Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION OF THE WATERS OF THE

ST. MARY AND MILK RIVERS

1980

by

D.A. Davis
representing Canada

and

Philip Cohen
representing United States

Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION OF THE WATERS OF THE ST. MARY AND MILK RIVERS

1980

by

D. A. Davis

representing Canada

and

Philip Cohen

representing United States

March, 1981

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, 1980.

Respectfully submitted,

D. A. Davis

D.A. Davis
Accredited Officer of Her Majesty

Philip Cohen
Accredited Officer of the United States

SYNOPSIS

During the 1980 irrigation season the natural flow of the St. Mary River was below normal and the Milk River was well below normal, being 93 percent and 67 percent of the average long term natural flow.

The natural flow of the St. Mary River during the irrigation season, April 1 to October 31, 1980 was 680 000 cubic decametres (dam^3) (551,000 acre-feet). Under the terms of the Treaty the Canadian share was 415 000 dam^3 (336,000 acre-feet). The total runoff recorded at the International Boundary during the irrigation season was 106 percent of the Canadian allotment.

The natural flow of the Milk River at its eastern crossing of the International Boundary was 99 400 dam^3 (80,600 acre-feet) with no adjustments for upstream usage by Canada and the United States during the period March 1 to October 31, 1980. Under the terms of the Treaty the United States' allotment was 69 500 dam^3 (56,300 acre-feet). A true determination of natural flow and apportionment of the flow of the Milk River has historically not been carried out as it is assumed that United States and Canadian utilization is less than their respective shares. However, increasing levels of utilization in both countries and the potential for a major storage reservoir in Canada has resulted in studies being conducted in 1980 to establish baseline conditions which will assist in the development of an appropriate natural flow methodology. These studies will be expanded in 1981.

The natural flow of the three eastern tributaries of the Milk River that are apportioned, Lodge Creek, Battle Creek and Frenchman River, was well below normal, being 5.6 percent, 29 percent, and 37 percent, respectively, of the

long term flow. The combined natural flow of these tributaries was 45 500 dam^3 (36,900 acre-feet) of which the United States received 24 400 dam^3 (19,800 acre-feet). A deficit delivery of 358 dam^3 (290 acre-feet) occurred on Lodge Creek during the irrigation season. This deficit was the result of underestimating the minor diversions in the interim natural flow calculations. In dry years the present methodology tends to underestimate the minor diversions which accounted for 49 percent of the natural flow. The flows delivered to the United States on the Frenchman River were deficient for most of the irrigation season but the deficits were refunded by the end of the season.

TABLE OF CONTENTS

TABLES

ANNEX

MAP

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, field representatives of the United States and Canada collected and compiled, on a cooperative 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. Most of this additional information is used to improve the accuracy of natural flow computations.

This report summarizes the natural flow computations during 1980, comments on the apportionment of the natural flow, and explains any unusual occurrences throughout the year as well as any modifications that 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 and other related data for 1980 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 1980 report uses SI units first, followed by Imperial units in parentheses. Data in tables are shown in SI units first, followed by the respective Imperial unit table, for example Tables 1 and 1A.

The format for Appendices A and B of the report will be SI units only for 1980. In 1980 all Canadian data were published in SI units. Data collected and compiled by the United States were computed in Imperial units and converted to SI units using the appropriate conversions. A summary of the conversion factors is 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. Philip Cohen, 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 United States Geological Survey and the Water Survey of Canada under the supervision of Messrs. Pike, Morton, and Halliday.

The annual conference between the staffs of the field representatives was held in Regina, Saskatchewan on January 28, 1981. 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 1981 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 dis-

charge of 666 cubic feet per second (18.86 cubic metres 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 1980 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 50 percent 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 11 700 dam^3 (9,490 acre-feet) on October 31, 1979, and had increased to 15 400 dam^3 (12,500 acre-feet) just prior to the irrigation season on March 31, 1980. The storage reached a maximum of 83 700

dam^3 (67,900 acre-feet) on July 1 and had decreased to 16 200 dam^3 (13,100 acre-feet) by the end of the irrigation season on October 31, 1980.

Water was diverted from the St. Mary River into the St. Mary Canal leading to the Milk River from March 11 to September 15, 1980. The total recorded flow for the gauging station on the St. Mary Canal at St. Mary Crossing was 246 000 dam^3 (199,000 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, 1979, to October 31, 1980, was 717 000 dam^3 (581,000 acre-feet), of which 680 000 dam^3 (551,000 acre-feet) occurred during the irrigation season, April 1 to October 31, 1980. For the irrigation season, Canada's and the United States' shares were 415 000 dam^3 (336,000 acre-feet) and 265 000 dam^3 (215,000 acre-feet), respectively. A total runoff of 442 000 dam^3 (358,000 acre-feet) was recorded at the International Boundary, which is 106 percent of the Canadian share. The computed natural flow during the irrigation season was 93 percent of the average of the previous seventy-seven years of record.

Deficit deliveries were recorded in two of the fourteen periods during the 1980 irrigation season. The deficit, which occurred during the April 16-30 and August 16-31 division periods, was refunded in the periods immediately following those in which the deficits occurred.

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

TABLE 1
SUMMARY OF DIVISION OF ST. MARY RIVER AND DIVERSION TO MILK RIVER
1980

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.	25 002	58 545	22 095	36 449	-11 448	2 652	19 276	30 724	53 412
MAY	146 600	222 281	98 495	123 786	22 815	36 533	61 963	39 148	55 943
JUN.	106 801	183 644	79 585	104 059	2 743	28 168	51 418	48 675	64 558
JUL.	54 031	81 472	28 089	53 382	648	-24 170	52 259	51 611	51 356
AUG.	33 482	44 753	11 325	33 428	54	-38 862	50 187	50 133	48 868
SEP.	48 714	55 663	16 845	38 818	9 896	-10 293	27 137	17 241	28 790
OCT.	27 414	33 626	8 465	25 161	2 253	6 212	2 253	0	4 280
TOTAL IRRIGATION SEASON	442 044	679 984	264 899	415 083	26 961	240	264 493	237 532	307 207

* 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	5 759	4 318	4 394	76	
APR. 16 TO APR. 30	52 785	32 131	20 608		11 523
MAY 1 TO MAY 15	94 948	53 593	65 128	11 536	
MAY 16 TO MAY 31	127 333	70 193	81 472	11 279	
JUN. 1 TO JUN. 15	96 107	54 170	56 167	1 996	
JUN. 16 TO JUN. 30	87 537	49 889	50 635	746	
JUL. 1 TO JUL. 15	47 464	29 851	30 211	360	
JUL. 16 TO JUL. 31	34 008	23 531	23 820	289	
AUG. 1 TO AUG. 15	21 880	16 378	16 801	423	
AUG. 16 TO AUG. 31	22 873	17 050	16 681		369
SEP. 1 TO SEP. 15	19 651	14 694	16 992	2 297	
SEP. 16 TO SEP. 30	36 012	24 123	31 723	7 599	
OCT. 1 TO OCT. 15	19 742	14 753	16 537	1 784	
OCT. 16 TO OCT 31	13 884	10 408	10 878	470	

TABLE 1A
SUMMARY OF DIVISION OF ST. MARY RIVER AND DIVERSION TO MILK RIVER
1980

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.	20,269	47,463	17,913	29,550	-9,281	2,150	15,628	24,909	43,301
MAY	118,851	180,207	79,852	100,355	18,496	29,618	50,234	31,738	45,353
JUN.	86,586	148,884	64,521	84,362	2,224	22,836	41,686	39,462	52,337
JUL.	43,804	66,051	22,773	43,278	526	-19,595	42,368	41,842	41,634
AUG.	27,144	36,282	9,182	27,101	44	-31,506	40,688	40,644	39,617
SEP.	39,493	45,127	13,656	31,470	8,023	-8,345	22,001	13,978	23,340
OCT.	22,225	27,261	6,863	20,398	1,827	5,036	1,827	0	3,470
TOTAL IRRIGATION SEASON	358,372	551,275	214,760	336,514	21,859	194	214,432	192,573	249,052

* 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	4,669	3,501	3,562	62	
APR. 16 TO APR. 30	42,794	26,049	16,707		9,342
MAY 1 TO MAY 15	76,976	43,449	52,801	9,352	
MAY 16 TO MAY 31	103,231	56,907	66,051	9,144	
JUN. 1 TO JUN. 15	77,916	43,917	45,535	1,619	
JUN. 16 TO JUN. 30	70,968	40,446	41,051	605	
JUL. 1 TO JUL. 15	38,480	24,201	24,492	292	
JUL. 16 TO JUL. 31	27,571	19,077	19,311	234	
AUG. 1 TO AUG. 15	17,738	13,278	13,621	343	
AUG. 16 TO AUG. 31	18,544	13,823	13,524		300
SEP. 1 TO SEP. 15	15,931	11,913	13,775	1,863	
SEP. 16 TO SEP. 30	29,195	19,557	25,718	6,161	
OCT. 1 TO OCT. 15	16,005	11,961	13,406	1,446	
OCT. 16 TO OCT 31	11,256	8,438	8,819	381	

TABLE 1A
SUMMARY OF DIVISION OF ST. MARY RIVER AND DIVERSION TO MILK RIVER
1980

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.	20,269	47,463	17,913	29,550	-9,281	2,150	15,628	24,909	43,301
MAY	118,851	180,207	79,852	100,355	18,496	29,618	50,234	31,738	45,353
JUN.	86,586	148,884	64,521	84,362	2,224	22,836	41,686	39,462	52,337
JUL.	43,804	66,051	22,773	43,278	526	-19,595	42,368	41,842	41,634
AUG.	27,144	36,282	9,182	27,101	44	-31,506	40,688	40,644	39,617
SEP.	39,493	45,127	13,656	31,470	8,023	-8,345	22,001	13,978	23,340
OCT.	22,225	27,261	6,863	20,398	1,827	5,036	1,827	0	3,470
TOTAL IRRIGATION SEASON	358,372	551,275	214,760	336,514	21,859	194	214,432	192,573	249,052

* 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	4,669	3,501	3,562	62	
APR. 16 TO APR. 30	42,794	26,049	16,707		9,342
MAY 1 TO MAY 15	76,976	43,449	52,801	9,352	
MAY 16 TO MAY 31	103,231	56,907	66,051	9,144	
JUN. 1 TO JUN. 15	77,916	43,917	45,535	1,619	
JUN. 16 TO JUN. 30	70,968	40,446	41,051	605	
JUL. 1 TO JUL. 15	38,480	24,201	24,492	292	
JUL. 16 TO JUL. 31	27,571	19,077	19,311	234	
AUG. 1 TO AUG. 15	17,738	13,278	13,621	343	
AUG. 16 TO AUG. 31	18,544	13,823	13,524		300
SEP. 1 TO SEP. 15	15,931	11,913	13,775	1,863	
SEP. 16 TO SEP. 30	29,195	19,557	25,718	6,161	
OCT. 1 TO OCT. 15	16,005	11,961	13,406	1,446	
OCT. 16 TO OCT 31	11,256	8,438	8,819	381	

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 (18.86 cubic metres 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 1980 irrigation season. This computation includes adjustment for the St. Mary River basin diverted water and channel losses but does not include a computation of water usage by Canada or the United States within the Milk River basin itself. Historically it has been assumed that Canadian and United States utilization is less than their respective shares and no formal apportionment has been carried out. However, several consecutive dry years and the increasing use of sprinkler irrigation systems have resulted in 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 addition the potential exists for construction of a major storage reservoir on the Milk River in Canada which will necessitate the establishment of a more comprehensive water division procedure.

In support of a natural flow study, two gauging stations were constructed in 1978 at Milk River near Pendant d'Oreille and at Milk River near Writing-on-Stone Park. These stations have been operated during the irrigation season

since 1978. In August of 1980 a number of miscellaneous measurements were made on the Milk River between Writing-on-Stone Park and Eastern Crossing of the International Boundary. These measurements were made to determine the significance of channel losses. Preliminary analysis indicates that significant losses occur between Milk River at Writing-on-Stone Park and Milk River at Eastern Crossing.

In 1981 the channel loss study will be expanded to include the entire reach of the Milk River channel in Canada. In addition, ground-water recharge studies will be initiated to help determine the magnitude and extent of the channel losses. These studies are being conducted in preparation for a more formal and precise natural flow computation procedure that will be required if Canadian or United States usage of the waters of the Milk River approaches their respective shares. Canada is now considering the construction of a 124 000 dam^3 (100,000 acre-feet) reservoir, on the main stem of the Milk River in Canada, which would allow better utilization of Canada's share of the Milk River.

The natural flow of the Milk River at its eastern crossing of the International Boundary during the period March 1 to October 31, 1980, was 99 400 dam^3 (80,600 acre-feet). This is 67 percent of the average natural flow of the previous sixty-eight years of record. The respective shares of the United States and Canada were 69 500 dam^3 (56,300 acre-feet) and 29 900 dam^3 (24,200 acre-feet) 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, 1980, was 327 000 dam^3 (265,000 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 users in the United States.

EASTERN TRIBUTARIES OF THE 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, the physical limitation due to transit time in the flow system was recognized. 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 1950's 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. During some years the United States may request that delivery of deficit water on Battle Creek be delayed, until later in the year, to allow better utilization by United States irrigators. Canada may honor this request if no regulation problems are anticipated by delaying the delivery of water to make up the deficit. 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 flow and usage are generally small and streamflow records are impractical to obtain during this period.

Lyons Creek is monitored but does not have sufficient usage in Canada at this time to warrant an operational division of flow. The quantity of water delivered by this tributary to the United States during the period March 1 to October 31, 1980, was 594 dam^3 (482 acre-feet).

In 1980 the network in the eastern tributary basins was modified. The gauging station Whitewater Creek near the International Boundary was suspended after 53

years of record until such time as Canadian water usage in the basin increases sufficiently to warrant monitoring an operational division of flow. Changes in Canadian water usage will continue to be monitored. The gauging station Battle Creek above Cypress Lake West Outflow Canal was relocated 5 kilometres upstream and the name was changed to Battle Creek below Wilson's Weir. This station is used to calculate the return flow in the Battle Creek basin but the relocation did did not affect the 1980 computations as it occurred after the irrigation season.

Estimates of unmeasured diversions to private irrigation projects in the Lodge Creek, Battle Creek and Frenchman River basins in Saskatchewan were provided by Saskatchewan Environment, and for the Lodge Creek basin in Alberta by the Regina office of the Water Survey of Canada. 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 conducted 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 total natural flow for the current year is derived from computed natural flow to date plus 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, some discrepancy exists between interim and final division computations. Lists of reported and estimated diversions for 1980 are contained in Appendix B.

A return flow of 35 percent, based on a 1972-76 study, was used for the Gaff Ditch diversion from Battle Creek. The return flows were computed to be 12 percent during the first irrigation period and 11 percent for the second irrigation period for Vidora, Richardson and McKinnon Ditches and 15 percent for Nashlyn Canal. The Squaw Coulee gauging station recorded a return flow of 28 dam^3 (23 acre-feet) from the 2570 dam^3 (2,080 acre-feet) diversion by Spangler Ditch from Lodge Creek.

A supplementary gauging station was operated during 1980 on Shepherd Ditch, a private diversion on Battle Creek located downstream from Gaff Ditch. A total diversion of 708 dam^3 (574 acre-feet) was recorded at this station during 1980, and is included in the list of miscellaneous diversions for Battle Creek in Appendix B.

The combined usable capacity of the six major Canadian reservoirs decreased from 61 300 dam^3 (49,700 acre-feet) or 44 percent, to 24 600 dam^3 (19,900 acre-feet) or 18 percent of the total capacity of 139 000 dam^3 (113,000 acre-feet) during the period March 1 to October 31, 1980.

LODGE CREEK

The computed natural flow of Lodge Creek below McRae Creek at the International Boundary for the period March 1 to October 31, 1980, was 2135 dam^3 (1,730 acre-feet) or 5.6 percent of the average natural flow of the previous thirty years of record. Each country was entitled to 50 percent of the natural flow. A total flow of 712 dam^3 (577 acre-feet) was recorded at the International Boundary.

Deficit deliveries were recorded in five of the twenty-four division periods during the season. The deficit of 358 dam^3 (290 acre-feet) was the result of underestimating the minor diversions used in the interim natural flow calculations. The minor diversions were reported to be 49 percent of the natural flow, based on the year end minor diversion reports from Saskatchewan Environment. In the future, especially during dry years, it is essential that Canada obtain a more precise figure for minor diversions early in the irrigation season so that any error in the interim diversion calculations will be minimized. The apparent deficits which occurred during the period August to October were adjusted to zero. The adjustment was based on the inflow-outflow records on Middle Creek Reservoir that indicated no significant inflow. The field representatives of both countries agreed to adjust the net depletion on Middle Creek Reservoir as the evaporation losses appeared to be too large.

The division of the Lodge Creek natural flow is summarized in Table 2 and 2A. 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, 1980, was 9960 dam^3 (8,070 acre-feet) or 29 percent of the average natural flow of the previous forty years of record. Each country is entitled to 50 percent of the natural flow. A total flow of 5860 dam^3 (4,750 acre-feet) was recorded at the International Boundary.

Deficit deliveries were recorded in six of the twenty-four division periods during the season. No difficulty was encountered in refunding these deficits.

TABLE 2
SUMMARY OF LODGE CREEK DIVISION
1980

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	0	0	
MAR. 11 - MAR 20	6	3	6	3	
MAR. 21 - MAR. 31	66	33	7		26
APR. 1 - APR. 10	317	158	16		142
APR. 11 - APR. 20	584	292	32		260
APR. 21 - APR. 30	485	242	12		230
MAY 1 - MAY 10	0	0	1	1	
MAY 11 - MAY 20	202	101	209	108	
MAY 21 - MAY 31	340	170	304	134	
JUN. 1 - JUN. 10	94	47	94	47	
JUN. 11 - JUN. 20	23	12	23	11	
JUN. 21 - JUN 30	14	7	7	0	
JUL. 1 - JUL. 10	4	2	1		1
JUL. 11 - JUL. 20	0	0	0	0	
JUL. 21 - JUL. 30	0	0	0	0	
AUG. 1 - AUG. 10	0	0	0	0	
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	
TOTAL - cubic decametres	2135	1067	712		

*Middle Creek Reservoir adjustment based on inflow-outflow records.

TABLE 2A
SUMMARY OF LODGE CREEK DIVISION
1980

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	0	0	
MAR. 11 - MAR 20	2	1	2	1	
MAR. 21 - MAR. 31	27	14	3		11
APR. 1 - APR. 10	130	65	7		58
APR. 11 - APR. 20	239	119	13		106
APR. 21 - APR. 30	198	99	5		94
MAY 1 - MAY 10	0	0	0	0	
MAY 11 - MAY 20	83	41	86	45	
MAY 21 - MAY 31	139	69	124	55	
JUN. 1 - JUN. 10	38	19	38	19	
JUN. 11 - JUN. 20	9	5	9	4	
JUN. 21 - JUN 30	6	3	3	0	
JUL. 1 - JUL. 10	2	1	0	0	
JUL. 11 - JUL. 20	0	0	0	0	
JUL. 21 - JUL. 30	0	0	0	0	
AUG. 1 - AUG. 10	0	0	0	0	
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	
TOTAL - cfs days	873	436	290		
- acre feet	1,732	865	575		

*Middle Creek Reservoir adjustment based on inflow-outflow records.

The division of the Battle Creek natural flow is summarized in Tables 3 and 3A. 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, 1980, was 33 400 dam^3 (27,100 acre-feet) or 37 percent of the average flow of the previous forty years of record. Each country is entitled to 50 percent of the natural flow. A total runoff of 17 800 dam^3 (14,400 acre-feet) was recorded at the International Boundary.

Deficit deliveries were recorded in ten of the twenty-four division periods during the season. A combination of dry conditions and the poor timing of releases carried the deficit to the end of the season at which time it was refunded.

The division of the Frenchman River natural flow is summarized in Tables 4 and 4A. 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
1980

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	0	0	
MAR. 11 - MAR 20	1071	536	816	280	
MAR. 21 - MAR. 31	660	330	290		40
APR. 1 - APR. 10	1151	576	464		112
APR. 11 - APR. 20	2893	1446	738		708
APR. 21 - APR. 30	1055	528	307		221
MAY 1 - MAY 10	337	168	62		106
MAY 11 - MAY 20	0	0	198	198	
MAY 21 - MAY 31	480	240	1103	863	
JUN. 1 - JUN. 10	705	352	439	87	
JUN. 11 - JUN. 20	375	188	183		5
JUN. 21 - JUN 30	222	111	169	58	
JUL. 1 - JUL. 10	209	104	159	53	
JUL. 11 - JUL. 20	0	0	99	99	
JUL. 21 - JUL. 30	16	8	235	227	
AUG. 1 - AUG. 10	203	102	155	53	
AUG. 11 - AUG. 20	41	20	31	11	
AUG. 21 - AUG. 31	14	7	11	4	
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	43	22	33	11	
OCT. 11 - OCT. 20	265	132	202	70	
OCT. 21 - OCT. 31	223	112	170	58	
TOTAL - cubic decametres	9963	4982	5864		

TABLE 3A
SUMMARY OF BATTLE CREEK DIVISION
1980

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	0	0	
MAR. 11 - MAR 20	438	219	334	115	
MAR. 21 - MAR. 31	270	135	119		16
APR. 1 - APR. 10	470	235	190		45
APR. 11 - APR. 20	1,182	591	302		289
APR. 21 - APR. 30	431	215	125		90
MAY 1 - MAY 10	138	69	25		44
MAY 11 - MAY 20	0	0	81	81	
MAY 21 - MAY 31	196	98	451	353	
JUN. 1 - JUN. 10	288	144	179	35	
JUN. 11 - JUN. 20	153	77	75		2
JUN. 21 - JUN 30	91	45	69	24	
JUL. 1 - JUL. 10	85	43	65	22	
JUL. 11 - JUL. 20	0	0	40	40	
JUL. 21 - JUL. 30	7	3	96	93	
AUG. 1 - AUG. 10	83	42	63	21	
AUG. 11 - AUG. 20	17	8	13	5	
AUG. 21 - AUG. 31	6	3	4	1	
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	18	9	13	4	
OCT. 11 - OCT. 20	108	54	83	29	
OCT. 21 - OCT. 31	91	46	70	24	
TOTAL - cfs days	4,072	2,036	2,397		
- acre feet	8,077	4,038	4,754		

TABLE 4
SUMMARY OF FRENCHMAN RIVER DIVISION
1980

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	211	211	
MAR. 11 - MAR 20	82	41	297	256	
MAR. 21 - MAR. 31	6622	3311	3011		300
APR. 1 - APR. 10	9205	4603	5378	775	
APR. 11 - APR. 20	7475	3738	752		2986
APR. 21 - APR. 30	2458	1229	314		915
MAY 1 - MAY 10	955	478	1001	523	
MAY 11 - MAY 20	999	499	2015	1516	
MAY 21 - MAY 31	1057	528	1865	1337	
JUN. 1 - JUN. 10	677	338	186		152
JUN. 11 - JUN. 20	920	460	88		372
JUN. 21 - JUN 30	710	355	60		295
JUL. 1 - JUL. 10	405	202	46		156
JUL. 11 - JUL. 20	111	56	204	148	
JUL. 21 - JUL. 30	226	113	554	441	
AUG. 1 - AUG. 10	398	199	679	480	
AUG. 11 - AUG. 20	523	262	255		7
AUG. 21 - AUG. 31	0	0	365	365	
SEP. 1 - SEP. 10	101	50	224	174	
SEP. 11 - SEP. 20	23	12	21	9	
SEP. 21 - SEP. 30	82	41	9		32
OCT. 1 - OCT 10	151	75	1		74
OCT. 11 - OCT 20	0	0	0	0	
OCT. 21 - OCT. 31	264	132	245	113	
TOTAL - cubic decametres	33444	16722	17781		

TABLE 4A
SUMMARY OF FRENCHMAN RIVER DIVISION
1980

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	86	86	
MAR. 11 - MAR 20	34	17	121	104	
MAR. 21 - MAR. 31	2,707	1,354	1,231		123
APR. 1 - APR. 10	3,762	1,881	2,198	317	
APR. 11 - APR. 20	3,055	1,528	307		1,221
APR. 21 - APR. 30	1,005	502	128		374
MAY 1 - MAY 10	390	195	409	214	
MAY 11 - MAY 20	408	204	824	620	
MAY 21 - MAY 31	432	216	762	546	
JUN. 1 - JUN. 10	277	138	76		62
JUN. 11 - JUN. 20	376	188	36		152
JUN. 21 - JUN 30	290	145	25		120
JUL. 1 - JUL. 10	166	83	19		64
JUL. 11 - JUL. 20	45	23	83	60	
JUL. 21 - JUL. 30	92	46	226	180	
AUG. 1 - AUG. 10	163	81	278	197	
AUG. 11 - AUG. 20	214	107	104		3
AUG. 21 - AUG. 31	0	0	149	149	
SEP. 1 - SEP. 10	41	20	92	72	
SEP. 11 - SEP. 20	9	5	9	4	
SEP. 21 - SEP. 30	34	17	4		13
OCT. 1 - OCT. 10	62	31	0		31
OCT. 11 - OCT. 20	0	0	0	0	
OCT. 21 - OCT. 31	108	54	100	46	
TOTAL - cfs days	13,670	6,835	7,267		
- acre feet	27,114	13,557	14,414		

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 further 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 of 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 thereof.

(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 System of Units

(SI) Conversions

IMPERIAL TO INTERNATIONAL SYSTEM OF UNITS

(SI) CONVERSION

The 1980 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).

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

1980

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	Newton Lake
11AC060	Cypress Lake East Outflow Canal
11AC062	Frenchman River below Newton Lake
11AC063	Huff Lake
11AC064	Belanger Creek Diversion to Cypress Lake
11AC065	Val Marie West Gravity Canal
11AC066	Val Marie West Pumping Canal

GAUGING STATIONS OPERATED INDEPENDENTLY

BY EITHER

CANADA OR UNITED STATES

IN THE

ST. MARY AND MILK RIVER DRAINAGE BASINS

1980

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, Montana	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
05AE041*	Dry Coulee 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'Oreille	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

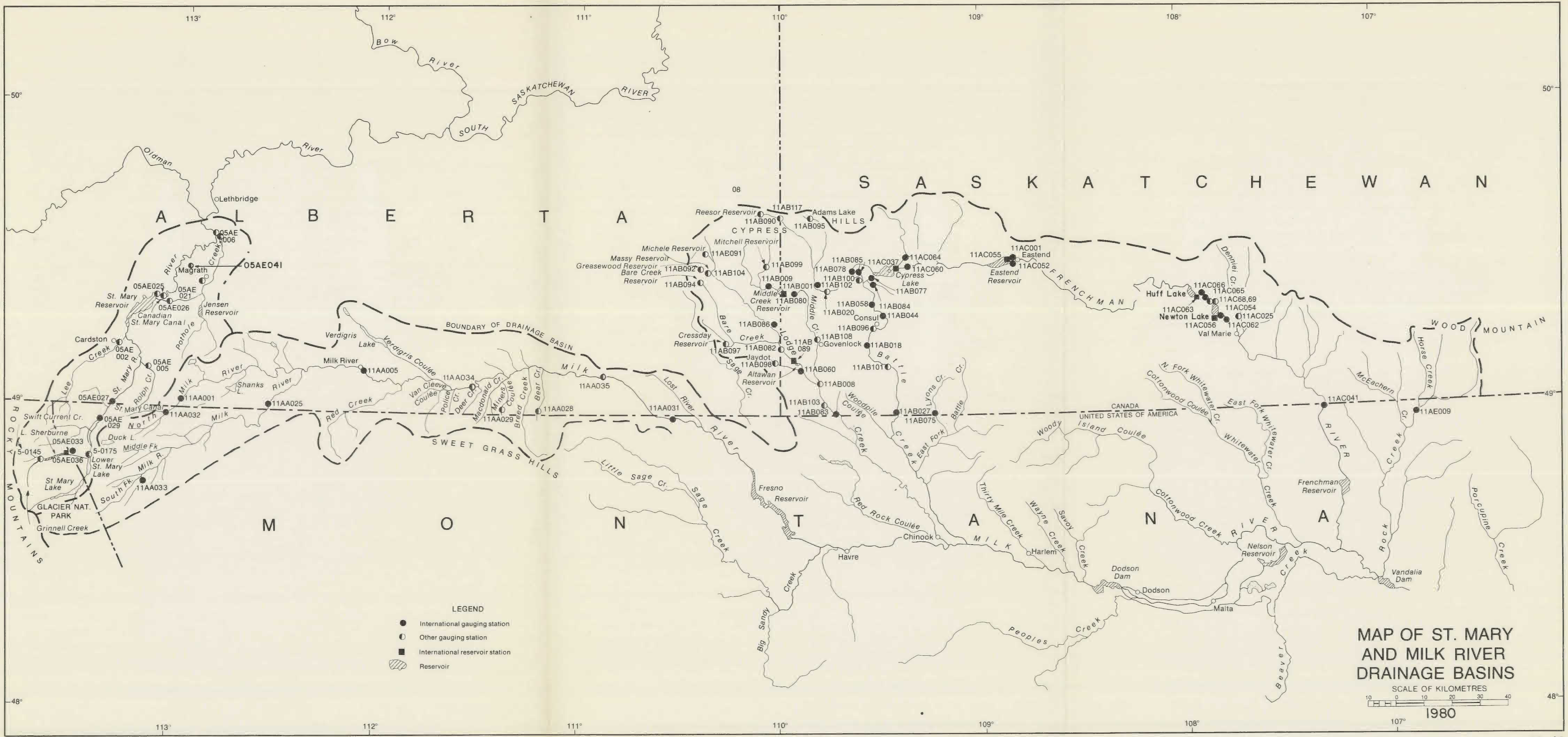
BATTLE CREEK TRIBUTARY BASIN

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

* Data not included in this report or appendices


MAP OF ST. MARY
AND MILK RIVER
DRAINAGE BASINS
SCALE OF KILOMETRES
1980
LEGEND
International gauging station
Other gauging station
International reservoir station
Reservoir
ALBERTA
SASKATCHEWAN
MONTANA
CANADA
UNITED STATES OF AMERICA
BOUNDARY OF DRAINAGE BASIN
SOUTH SASKATCHEWAN RIVER
Bow River
Oldman River
Lethbridge
Magrath
Cardston
CYPRESS HILLS
SWEET GRASS HILLS
WOOD MOUNTAIN
ROCKY MOUNTAINS
GLACIER NAT. PARK
St. Mary Reservoir
Jensen Reservoir
Canadian St. Mary Canal
Verdigris Lake
Milk River
Reesor Reservoir
Adams Lake
Mitchell Reservoir
Michele Reservoir
Massy Reservoir
Greasewood Reservoir
Bare Creek Reservoir
Cressday Reservoir
Middle Creek Reservoir
Cypress Lake
Consul
Govenlock
Jaydot
Altawan Reservoir
Eastend
Eastend Reservoir
Huff Lake
Newton Lake
Val Marie
FRENCHMAN
Fresno Reservoir
Havre
Chinook
Harlem
Dodson Dam
Dodson
Malta
Nelson Reservoir
Frenchman Reservoir
Vandalia Dam
MILK RIVER
05AE041
11AB117
11AA005
11AC041
11AE009

HD
1694
.A2
R424
1980

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