned, Lodge Creek, Battle Creek and Frenchman River, was above normal being 123%, 141% and 122% respectively of the long term flow. The combined natural flow of these tributaries was 203 000 dam^3 (165,000 acre-feet) of which the United States received 135 000 dam^3 (110,000 acre-feet). Although the flows delivered across the International Boundary were deficient for a number of apportionment periods, most of the deficits were refunded by subsequent deliveries.

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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. The terms of the Treaty were further clarified by the 1921 Order of the International Joint Commission. A copy of Article VI and the 1921 Order are contained in Annex A of this report. To comply with this Treaty, representatives of the United States and Canada collected and compiled on a co-operative basis, hydrometric data at forty international gauging stations. An additional thirty-nine gauging stations were operated independently by Canada or the United States to obtain data on diversions, reservoir contents, return flows, and index runoff. The majority of this additional information is used to improve the accuracy of natural flow computations.

This report summarizes the natural flow computations during 1979, comments on the apportionment of the natural flow and explains any unusual occurrences throughout the year as well as any modifications, which have been or are being contemplated, for increasing the accuracy of the natural flow computations. Summarized natural flow tables are included in the report proper, whereas the detailed natural flow computations are included in Appendix A. The daily discharge data for 1979 are included in Appendix B. Appendices A and B are submitted with this report under separate cover.

In accordance with the SI conversion schedule established by the International Joint Commission, the 1979 report uses SI units first, followed by Imperial units in parenthesis. Tables are shown in SI units first followed by the respective Imperial unit table, for example Table 1 and Table 1-A. The format for Appendices A and B of the report will be SI units only for 1979. In 1979 all Canadian data were published in SI units. Data collected

and compiled by the United States was computed in Imperial units and converted to SI units using the appropriate conversions. A summary of the conversion factors are contained in Annex B.

Mr. D.A. Davis, Regional Director, Western & Northern Region, Inland Waters Directorate, as Accredited Officer of Her Majesty, was represented in the field by Mr. G.H. Morton, Regional Chief, Water Survey of Canada, Calgary, Alberta and Mr. R.A. Halliday, Regional Chief, Water Survey of Canada, Regina, Saskatchewan. Mr. J.S. Cragwell Jr., 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, United States Geological Survey, Helena, Montana. This report was prepared jointly by personnel of the Water Survey of Canada and the United States Geological Survey under the supervision of Messrs. Morton, Halliday and Pike.

The annual conference between the staffs of the field representatives was held in Helena, Montana on January 30 and 31, 1980. Streamflow records collected jointly by Canada and the United States were reviewed and approved. Mutual problems and changes in computational procedures were discussed and a schedule of field operations for 1980 adopted.

ST. MARY RIVER

During the irrigation season, April 1 to October 31, 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-fourths of the natural flow up to a total discharge of 666 cubic feet per second, with volumes above that quantity to be divided equally between Canada and the United States. During the non-irrigation season, the flow is to be divided equally between the two countries.

To comply with the above order, representatives of both countries made semi-monthly computations of the daily natural flow of the St. Mary River during the 1979 irrigation season. If usage by the United States is in excess of its share then at the earliest opportunity a delivery of an equivalent amount of water is made to Canada. Regular interim reports of these computations were sent to all agencies involved in the water use and management of the flow of the St. Mary River. The interim reports keep these agencies informed as to the amount of water available.

Tentative computations and interim reports are not made during the non-irrigation season, because the only usage by the United States during this period is storage in Lake Sherburne. The storage in Lake Sherburne is considerably less than fifty per cent of the natural flow.

Lake Sherburne, the only storage reservoir within the St. Mary River basin in the United States, is used to store a portion of the United States share of flows for diversion to the Milk River. This water which passes through Canada is used by the United States for irrigation purposes in the lower Milk River valley.

Storage in Lake Sherburne was 10 100 dam^3 (8,170 acre-feet) on October 31, 1978, and had increased to 20 200 dam^3 (16,400 acre-feet) just prior to the irrigation season on March 31, 1979. The storage reached a maximum of 72 000 dam^3 (58,400 acre-feet) on July 8th and had decreased to 11 700 dam^3 (9,510 acre-feet) by the end of the irrigation season on October 31, 1979.

Water was diverted from the St. Mary River into the St. Mary Canal from May 15 to September 12, 1979. The total recorded flow for the gauging station on the St. Mary Canal at St. Mary Crossing was 159 000 dam^3 (129,000 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, 1978, to October 31, 1979, was 687 000 dam^3 (557,000 acre-feet), of which 612 000 dam^3 (496,000 acre-feet) occurred during the irrigation season, April 1 to October 31, 1979. For the irrigation season, the Canadian and the United States shares were 371 000 dam^3 (301,000 acre-feet) and 241 000 dam^3 (195,000 acre-feet), respectively. A total runoff of 461 000 dam^3 (374,000 acre-feet) was recorded at the International boundary which is 124% of the Canadian share. The computed natural flow during the irrigation season was 84% of the average of the previous seventy-six years of record.

Deficit deliveries were recorded in two of the fourteen periods during the 1979 irrigation season. The deficit which occurred during the August 16-31 division period was refunded in the following period. However, the deficit which occurred during the October 16-31 division period was not determined until after the end of the irrigation season and corrective action could

not be taken. In the future, when the possibility of a deficit delivery exists during the October 16-31 division period, flow will be closely monitored and corrective action taken within this division period.

Tables 1 and 1-A, which follow, summarize the apportionment of the waters of the St. Mary River.

TABLE I

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

1979

QUANTITIES IN CUBIC DECAMETRES

MONTH	St. MARY RIVER AT INTERNATIONAL BOUNDARY				EXCESS REC'D 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'S SHARE					
APR.	29 064	34 914	9 114	25 800	3 264	5 850	3 264	0	55 938
MAY	170 489	189 025	81 860	107 165	63 324	12 073	69 786	6 461	56 672
JUN.	130 382	209 019	92 271	116 750	13 633	32 524	59 747	46 114	53 904
JUL.	65 469	99 559	37 128	62 431	3 039	-14 876	52 004	48 965	47 903
AUG.	29 631	39 674	9 953	29 722	- 90	-36 793	46 746	46 836	46 487
SEP.	25 653	26 071	6 518	19 553	6 100	-10 433	16 951	10 851	20 523
OCT.	10 122	13 429	3 356	10 073	49	3 308	48	0	2 767
TOTAL IRRIGATION SEASON	460 811	611 693	240 201	371 494	89 319	- 8 346	248 546	159 228	284 194

* Milk River at Eastern Crossing is the Natural flow of the Milk River plus the diversion from the St. Mary River basin, less unaccounted canal losses.

QUANTITIES FOR 15 DAY PERIODS IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
APR. 1 TO APR. 15	12 948	9 713	10 789	1 077	
APR 16 TO APR. 30	21 966	16 087	18 274	2 187	
MAY 1 TO MAY 15	55 826	34 035	44 144	10 110	
MAY 16 TO MAY 31	133 201	73 131	126 345	53 214	
JUN. 1 TO JUN. 15	120 793	66 514	78 855	12 341	
JUN. 16 TO JUN. 30	88 226	50 234	51 527	1 291	
JUL. 1 TO JUL. 15	62 115	37 181	38 310	1 127	
JUL. 16 TO JUL. 31	37 443	25 250	27 160	1 911	
AUG. 1 TO AUG. 15	21 180	15 854	16 116	262	
AUG. 16 TO AUG. 31	18 494	13 867	13 515		353
SEP. 1 TO SEP. 15	15 008	11 257	16 787	5 530	
SEP. 16 TO SEP. 30	11 063	8 297	8 866	570	
OCT. 1 TO OCT 15	6 729	5 045	5 408	363	
OCT 16 TO OCT 31	6 702	5 028	4 714		313

TABLE IA

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

1979

QUANTITIES IN ACRE-FEET

MONTH	ST. MARY RIVER AT INTERNATIONAL BOUNDARY				EXCESS REC'D 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'S SHARE					
APR.	23,562	28,305	7,389	20,916	2,646	4,743	2,646	0	45,349
MAY	138,216	153,243	66,364	86,879	51,337	9,788	56,576	5,238	45,944
JUN.	105,701	169,452	74,804	94,649	11,052	26,367	48,437	37,385	43,700
JUL.	53,076	80,713	30,100	50,613	2,464	-12,060	42,160	39,696	38,835
AUG.	24,022	32,164	8,069	24,096	-73	-29,828	37,897	37,970	37,687
SEP.	20,797	21,136	5,284	15,852	4,945	-8,458	13,742	8,797	16,638
OCT.	8,206	10,887	2,721	8,166	40	2,682	39	0	2,243
TOTAL IRRIGATION SEASON	373,580	495,900	194,731	301,171	72,411	-6,766	201,497	129,086	230,396

* Milk River at Eastern Crossing is the Natural flow of the Milk River plus the diversion from the St. Mary River basin, less unaccounted canal losses.

QUANTITIES FOR 15-DAY PERIODS IN ACRE-FEET

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
APR. 1 TO APR. 15	10,497	7,874	8,747	873	
APR. 16 TO APR. 30	17,808	13,042	14,815	1,773	
MAY 1 TO MAY 15	45,258	27,592	35,788	8,196	
MAY 16 TO MAY 31	107,986	59,287	102,428	43,141	
JUN. 1 TO JUN. 15	97,927	53,923	63,928	10,005	
JUN. 16 TO JUN. 30	71,525	40,725	41,773	1,047	
JUL. 1 TO JUL. 15	50,357	30,143	31,058	914	
JUL. 16 TO JUL. 31	30,355	20,470	22,019	1,549	
AUG. 1 TO AUG. 15	17,171	12,853	13,065	212	
AUG. 16 TO AUG. 31	14,993	11,242	10,957		286
SEP. 1 TO SEP. 15	12,167	9,126	13,609	4,483	
SEP. 16 TO SEP. 30	8,969	6,726	7,188	462	
OCT. 1 TO OCT. 15	5,455	4,090	4,384	294	
OCT. 16 TO OCT. 31	5,433	4,076	3,822		254

THE MILK RIVER

During the irrigation season, April 1 to October 31, the United States' share of the natural flow of the Milk River at Eastern Crossing of the International Boundary is, as stipulated by the 1921 Order, to be three-fourths of the natural flow up to a total discharge of 666 cubic feet per second, with volumes above that quantity to be divided equally between the United States and Canada. During the non-irrigation season, November 1 to March 31, the flow is to be divided equally between the countries.

To comply with the above order, representatives of both countries made computations of the natural flow of the Milk River during the 1979 irrigation season. The interim reporting procedure of these computations is not as formal as that of the St. Mary River, since Canadian and United States usage has generally been considered to be less than their share. However several consecutive dry years and the increasing use of sprinkler irrigation systems has increased usage by Canadian and American irrigators. To evaluate the significance of the increased usage, a joint natural flow study has been initiated by Canada and the United States.

In support of a natural flow study, two gauging stations were constructed in 1978 at Milk River near Pendant D'Oreille and Milk River near Writing-On-Stone Park. When streamflow and usage data become available the natural flow study may provide the methodology which would improve the computation procedures of the natural flow of Milk River at Eastern Crossing. If usage by Canada is a sufficient factor then formal apportionment could be recommended.

The natural flow of the Milk River at its eastern crossing of the International Boundary during the period March 1 to October 31, 1979, was 248 000 dam^3 (201,000) acre-feet. This is 170% of the average natural flow

of the previous sixty-seven years of record. The United States and Canadian shares were 153 000 dam^3 (124,000 acre-feet) and 95 600 dam^3 (77,500 acre-feet), respectively during the irrigation season. The computations for determining the natural flow of the Milk River at its eastern crossing are given in Table 8 in Appendix A.

The total recorded flow at Milk River at Eastern Crossing of the International Boundary during the period March 1 to October 31, 1979 was 396 000 dam^3 (321,000 acre-feet). The recorded flow is composed of the natural flow of the Milk River, plus diverted St. Mary River water, which is used by downstream Milk River, United States users.

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 order might well be interpreted as requiring that the division of water be made on a continuing basis. However, it was recognized that there is a physical limitation because of the transit time in the flow system. Further analyses showed that the smallest practical time frame for compilation of the natural flows at the International Boundary was a ten-day period.

Prior to 1937, Canadian usage on the eastern tributaries consisted of private irrigators and the Canadian share of the natural flow was not fully utilized. The construction of three major reservoirs by the government of Canada on the Frenchman River during the late 1930's made an operational division of flow necessary on this tributary in 1937.

The re-development of several private irrigation projects and the construction of the Vidora project during the early 1950s resulted in increased utilization in Canada of Battle Creek water and made an operational division of flow on this tributary necessary in 1957.

Construction of a major reservoir and irrigation project on Lodge Creek in 1960 made an operational division of flow on this tributary necessary in 1961.

During the runoff season March 1 to October 31, ten-day computations of the natural flows of Lodge Creek, Battle Creek and Frenchman River are made to determine each country's share. If usage by Canada is in excess of its share then at the earliest opportunity a delivery of an equivalent amount of water is made to the United States. 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 or use and it is impracticable to obtain streamflow records during this period.

There were no serious problems in apportionment and the total quantity of water delivered to the United States during the season was in excess of its allotted share.

The two tributaries, Lyons and Whitewater Creeks, are monitored but do not have sufficient usage in Canada at this time to warrant an operational division of flow. The quantity of water delivered by these two tributaries to the United States during the period March 1 to October 31, 1979 was 3680 and 3550 dam^3 (2,980 and 2,880 acre-feet) respectively.

In 1979 several modifications were made to the gauging network in the eastern tributary basins. The status of the gauging station on Rock Creek below Horse Creek was changed from an International station to a bench mark station. The return flow gauging station on Walburger Coulee, in the Lodge Creek basin, was suspended from operation in 1979. The well and shelter were left on site to enable re-activation if water is released from Middle Creek reservoir through the Bedford outlet.

Estimates of unmeasured diversions to private irrigation projects in the Lodge Creek, Battle Creek and Frenchman River basins in Saskatchewan were provided by Environment Saskatchewan, and for the Lodge Creek basin in Alberta by the Department of Regional Economic Expansion, PFRA. These estimates are based on reports received from the operators of individual projects and by field inspections. An additional charge is made for domestic projects in the Battle Creek and Frenchman River basins based on the results of studies carried out by Canada on domestic project usage.

For the interim reports prepared at the end of apportionment periods an estimate of minor diversion projects usage is made based on a correlation between annual natural flows and reported usages for previous years. The natural flow for the current year is estimated from computed natural flow to date and an estimate of runoff volume for the remainder of the year dependent on runoff conditions. At the end of the year, the actual flow is known and a final estimate of minor diversions is made based on reported usage, consequently there is some discrepancy between interim and final division computations. Lists of reported and estimated diversions for 1979 are contained in Appendix B.

A return flow of 35%, based on a 1972-76 study, was used for the Gaff Ditch diversion from Battle Creek. The return flows were computed to be 30% for Vidora, Richardson and McKinnon canals and 25% for Nashlyn canal. The Squaw Coulee gauging station recorded a return flow of 354 dam^3 (287 acre-feet) from the 2870 dam^3 (2,330 acre-feet) diversion by Spangler Ditch from Lodge Creek.

A supplementary gauging station was operated during 1979 on Shepherd Ditch, a private diversion on Battle Creek located downstream from Gaff Ditch. A total diversion of 284 dam^3 (230 acre-feet) was recorded at this station during 1979, and is included in the list of miscellaneous diversions for Battle Creek in Appendix B.

The combined contents of the six major Canadian reservoirs increased from 64 000 dam^3 (51,900 acre-feet) or 32%, to 94 800 dam^3 (76,800 acre-feet) or 56% of the total capacity of 170 000 dam^3 (138,000 acre-feet) during the period March 1 to October 31, 1979.

LODGE CREEK

The computed natural flow of Lodge Creek below McRae Creek at the International Boundary for the period March 1 to October 31, 1979 was 47 000 dam^3 (38,100 acre-feet) or 123% of the average natural flow of the previous twenty-nine years of record. Each country was entitled to fifty percent of the natural flow. A total flow of 30 400 dam^3 (24,600 acre-feet) was recorded at the international boundary.

Deficit deliveries were recorded in four of the twenty-four division periods during the season. The deficits that occurred during July through September were refunded with an October release from Altawan Reservoir. An anomaly occurred during the detailed computation of natural flow for the

TABLE 2

SUMMARY OF LODGE CREEK DIVISION

1979

QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR. 1 - MAR. 10	35	17	0		17
MAR. 11 - MAR 20	11 468	5 734	6 053	319	
MAR. 21 - MAR. 31	12 820	6 410	8 417	2 007	
APR. 1 - APR. 10	2 463	1 232	1 827	595	
APR. 11 - APR. 20	10 191	5 096	6 449	1 353	
APR. 21 - APR. 30	4 917	2 458	3 090	632	
MAY 1 - MAY 10	2 357	1 178	1 934	756	
MAY 11 - MAY 20	1 365	682	1 234	552	
MAY 21 - MAY 31	892	446	638	192	
JUN. 1 - JUN. 10	227	114	227	113	
JUN. 11 - JUN. 20	0	0	106	106	
JUN. 21 - JUN 30	5	2	82	80	
JUL. 1 - JUL. 10	26	13	26	13	
JUL 11 - JUL. 20	19	10	1		9
JUL. 21 - JUL. 31	123	62	2		60
AUG. 1 - AUG. 10	58	29	74	45	
AUG. 11 - AUG. 20	13	7	14	7	
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	38	19	0		19
OCT. 1 - OCT 10	0	0	2	2	
OCT 11 - OCT 20	0	0	88	88	
OCT 21 - OCT. 31	0	0	126	126	
TOTAL - cubic decametres	47 017	23 509	30 390		

TABLE 2A

SUMMARY OF LODGE CREEK DIVISION

1979

QUANTITIES IN cfs days

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR. 1 - MAR. 10	14	7	0		- 7
MAR. 11 - MAR 20	4,687	2,344	2,474	130	
MAR. 21 - MAR. 31	5,240	2,620	3,440	820	
APR. 1 - APR. 10	1,007	504	747	243	
APR. 11 - APR. 20	4,165	2,083	2,636	553	
APR. 21 - APR. 30	2,010	1,005	1,263	258	
MAY 1 - MAY 10	963	481	790	309	
MAY 11 - MAY 20	558	279	504	226	
MAY 21 - MAY 31	365	182	261	78	
JUN. 1 - JUN. 10	93	47	93	46	
JUN. 11 - JUN. 20	0	0	43	43	
JUN. 21 - JUN 30	2	1	34	33	
JUL. 1 - JUL. 10	11	5	11	5	
JUL. 11 - JUL. 20	8	4	0		4
JUL. 21 - JUL. 31	50	25	1		25
AUG. 1 - AUG. 10	24	12	30	18	
AUG. 11 - AUG. 20	5	3	6	3	
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	16	8	0		8
OCT. 1 - OCT. 10	0	0	1	1	
OCT. 11 - OCT. 20	0	0	36	36	
OCT. 21 - OCT. 31	0	0	52	52	
TOTAL - cfs days	19 217	9 609	12 421		
- acre feet	38,117	19,059	24,637		

division period October 11-20. All recorded flow at the International boundary for this period was attributed to the release from Altawan Reservoir, however, the detailed computation indicated a natural flow of 71 dam^3 (58 acre-feet). The field representatives of both countries studied the problem and indicated that the anomaly arose due to the timing of the release from Altawan Reservoir and the use of an average time of travel between the reservoir and the boundary. It was agreed that the natural flow was zero for this period.

The division of the Lodge Creek natural flow is summarized in Table 2. The detailed computation of the natural flow is given in Table 9 and the historical summary in Table 10 of Appendix A.

BATTLE CREEK

The computed natural flow of Battle Creek at the International Boundary for the period March 1 to October 31, 1979 was 47 500 dam^3 (38,500 acre-feet) or 141% of the average natural flow of the previous thirty-nine years of record. Each country is entitled to fifty percent of the natural flow. A total flow of 27 600 dam^3 (22,400 acre-feet) was recorded at the international boundary.

Deficit deliveries were recorded in two of the twenty-four division periods during the season.

The division of the Battle Creek natural flow is summarized in Table 3. The detailed computation of the natural flow is given in Table 11 and the historical summary in Table 12 of Appendix A.

FRENCHMAN RIVER

The computed natural flow of the Frenchman River at the International

Boundary for the period March 1 to October 31, 1979 was 108 000 dam^3 (87,900 acre-feet) or 122% of the average flow of the previous thirty-nine years of record. Each country is entitled to fifty percent of the natural flow. A total runoff of 77 400 dam^3 (62,700 acre-feet) was recorded at the international boundary.

Deficit deliveries were recorded in nine of the twenty-four division periods during the season. These deficits occurred throughout the season and were refunded at the earliest opportunity.

The division of the Frenchman River natural flow is summarized in Table 4. The detailed computation of the natural flow is given in Table 13 and the historical summary in Table 14 of Appendix A.

TABLE 3

SUMMARY OF BATTLE CREEK DIVISION

1979

QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR. 1 - MAR. 14	141	70	131	61	
MAR. 15 - MAR. 25	13 709	6 854	9 021	2 167	
MAR. 26 - APR. 4	4 032	2 016	2 113	97	
APR. 5 - APR. 14	4 672	2 336	2 637	301	
APR. 15 - APR. 24	7 723	3 862	1 977		1 885
APR. 25 - MAY 4	5 229	2 614	2 684	70	
MAY 5 - MAY 14	3 160	1 580	2 195	615	
MAY 15 - MAY 25	3 502	1 751	2 217	466	
MAY 26 - JUN. 4	1 961	980	788		192
JUN. 5 - JUN. 14	506	253	1 015	762	
JUN. 15 - JUN. 24	479	240	472	232	
JUN. 25 - JUL. 4	383	192	230	38	
JUL. 5 - JUL. 14	814	407	524	117	
JUL. 15 - JUL. 25	0	0	82	82	
JUL. 26 - AUG. 4	0	0	549	549	
AUG. 5 - AUG. 14	351	176	206	30	
AUG. 15 - AUG. 25	76	38	71	33	
AUG. 26 - SEP. 4	49	24	46	22	
SEP. 5 - SEP. 14	67	34	62	28	
SEP. 15 - SEP. 24	107	54	100	46	
SEP. 25 - OCT. 4	57	28	53	25	
OCT. 5 - OCT. 14	57	28	53	25	
OCT. 15 - OCT. 25	266	133	248	115	
OCT. 26 - OCT. 31	175	88	163	75	
TOTAL - cubic decametres	47 516	23 758	27 637		

TABLE 3A

SUMMARY OF BATTLE CREEK DIVISION

1979

QUANTITIES IN cfs days

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR. 1 - MAR. 14	58	29	54	25	
MAR. 15 - MAR. 25	5,603	2,801	3,687	886	
MAR. 26 - APR. 4	1,648	824	864	40	
APR. 5 - APR. 14	1,910	955	1,078	123	
APR. 15 - APR. 24	3,157	1,579	808		770
APR. 25 - MAY 4	2,137	1,068	1,097	29	
MAY 5 - MAY 14	1,292	646	897	251	
MAY 15 - MAY 25	1,431	716	906	190	
MAY 26 - JUN. 4	802	401	322		78
JUN. 5 - JUN. 14	207	103	415	311	
JUN. 15 - JUN. 24	196	98	193	95	
JUN. 25 - JUL. 4	157	78	94	16	
JUL. 5 - JUL. 14	333	166	214	48	
JUL. 15 - JUL. 25	0	0	34	34	
JUL. 26 - AUG. 4	0	0	224	224	
AUG. 5 - AUG. 14	143	72	84	12	
AUG. 15 - AUG. 25	31	16	29	13	
AUG. 26 - SEP. 4	20	10	19	9	
SEP. 5 - SEP. 14	27	14	25	11	
SEP. 15 - SEP. 24	44	22	41	19	
SEP. 25 - OCT. 4	23	11	22	10	
OCT. 5 - OCT. 14	23	11	22	10	
OCT. 15 - OCT. 25	109	54	101	47	
OCT. 26 - OCT. 31	72	36	67	31	
TOTAL - cfs days	19,421	9,711	11,296		
- acre-feet	38,521	19,262	22,406		

TABLE 4

SUMMARY OF FRENCHMAN RIVER DIVISION

1979

QUANTITIES IN CUBIC DECAMETRES

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR. 1 - MAR. 10	0	0	173	173	
MAR. 11 - MAR 20	2 578	1 289	880		409
MAR. 21 - MAR. 31	12 872	6 436	3 130		3 306
APR. 1 - APR. 10	8 780	4 390	7 763	3 373	
APR. 11 - APR. 20	26 788	13 394	22 213	8 819	
APR. 21 - APR. 30	26 785	13 393	25 360	11 967	
MAY 1 - MAY 10	9 273	4 636	3 844		792
MAY 11 - MAY 20	4 844	2 422	3 437	1 015	
MAY 21 - MAY 31	4 152	2 076	2 347	271	
JUN. 1 - JUN. 10	2 457	1 229	1 408	179	
JUN. 11 - JUN. 20	1 351	675	759	84	
JUN. 21 - JUN 30	587	294	76		218
JUL. 1 - JUL. 10	4 560	2 280	3 823	1 543	
JUL. 11 - JUL. 20	894	447	172		275
JUL. 21 - JUL. 31	511	255	566	311	
AUG. 1 - AUG. 10	1 047	524	931	407	
AUG. 11 - AUG. 20	438	219	91		128
AUG. 21 - AUG. 31	189	94	1		93
SEP. 1 - SEP. 10	5	3	0		3
SEP. 11 - SEP. 20	0	0	118	118	
SEP. 21 - SEP. 30	152	76	261	185	
OCT. 1 - OCT. 10	3	1	3	2	
OCT. 11 - OCT. 20	0	0	0	0	
OCT. 21 - OCT. 31	204	102	0		102
TOTAL - cubic decametres	108 470	54 235	77 356		

TABLE 4A

SUMMARY OF FRENCHMAN RIVER DIVISION

1979

QUANTITIES IN cfs days

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR. 1 - MAR. 10	0	0	71	71	
MAR. 11 - MAR 20	1,054	527	360		167
MAR. 21 - MAR. 31	5,261	2,631	1,279		1351
APR. 1 - APR. 10	3,589	1,794	3,173	1,379	
APR. 11 - APR. 20	10,949	5,474	9,079	3,605	
APR. 21 - APR. 30	10,948	5,474	10,365	4,891	
MAY 1 - MAY 10	3,790	1,895	1,571		324
MAY 11 - MAY 20	1,980	990	1,405	415	
MAY 21 - MAY 31	1,697	849	959	111	
JUN. 1 - JUN. 10	1,004	502	575	73	
JUN. 11 - JUN. 20	552	276	310	34	
JUN. 21 - JUN 30	240	120	31		89
JUL. 1 - JUL. 10	1,864	932	1,563	631	
JUL. 11 - JUL. 20	365	183	70		112
JUL. 21 - JUL. 31	209	104	231	127	
AUG. 1 - AUG. 10	428	214	381	166	
AUG. 11 - AUG. 20	179	90	37		52
AUG. 21 - AUG. 31	77	38	0		38
SEP. 1 - SEP. 10	2	1	0		1
SEP. 11 - SEP. 20	0	0	48	48	
SEP. 21 - SEP. 30	62	31	107	76	
OCT. 1 - OCT. 10	1	0	1	1	
OCT. 11 - OCT. 20	0	0	0	0	
OCT. 21 - OCT. 31	83	42	0		42
TOTAL - cfs days	44,334	22,167	31,617		
- acre feet	87,936	43,968	62,712		

ANNEX A

TREATY BETWEEN THE UNITED STATES AND GREAT BRITAIN RELATING TO BOUNDARY WATERS; AND QUESTIONS ARISING BETWEEN THE UNITED STATES AND CANADA - ARTICLE VI

INTERNATIONAL JOINT COMMISSION
1921 Order

TREATY
BETWEEN THE UNITED STATES AND GREAT
BRITAIN RELATING TO BOUNDARY WATERS;
AND QUESTIONS ARISING BETWEEN THE
UNITED STATES AND CANADA

ARTICLE VI

The High Contracting Parties agree that the St. Mary and Milk Rivers and their tributaries (in the State of Montana and the Provinces of Alberta and Saskatchewan) are to be treated as one stream for the purposes of irrigation and power, and the waters thereof shall be apportioned equally between the two countries, but in making such equal apportionment more than half may be taken from one river and less than half from the other by either country so as to afford a more beneficial use to each. It is furthur agreed that in the division of such waters during the irrigation season, between the 1st of April and 31st of October, inclusive, annually, the United States is entitled to a prior appropriation of 500 cubic feet per second of the waters of the Milk River, or so much of such amount as constitutes three-fourths of its natural flow, and that Canada is entitled to a prior appropriation of 500 cubic feet per second of the flow of St. Mary River, or so much of such amount as constitutes three-fourths of its natural flow.

The Channel of the Milk River in Canada may be used at the convenience of the United States for the conveyance, while passing through Canadian territory, of waters diverted from the St. Mary River. The provisions of Article II of this treaty shall apply to any injury resulting to property in Canada from the conveyance of such waters through the Milk River.

The measurement and apportionment of the water to be used by each country shall from time to time be made jointly by the properly constituted reclamation officers of the United States and the properly constituted irrigation officers of His Majesty under the direction of the International Joint Commission.

INTERNATIONAL JOINT COMMISSION

ORDER

IN THE MATTER OF THE MEASUREMENT AND APPORTIONMENT OF THE WATERS OF THE ST. MARY AND MILK RIVERS AND THEIR TRIBUTARIES IN THE STATE OF MONTANA AND THE PROVINCES OF ALBERTA AND SASKATCHEWAN.

Whereas by Article VI of the Treaty entered into between the United States of America and His Majesty, the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor or India, signed at Washington on the 11th of January, 1909;

And whereas the said Reclamation and Irrigation Officers have been unable to agree as to the manner in which the waters mentioned in the said Article VI should be measured and apportioned;

And whereas, before giving directions as to the measurement and apportionment of the said waters, the International Joint Commission deemed it proper to hear such representations and suggestions thereon as the Governments of the United States and Canada, the Provinces of Alberta and Saskatchewan, and the State of Montana, and as corporations and persons interested might see fit to make, and for such purposes sittings of the Commission were held at the following times and places: At the city of St. Paul, in the State of Minnesota, on the 24th, 25th, 26th, 27th, and 28th days of May, 1915; at the city of Detroit, in the State of Michigan, on the 15th, 16th, and 17th days of May, 1917; at the city of Ottawa, in the Province of Ontario, on the 3rd, 4th, and 5th days of May, 1920; at the village of Chinook, in the State of Montana, on the 15th day of September, 1921; and at the city of Lethbridge, in the Province of Alberta, on the 17th day of September, 1921, when counsel and representatives of the said Governments, corporations, and persons appeared and presented their views;

And whereas, pending final decision as to the proper method of measuring and apportioning said waters, interim orders with reference thereto have been made by the International Joint Commission from time to time, the last of such orders bearing the date of 5th day of April, 1921;

And whereas the members of the International Joint Commission have unanimously determined that the said Reclamation and Irrigation Officers should be guided in the measurement and apportionment of said waters by the directions and instructions hereinafter set forth:

IT IS THEREFORE ORDERED AND DIRECTED by the Commission in pursuance of the powers conferred by the said Article VI of the said Treaty that the Reclamation and Irrigation Officers of the United States and Canada shall, until this order is varied, modified, or withdrawn by the Commission, make jointly the measurement and apportionment of the water to be used by the United States and Canada in accordance with the following rules:

St. Mary River.

I. (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.

(c) During the non-irrigation season the natural flow of the St. Mary River at the point where it crosses the international boundary shall be divided equally between the two countries.

Milk River.

II. (a) During the irrigation season when the natural flow of the Milk River at the point where it crosses the international boundary for the last time (commonly and hereafter called the Eastern Crossing) is six hundred and sixty-six (666) cubic feet per second or less, the United States shall be entitled to three-fourths and Canada to one-fourth of such natural flow.

(b) During the irrigation season when the natural flow of the Milk River at the Eastern Crossing is more than six hundred and sixty-six (666) cubic feet per second the United States 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.

(c) During the non-irrigation season the natural flow of the Milk River at the Eastern Crossing shall be divided equally between the two countries.

Eastern Tributaries of Milk River.

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.

Waters not naturally crossing the boundary.

IV. Each country shall be apportioned such waters of the said rivers and of any tributaries thereof as rise in that country but do not naturally flow across the international boundary.

V. For the purpose of carrying out the apportionment directed in Paragraphs I, II, and III hereof the said Reclamation and Irrigation Officers shall jointly take steps:

(a) To ascertain and keep a daily record of the natural flow of the St. Mary River at the international boundary, of the Milk River at the Eastern Crossing, and of the eastern tributaries of the Milk River at the international boundary by measurement in each case:

(1) At the gauging station at the international boundary;

(2) At all places where any of the waters which would naturally flow across the international boundary at that particular point are diverted in either country prior to such crossing:

(3) At all places where any of the waters which would naturally flow across the international boundary at that particular point are stored, or the natural flow thereof increased or decreased prior to such crossing;

(b) To fix the amount of water to which each country is entitled in each case by applying the directions contained in paragraphs 1, 2, and 3 hereof to the total amount of the natural flow so ascertained in each case.

(c) To communicate the amount so fixed to all parties interested, so that the apportionment of the said waters may be fully carried out by both countries in accordance with the said directions.

VI. Each country may receive its share of the said waters as so fixed at such point or points as it may desire. A gauging station shall be established and maintained by the Reclamation or Irrigation Officers of the country in which any diversion, storage, increase, or decreases of the natural flow shall be made at every point where such diversion, storage, increase, or decrease takes place.

VII. International gauging stations shall be maintained at the following points:

St. Mary River near international boundary; the north branch of Milk River near international boundary; the south branch of Milk River near international boundary; Milk River at Eastern Crossing; Lodge Creek, Battle Creek, and Frenchman River, near international boundary; and gauging stations shall be established and maintained at such other points as the Commission may from time to time approve.

VIII. The said Reclamation and Irrigation Officers are hereby further authorized and directed:

(a) To make such additional measurements and to take such further and other steps as may be necessary or advisable in order to insure the apportionment of the said waters in accordance with the directions herein set forth.

(b) To operate the irrigation works of either country in such a manner as to facilitate the use by the other country of its share of the said waters and subject hereto to secure to the two countries the greatest beneficial use therof.

(c) To report to the Commission the measurements made at all international and other gauging stations established pursuant to this order.

IX. In the event of any disagreement in respect to any matter or thing to be done under this order the said Reclamation and Irrigation Officers shall report to the Commission, setting forth fully the points of difference and the facts relating thereto.

X. The said order of the Commission, dated the 6th day of April 1921, is hereby withdrawn, except with respect to the report to be furnished to the Commission thereunder.

Dated at Ottawa, Canada, this 4th day of October, 1921.

O. GARDNER,
C. A. MACGRATH,
C. D. CLARK,
HENRY A. POWELL,
W. H. HEARST,
MARK A. SMITH.

ANNEX B

International Systems of Units

(SI) Conversions

ENGLISH TO INTERNATIONAL SYSTEMS OF UNITS

(SI) CONVERSION

The 1979 Report to the International Joint Commission on the Division of the Waters of the St. Mary and Milk Rivers uses dual units (SI and Imperial) as a transition to future reports which will be written entirely in SI units.

The two Imperial units that have been used in previous reports are cfs-days and acre-feet.

1 cfs-day = 86,400 cubic feet

1 acre-foot = 43,560 cubic feet

1 cfs-day = 1.9835 acre-feet

The SI unit replacing the Imperial units is the cubic decametre (dam^3)
1 dam^3 = 1000 cubic metres

1 cubic metre = 35.315 cubic feet

1 dam^3 = 35,315 cubic feet

1 acre-foot = 1.2335 dam^3

1 cfs-day = 2.4466 dam^3

ANNEX C

List of Gauging Stations

INTERNATIONAL GAUGING STATIONS OPERATED JOINTLY

BY

CANADA AND UNITED STATES

ST. MARY AND MILK RIVER DRAINAGE BASINS

1979

Map Index	Stream and Location
	ST. MARY RIVER BASIN
05AE027	St. Mary River at International Boundary
05AE029	St. Mary Canal at St. Mary Crossing near Babb, Montana
05AE033	Swiftcurrent Creek at Sherburne, Montana
05AE036	Lake Sherburne at Sherburne, Montana
	MILK RIVER BASIN
11AA001	North Milk River near International Boundary
11AA005	Milk River at Milk River
11AA025	Milk River at Western Crossing of International Boundary
11AA031	Milk River at Eastern Crossing of International Boundary
11AA032	North Fork Milk River above St. Mary Canal near Browning, Montana
11AA033	South Fork Milk River near Babb, Montana
	LODGE CREEK TRIBUTARY BASIN
11AB001	Middle Creek below Middle Creek Reservoir
11AB009	Middle Creek near Alberta Boundary
11AB060	Spangler Ditch near Govenlock
11AB080	Middle Creek Reservoir
11AB083	Lodge Creek below McRae Creek at International Boundary
11AB089	Altawan Reservoir near Govenlock

BATTLE CREEK TRIBUTARY BASIN

11AB018	Nashlyn Canal near Consul
11AB027	Battle Creek at International Boundary
11AB044	McKinnon Ditch near Consul
11AB058	Richardson Ditch near Consul
11AB075	Lyons Creek at International Boundary
11AB077	Cypress Lake West Outflow Canal
11AB078	Cypress Lake West Inflow Canal
11AB084	Vidora Ditch near Consul
11AB085	Cypress Lake West Inflow Canal Drain
11AB102	Gaff Ditch near Merryflat

FRENCHMAN RIVER TRIBUTARY BASIN

11AC001	Frenchman River below Eastend Reservoir
11AC037	Cypress Lake
11AC041	Frenchman River at International Boundary
11AC052	Eastend Canal
11AC054	Val Marie Main Canal
11AC055	Eastend Reservoir
11AC056	Val Marie Reservoir
11AC060	Cypress Lake East Outflow Canal
11AC062	Frenchman River below Val Marie Reservoir
11AC063	Val Marie West Reservoir
11AC064	Belanger Creek Diversion to Cypress Lake
11AC065	Val Marie West Gravity Canal
11AC066	Val Marie West Pumping Canal

WHITEWATER CREEK TRIBUTARY BASIN

11AD001	Whitewater Creek near International Boundary

GAUGING STATIONS OPERATED INDEPENDENTLY BY EITHER CANADA OR UNITED STATES IN THE ST. MARY AND MILK RIVER DRAINAGE BASINS 1979

Map Index	Stream and Location	Operated by
	ST. MARY RIVER BASIN	
5-0145*	Swiftcurrent Creek at Many Glacier, Montana	U.S.A.
5-0175*	St. Mary River near Babb, Monanta	U.S.A.
05AE002*	Lee Creek at Cardston	Canada
05AE005*	Rolph Creek near Kimball	Canada
05AE006*	St. Mary River near Lethbridge	Canada
05AE016*	Pothole Creek at Russell's Ranch	Canada
05AE021*	Magrath Irrigation District Canal near Spring Coulee	Canada
05AE025*	St. Mary Reservoir near Spring Coulee	Canada
05AE026*	Canadian St. Mary Canal near Spring Coulee	Canada
05AE038*	Pothole Turnout near Magrath	Canada
	MILK RIVER BASIN	
11AA028*	Bear Creek near International Boundary	Canada
11AA029*	Miners Coulee near International Boundary	Canada
11AA034*	Milk River near Writing-on-Stone Park	Canada
11AA035*	Milk River near Pendant d'Orielle	Canada

LODGE CREEK TRIBUTARY BASIN

11AB008*	Middle Creek above Lodge Creek	Canada
11AB082*	Lodge Creek at Alberta Boundary	Canada
11AB091	Michele Reservoir near Elkwater	Canada
11AB092	Greasewood Reservoir near Elkwater	Canada
11AB094	Bare Creek Reservoir near Elkwater	Canada
11AB097	Cressday Reservoir near Cressday	Canada
11AB098	Jaydot Reservoir near Jaydot	Canada
11AB099	Mitchell Reservoir near Elkwater	Canada
11AB103	Squaw Coulee near Willow Creek	Canada
11AB104	Massy Reservoir near Elkwater	Canada
11AB108*	Middle Creek near Govenlock	Canada
11AB113	Middle Creek Reservoir Main Outlet	Canada
11AB114	Middle Creek Reservoir Bedford Outlet	Canada
11AB115	Middle Creek Reservoir Flood Spillway	Canada

BATTLE CREEK TRIBUTARY BASIN

11AB020*	Shepherd Ditch near Consul	Canada
11AB090	Reesor Reservoir	Canada
11AB095	Adams Lake	Canada
11AB096*	Battle Creek near Consul	Canada
11AB100*	Battle Creek above Cypress Lake West Outflow Canal	Canada
11AB101*	Battle Creek below Nashlyn Project	Canada
11AB117*	Battle Creek at Alberta Boundary	Canada

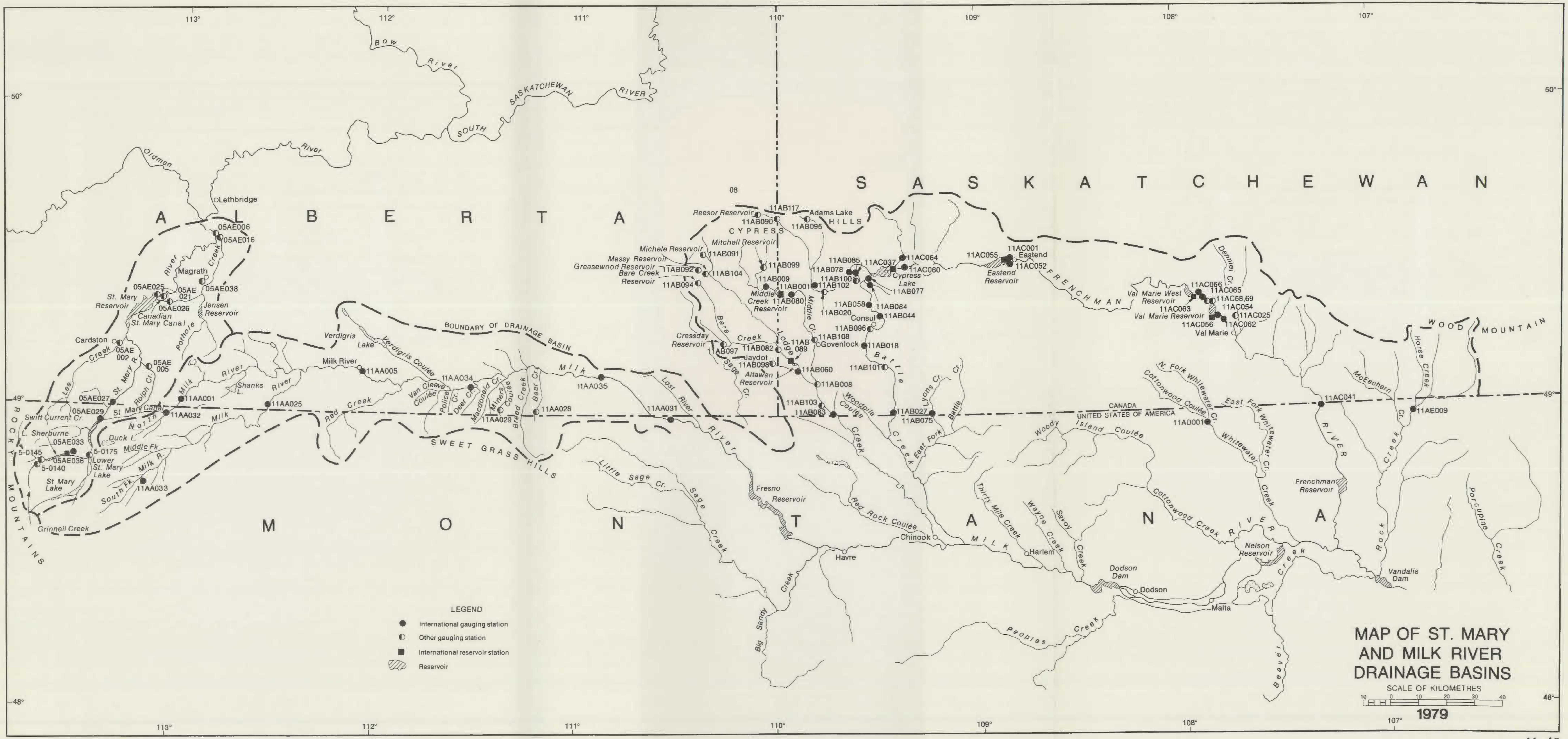
FRENCHMAN RIVER TRIBUTARY BASIN

11AC025*	Denniel Creek near Val Marie	Canada
11AC068	Val Marie Pump No. 1	Canada
11AC069	Val Marie Pump No. 2	Canada

ROCK CREEK TRIBUTARY BASIN

11AE009	Rock Creek below Horse Creek near International Boundary	U.S.A.

* Data not included in this report or appendices


MAP OF ST. MARY AND MILK RIVER DRAINAGE BASINS
SCALE OF KILOMETRES
10 0 10 20 30 40
1979
LEGEND
International gauging station
Other gauging station
International reservoir station
Reservoir
ALBERTA
SASKATCHEWAN
MONTANA
CANADA
UNITED STATES OF AMERICA
BOUNDARY OF DRAINAGE BASIN
ROCKY MOUNTAINS
SWEET GRASS HILLS
CYPRESS HILLS
WOOD MOUNTAIN
Bow River
SOUTH SASKATCHEWAN RIVER
Oldman River
Lethbridge
Magrath
Cardston
St. Mary Reservoir
Jensen Reservoir
Canadian St. Mary Canal
Pothole Creek
Lee Creek
St. Mary R.
Rolph Cr.
Swift Current Cr.
L. Sherburne
Duck L.
Lower St. Mary Lake
St Mary Lake
Grinnell Creek
Middle Fk
South Fk. Milk R.
North Milk River
St Mary Canal
Shanks L.
Milk River
Verdigris Lake
Verdigris Coulée
Red Creek
Van Cleeve Coulée
Police Cr.
Deer Cr.
Macdonald Cr.
Miners Coulée
Breed Creek
Bear Cr.
Lost River
Little Sage Cr.
Sage Creek
Fresno Reservoir
Reesor Reservoir
Adams Lake
Mitchell Reservoir
Michele Reservoir
Massy Reservoir
Greasewood Reservoir
Bare Creek Reservoir
Middle Creek Reservoir
Cressday Reservoir
Bare Creek
Sage Cr.
Jaydot
Altawan Reservoir
Lodge Cr.
Middle Cr.
Govenlock
Consul
Cypress Lake
Battle Cr.
Woodpile Coulée
Lyons Cr.
East Fork Battle Cr.
Eastend
Eastend Reservoir
FRENCHMAN
Val Marie West Reservoir
Val Marie Reservoir
Val Marie
Denniel Cr.
Horse Creek
McEachern Cr.
N. Fork Whitewater Cr.
Cottonwood Coulée
East Fork Whitewater Cr.
Whitewater Cr.
Woody Island Coulée
Red Rock Coulée
Chinook
Havre
Big Sandy Creek
Thirty Mile Creek
Wayne Creek
Savoy Creek
Harlem
MILK RIVER
Cottonwood Creek
Dodson Dam
Dodson
Malta
Nelson Reservoir
Peoples Creek
Beaver Creek
Frenchman Reservoir
Rock Creek
Porcupine Creek
Vandalia Dam
113° 112° 111° 110° 109° 108° 107°
50° 49° 48°
08
05AE006 05AE016 05AE025 05AE021 05AE026 05AE038 05AE002 05AE005 05AE027 05AE029 05AE033 05AE036
5-0145 5-0140 5-0175
11AA001 11AA005 11AA025 11AA028 11AA029 11AA031 11AA032 11AA033 11AA034 11AA035
11AB001 11AB008 11AB009 11AB018 11AB020 11AB027 11AB044 11AB058 11AB060 11AB075 11AB077 11AB078 11AB080 11AB082 11AB083 11AB084 11AB085 11AB089 11AB090 11AB091 11AB092 11AB094 11AB095 11AB096 11AB097 11AB098 11AB099 11AB100 11AB101 11AB102 11AB103 11AB104 11AB108 11AB117
11AC001 11AC025 11AC037 11AC041 11AC052 11AC054 11AC055 11AC056 11AC060 11AC062 11AC063 11AC064 11AC065 11AC066 11AC68,69
11AD001
11AE009

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1979

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