

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

E. F. DURRANT
representing Canada

1975

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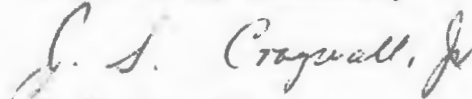
March 8, 1976

INTERNATIONAL JOINT COMMISSION
WASHINGTON, D.C. and OTTAWA, ONTARIO

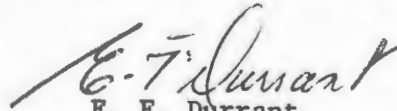
GENTLEMEN:

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, 1975.

Respectfully submitted,



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



E. F. Durrant,
Accredited Officer of Her Majesty

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ENGLISH TO METRIC (SI) CONVERSION

The 1975 Report to the International Joint Commission on the Division of the Waters of the St. Mary and Milk Rivers uses dual units (metric and English) as the forerun to future reports that will be entirely in metric units.

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

A cfs day is the equivalent volume of one cubic foot per second flowing for 24 hours ($60 \times 60 \times 24$) or 86,400 cubic feet.

An acre-foot is the volume of water covering one acre to the depth of one foot and is equal to 43,560 cubic feet.

One cfs day is equal to 1.9835 acre-feet.

The metric (SI) unit replacing the English units is the cubic decametre (dam^3) and is the volume contained in a cube $10\text{m} \times 10\text{m} \times 10\text{m}$ or 1,000 cubic metres.

One cubic metre is equal to 35.315 cubic feet.

One cubic decametre is equal to 35,315 cubic feet.

An acre-foot is equal to 1.2335 cubic decametres.

A cfs day is equal to 2.4466 cubic decametres.

SYNOPSIS

During the 1975 irrigation season, the natural runoff of the St. Mary River, Milk River and the principal eastern tributaries of the Milk River were above normal, being 140, 226, and 118 percent of the long term natural runoff respectively.

The natural runoff of the St. Mary River was 1,020,000 cubic decametres (830,000 acre-feet), of which Canada received 915,000 cubic decametres (742,000 acre-feet), 329,000 cubic decametres (266,000 acre-feet) more than its allotment under the 1909 Boundary Waters Treaty.

The natural runoff of the Milk River was 324,000 cubic decametres (263,000 acre-feet), of which the United States received almost the entire amount, 118,000 cubic decametres (96,000 acre-feet) more than its allotment under the Treaty neglecting unmeasured minor diversions within Canada and the United States.

The combined natural runoff of Lodge Creek, Battle Creek and Frenchman River was 194,400 cubic decametres (157,600 acre-feet) of which the United States received 127,700 cubic decametres (103,500 acre-feet), 30,500 cubic decametres (24,700 acre-feet) more than its allotment under the Treaty.

Although the flows delivered across the International Boundary were deficient for several periods during the year, the deficits were soon refunded and no problems in the apportionment of water between the two countries occurred in 1975.

INTRODUCTION

Article VI of the Boundary Waters Treaty of 1909 between Great Britain and the United States governs the apportionment of the waters of the St. Mary and Milk Rivers. To comply with this Treaty, representatives of the United States and Canada collected and compiled on a co-operative basis, hydrometric data at forty-seven international gauging stations. Additional gauging stations were operated independently by Canada and 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 1975, enlarges on the apportionment of the natural flow and explains any unusual occurrences throughout the year as well as any modifications which have been made or are contemplated for increasing the accuracy of the natural flow computations. Summarized natural flow tables are included in the report proper, whereas the detailed natural flow computations are included in Appendix A. The daily discharge data for 1975 are included in Appendix B.

In accordance with the metric conversion schedule established by the International Joint Commission, the 1975 report uses metric (SI) units first, followed by English units in parenthesis. Tables are shown, for example Table 1, by the results in metric (SI) units first, followed by the respective English unit table, Table 1-A. The format for Appendices A and B of the report remain unchanged for 1975, using English units only.

Mr. J.S. Cragwall, 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, Helena, Montana. Mr. E.F. Durrant, Director, Western & Northern Region, Inland Waters Directorate, as Accredited Officer of Her Majesty, was represented in the field by Mr. R.D. May, District Engineer, Calgary, Alberta and Mr. D.A. Davis, District Engineer, Regina, Saskatchewan. This report has been prepared jointly by personnel of the United States Geological Survey and the Water Survey of Canada under the supervision of Messrs. G.M. Pike, R.D. May and D.A. Davis.

During the 1975 irrigation season the natural runoff of the St. Mary River, Milk River and the principal Eastern Tributaries of the Milk River was above normal, being 140% and 226% of the average long term natural flows for the St. Mary and Milk Rivers respectively. The corresponding values for the Eastern Tributaries were 121% for Lodge Creek, 160% for Battle Creek and 101% for the Frenchman River. There was one small deficit in deliveries on the St. Mary River which was promptly refunded. The flow across the boundary for the Eastern Tributaries was deficient within a small number of apportionment periods. These deficits were soon refunded and no problems in apportionment of flows were encountered during the 1975 irrigation season.

The annual conference between the staffs of the field officers was held in Calgary, Alberta, on January 26-27, 1976. Streamflow records collected jointly by the United States and Canada were reviewed and approved. Mutual problems and changes in computational procedures were discussed and a schedule of field operations for 1976 adopted.

The report "Return Flow Analysis -- Frenchman River Basin" prepared by the Water Survey of Canada, Saskatchewan District was discussed. The

report summarizes the methodology and findings of previous return flow studies in the basin and extends the previous work to include the years 1970-74. The report concludes that an average return flow coefficient of 25%, as is now being used, appears reasonable. Additional recommendations in the report concerning changes to the hydrometric network will be presented to the International Joint Commission as a separate submission.

Before amending the Cypress Lake Natural Overflow computations as recommended at the 1975 annual conference a further in-depth examination will be made of the philosophy and methodology of computing natural overflow.

ST. MARY RIVER

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

To comply with the above order, field engineers of both countries made semi-monthly computations of the daily natural flow of St. Mary River during the 1975 irrigation season. Regular interim reports of these computations were sent to all agencies involved in the water use and distribution of the flow of the St. Mary River, in order to keep them informed as to the amount of water available, as well as to ensure that any appropriation by the United States in excess of her share could be adjusted by a subsequent delivery of an equivalent amount at the earliest opportunity.

No tentative computations and interim reports are made during the non-irrigation season, as normally the only usage by the United States during this period is storage in Lake Sherburne.

Lake Sherburne, the only storage reservoir in the St. Mary River Basin in the United States, is used to store excess flows for diversion to the Milk River. This water is later utilized by the United States, after passing through Canada, for irrigation in the lower Milk River valley.

Storage in Lake Sherburne was 12,600 cubic decametres (10,200 acre-feet) on October 31, 1974, and had increased to 24,200 cubic decametres

(19,600 acre-feet) just prior to the irrigation season on March 31, 1975. The storage reached a maximum of 81,800 cubic decametres (66,300 acre-feet) on July 7, and had declined to 8,410 cubic decametres (6,820 acre-feet) by the end of the irrigation season on October 31. A new stage-capacity curve for Lake Sherburne was used in 1975. This curve was developed from the results of a joint survey by Canada and the United States using automated electronic sounding equipment.

Water was diverted from the St. Mary River into the St. Mary Canal from June 12, to September 30. The total recorded flow past the gauging station on the St. Mary Canal at St. Mary Crossing was 122,000 cubic decametres (99,200 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, 1974 to October 31, 1975 was 1,070,000 cubic decametres (870,000 acre-feet), of which 1,020,000 cubic decameters (830,000 acre-feet) occurred during the irrigation season, April 1 to October 31, 1975. For the irrigation season the Canadian and United States shares were 587,000 cubic decametres (476,000 acre-feet) and 437,000 cubic decametres (354,000 acre-feet), respectively. The United States used 109,000 cubic decametres (88,000 acre-feet) or 25 percent of her share. No problems were encountered in the apportionment of natural flow. The computed natural flow during the irrigation season was 140 percent of the average of the previous seventy-two years of record.

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

In order to provide advance information on the probable runoff in the St. Mary River basin, the fifty-fourth annual international snow survey was conducted on April 29 and 30, 1975. The 1975 snowpack water equivalent was much above normal, being 131% of the average for the previous 53 years. Based on the snow survey results, personnel of the United States Geological Survey prepared a forecast for the St. Mary River at the International Boundary, with the predicted runoff being 107% of normal. Actual runoff was 151% of normal. The snow survey results are also used by other agencies for preparation of runoff forecasts in other basins.

TABLE 1

SUMMARY OF DIVISION OF ST. MARY RIVER AND DIVERSION TO MILK RIVER
1975
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 Share					
April	10,005	12,135	3,034	9,102	903	2,130	904	0	49,326
May	106,085	133,037	54,700	78,337	27,748	26,952	27,748	0	126,004
June	436,066	467,435	221,470	245,964	190,102	22,918	198,552	8,451	93,797
July	202,876	231,577	103,138	128,439	74,437	4,888	98,250	23,813	42,356
August	54,732	80,044	27,370	52,674	2,057	-25,367	52,737	50,680	58,791
Sept.	57,117	49,447	13,953	35,494	21,623	-47,079	61,032	39,408	50,739
Oct.	48,269	50,034	13,396	36,639	11,632	1,764	11,632	0	13,784
Total Irrig. Season	915,150	1,023,710	437,061	586,649	328,502	-13,793	450,854	122,351	434,798
Period Nov. to Oct.	953,532	1,073,756	462,084	611,670					

Milk River at Eastern Crossing is the natural flow of Milk River plus the diversion from 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 - Apr. 15	4,678	3,508	3,756	247	
Apr. 16 - Apr. 30	7,457	5,593	6,249	656	
May 1 - May 15	37,235	23,906	29,528	5,622	
May 16 - May 31	95,799	54,430	76,554	22,125	
June 1 - June 15	162,924	87,583	148,925	61,341	
June 16 - June 30	304,501	158,376	287,133	128,757	
July 1 - July 15	150,407	81,325	140,851	59,526	
July 16 - July 31	81,166	47,112	62,021	14,910	
Aug. 1 - Aug. 15	43,434	27,837	27,086		751
Aug. 16 - Aug. 31	36,608	24,835	27,644	2,809	
Sept. 1 - Sept. 15	30,042	20,940	26,318	5,378	
Sept. 16 - Sept. 30	19,404	14,552	30,798	16,245	
Oct. 1 - Oct. 15	24,970	17,941	25,447	7,506	
Oct. 16 - Oct. 31	25,063	18,697	22,822	4,125	

TABLE 1-A

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

1975

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 Share					
April	8,111	9,838	2,460	7,379	732	1,727	733	0	39,989
May	86,003	107,853	44,345	63,508	22,495	21,850	22,495	0	102,152
June	353,519	378,950	179,546	199,403	154,116	18,580	160,966	6,851	76,041
July	164,472	187,740	83,614	104,126	60,346	3,963	79,651	19,305	34,338
Aug.	44,371	64,892	22,189	42,703	1,668	-20,565	42,754	41,086	47,662
Sept.	46,305	40,087	11,312	28,775	17,530	-38,167	49,479	31,948	41,134
Oct.	39,132	40,563	10,860	29,703	9,430	1,430	9,430	0	11,175
Total Irrig. Season	741,913	829,923	354,326	475,597	266,317	-11,182	365,508	99,190	352,491
Period Nov. to Oct.	773,030	870,495	374,612	495,882					

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

Quantities for 15-Day Periods in CFS-days

Division Period at International Boundary	Natural Flow	Canada's Share	Received by Canada	Received by Canada	
				Above Share	Below Share
Apr. 1 - Apr. 15	1,912	1,434	1,535	101	
Apr. 16 - Apr. 30	3,048	2,286	2,554	268	
May 1 - May 15	15,219	9,771	12,069	2,298	
May 16 - May 31	39,156	22,247	31,290	9,043	
June 1 - June 15	66,592	35,798	60,870	25,072	
June 16 - June 30	124,459	64,733	117,360	52,627	
July 1 - July 15	61,476	33,240	57,570	24,330	
July 16 - July 31	33,175	19,256	25,350	6,094	
Aug. 1 - Aug. 15	17,753	11,378	11,071		307
Aug. 16 - Aug. 31	14,963	10,151	11,299	1,148	
Sept. 1 - Sept. 15	12,279	8,559	10,757	2,198	
Sept. 16 - Sept. 30	7,931	5,948	12,588	6,640	
Oct. 1 - Oct. 15	10,206	7,333	10,401	3,068	
Oct. 16 - Oct. 31	10,244	7,642	9,328	1,686	

MILK RIVER

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

No actual apportionment of the Milk River at Eastern Crossing is made as Canadian usage is considerably less than her share of the natural flow. Alberta is, however, processing more and more license requests for water usage in the basin, which may require a change in natural flow computation procedures and a more formal approach to apportionment. Alberta Water Rights personnel and Water Survey of Canada staff are currently reviewing all the licensed projects in the basin to determine the actual current Canadian usage.

The computed natural flow of the Milk River at its eastern crossing of the International Boundary during the period March 1 to October 31, 1975 was 324,000 cubic decametres (263,000 acre-feet). This is 226 percent of the average natural flow of the previous sixty-three years of record. The United States and Canadian shares were 206,000 cubic decametres (167,000 acre-feet) and 118,000 cubic decametres (95,700 acre-feet), respectively. The natural flow computations of the Milk River at its eastern crossing are given in Table 8 in Appendix A.

An international gauging station was again operated in 1975 on the South Fork Milk River near Babb, Montana, for the purpose of studying

the utilization of water in the Milk River basin within the Blackfoot Indian Reservation. A substantial flow was recorded all summer downstream at the gauging station, Milk River at the Western Crossing of the International Boundary, and consequently there were no complaints by Canadian ranchers about water shortages.

The Milk River miscellaneous suspended sediment program which was initiated in 1974 was continued during the 1975 irrigation season. Preliminary results indicate substantial increases in suspended sediment concentrations from the upstream site (North Milk River near the International Boundary) to the downstream site (Milk River at Eastern Crossing). In 1974 the maximum sampled concentrations for the upstream and downstream sites were 82 and 6,455 milligrams per litre, respectively. In 1975 the maximum sampled concentration was 12,300 milligrams per litre. The program is to continue in 1976.

EASTERN TRIBUTARIES OF MILK RIVER

The waters of the eastern tributaries of the Milk River were divided in accordance with the Order of the International Joint Commission dated October 4, 1921, which stipulates under Rule III that "The natural flow of the eastern (otherwise known as the Saskatchewan or northern) tributaries of the Milk River at the points where they cross the International Boundary shall be divided equally between the two countries". This rule might well be interpreted as requiring that the division of water be made on a daily basis. It was recognized that a daily division was impracticable so compilation of the natural flows at the International Boundary are done by ten-day periods.

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 by the government 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 government reservoir and irrigation project on Lodge Creek in 1960 made an operational division of flow on this tributary necessary in 1961.

The remaining tributaries, Woodpile, East Fork Battle, Lyons,

Whitewater, Rock and McEachern Creeks, are monitored but do not have sufficient usage in Canada to warrant an operational division of flow.

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

Deficit deliveries in the 10-day division periods during May in the Battle Creek and Frenchman River did not create a significant problem this year since runoff was above average. Makeup deliveries appear to have been well planned to the benefit of downstream users in the United States.

The total quantity of water delivered to the United States by the Eastern tributaries of the Milk River during the period March 1 to October 31, 1975 was 168,900 cubic decametres (136,900 acre-feet) or 103 percent of the average of the previous forty-eight years. The quantities delivered to the United States by the various tributaries are listed in Table 2 on Page 14 of this report. The historical summary is listed in Table 16 in Appendix A.

TABLE 2
RECORDED RUNOFF OF EASTERN TRIBUTARIES
OF MILK RIVER AT INTERNATIONAL BOUNDARY
FOR PERIOD MARCH TO OCTOBER 1975
(quantities in cubic decametres)

[illegible]

TABLE 2-A
RECORDED RUNOFF OF EASTERN TRIBUTARIES
OF MILK RIVER AT INTERNATIONAL BOUNDARY
FOR PERIOD MARCH TO OCTOBER 1975
(quantities in acre-feet)

Month	Lodge Creek	Battle Creek	Wood-pile Coulee	East Fork Battle Creek	Lyons Creek	White-water Creek	Frenchman River	Rock Creek below Horse Creek	Mc-Eachern Creek
Mar	0	69	0	0	0	22	670	162	5
Apr	9,040	5,770	1,300	735	522	358	14,600	12,540	6,070
May	11,710	6,840	597	88	229	529	24,600	2,940	3,230
Jun	6,650	6,830	1,030	0	7	24	3,330	434	15
Jul	436	1,830	226	0	0	2	2,270	106	2
Aug	149	3,120	431	87	93	2	1,990	821	292
Sep	6	492	4	0	1	4	408	143	3
Oct	1	1,350	0	0	0	7	1,320	336	10
TOTAL	27,992	26,301	3,588	910	852	948	49,188	17,482	9,627

Total - Milk River Eastern Tributaries - 136,888 acre-feet

Estimates of unmeasured diversions to private irrigation projects in the Lodge, Battle and Frenchman basins in Saskatchewan were provided by the Saskatchewan Department of the Environment, and for the Lodge 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 and Frenchman 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 forecast based on snowmelt runoff volumes. If the forecasted flow is eventually shown to be incorrect an adjustment to the minor diversions may be made in mid-season. At the end of the year, the actual flow is known and a final estimate of minor diversions is made, consequently there is some discrepancy between interim and final division computations. A list of reported and estimated diversions for 1975 are contained in Appendix B.

The return flows from the Vidora, Richardson and McKinnon projects on Battle Creek were more than the 20 percent of the diversion used in computation of natural flows in previous years. Records from the supplementary gauging stations indicated that the return flow was 26 percent of the diversion. The Squaw Coulee gauging station which records the return flow from the Spangler project on Lodge Creek indicated a return flow of 381 cubic decametres (309 acre-feet) or 14 percent of the 2712 cubic decametres (2,199 acre-feet) diverted. The actual values of return flow were used in the computation of natural flow.

A supplementary gauging station was operated during 1975 on Shepherd Ditch, a private diversion on Battle Creek re-constructed during 1972 and located downstream from Gaff Ditch, to record the amount of water being diverted. A total diversion of 673 cubic decametres (546 acre-feet) was recorded at this station during 1975.

Canada installed and tested a Leupold & Stevens Memomark coupled with an ERTS platform satellite communications system on Battle Creek at the International Boundary during October 1975. Data from this gauging station will be available daily via Telex from the satellite tracking station during the 1976 irrigation season.

A revised method of computing reservoir evaporation and used on a trial basis at Middle Creek Reservoir in 1974, was used for all reservoirs in the Eastern Tributaries during 1975. The Atmospheric Environment service continued their study of indirect methods of determining evaporation at Val Marie Reservoir.

LODGE CREEK

The computed natural runoff of Lodge Creek at the International Boundary for the period March 1 to October 31, 1975 was 48,000 cubic decametres (38,900 acre-feet) or 121 percent of the average natural runoff of the previous twenty-five years of record. Each country was entitled to 24,000 cubic decametres (19,450 acre-feet), which is fifty percent of the natural runoff. A total runoff of 34,500 decametres (28,000 acre-feet) was recorded at the International Boundary which is 144 percent of the United States share.

Deficit deliveries to the U.S.A. were recorded in only two of the twenty-four division periods during the season. The deficits were refunded within 20 days of their occurrence.

The division of the Lodge Creek natural flow is summarized in Table 3. The detailed computation of the natural flow is given in Table 10 and the historical summary in Table 11 of Appendix A.

TABLE 3
SUMMARY OF LODGE CREEK DIVISION
1975
 (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	0	0	0	0	
Mar 21 - Mar 31	86	43	0		43
Apr 1 - Apr 10	5	2	0		2
Apr 11 - Apr 20	1169	585	1128	543	
Apr 21 - Apr 30	16532	8266	10029	1763	
May 1 - May 10	12488	6244	9195	2951	
May 11 - May 20	3885	1942	2733	791	
May 21 - May 31	3501	1750	2518	768	
June 1 - Jun 10	741	370	761	391	
June 11 - June 20	695	348	1020	672	
June 21 - June 30	8143	4071	6422	2351	
July 1 - July 10	511	256	357	101	
July 11 - July 20	61	30	130	100	
July 21 - July 31	0	0	51	51	
Aug 1 - Aug 10	17	9	66	57	
Aug 11 - Aug 20	0	0	2	2	
Aug 21 - Aug 31	154	78	118	40	
Sep 1 - Sep 10	10	5	7	2	
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	47,998	23,999	34,537		

TABLE 3-A
SUMMARY OF LODGE CREEK DIVISION
1975
 (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	0	0	0	0	
Mar 21 - Mar 31	35	17	0		17
Apr 1 - Apr 10	2	1	0		1
Apr 11 - Apr 20	478	239	461	222	
Apr 21 - Apr 30	6757	3378	4099	721	
May 1 - May 10	5104	2552	3758	1206	
May 11 - May 20	1588	794	1117	323	
May 21 - May 31	1431	716	1029	313	
June 1 - June 10	303	152	311	159	
June 11 - June 20	284	142	417	275	
June 21 - June 30	3328	1664	2625	961	
July 1 - July 10	209	104	146	42	
July 11 - July 20	25	12	53	41	
July 21 - July 31	0	0	21	21	
Aug 1 - Aug 10	7	4	27	23	
Aug 11 - Aug 20	0	0	1	1	
Aug 21 - Aug 31	63	32	48	16	
Sep 1 - Sep 10	4	2	3	1	
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	19,618	9,809	14,116		
- acre-feet	38,912	19,456	27,999		

BATTLE CREEK

The computed natural runoff of Battle Creek at the International Boundary for the period March 1 to October 31, 1975 was 54,400 cubic decametres (44,100 acre-feet) or 160 percent of the average natural runoff of the previous thirty-five years of record. Each country was entitled to 27,200 cubic decametres (22,050 acre-feet), which is 50 percent of the natural runoff. A total runoff of 32,400 cubic decametres (26,300 acre-feet) was recorded at the International Boundary which is 119 percent of the United States share.

Deficit deliveries were recorded in five division periods during the season of which three deficit periods during the May flood totalled 5,120 cubic decametres (4,150 acre-feet). In consideration of a request from the Battle Creek Water User's Association, release of water from Cypress Lake to restore this deficit was delayed until required for irrigation operations in Montana, thereby deriving the most beneficial use to irrigators and reducing the risk of flood damage in both countries.

The division of the Battle Creek natural flow is summarized in Table 4. The detailed computation of the natural flow is given in Table 12 and the historical summary in Table 13 of Appendix A.

TABLE 4
SUMMARY OF BATTLE CREEK DIVISION
1975
 (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	17	8	17	9	
Mar 15 - Mar 25	46	23	44	21	
Mar 26 - Apr 4	69	35	64	29	
Apr 5 - Apr 14	274	137	254	117	
Apr 15 - Apr 24	5547	2773	4920	2147	
Apr 25 - May 4	6224	3112	2547		565
May 5 - May 14	16030	8015	4218		3797
May 15 - May 25	6107	3054	2300		754
May 26 - Jun 4	3325	1662	2224	562	
Jun 5 - Jun 14	1600	800	2429	1629	
Jun 15 - Jun 24	3929	1965	3829	1864	
Jun 25 - Jul 4	2527	1263	1811	548	
Jul 5 - Jul 14	859	430	800	370	
Jul 15 - Jul 25	695	347	394	47	
Jul 26 - Aug 4	712	356	1324	968	
Aug 5 - Aug 14	575	288	839	551	
Aug 15 - Aug 25	1483	741	1380	639	
Aug 26 - Sep 4	1346	673	913	240	
Sep 5 - Sep 14	651	326	220		106
Sep 15 - Sep 24	328	164	130		34
Sep 25 - Oct 4	289	144	174	30	
Oct 5 - Oct 14	668	334	621	287	
Oct 15 - Oct 25	827	414	692	278	
Oct 26 - Oct 31	316	158	294	136	
TOTAL - cubic decametres	54,444	27,222	32,438		

TABLE 4-A
SUMMARY OF BATTLE CREEK DIVISION
1975
 (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	7	4	7	3	
Mar 15 - Mar 25	19	9	18	9	
Mar 26 - Apr 4	28	14	26	12	
Apr 5 - Apr 14	112	56	104	48	
Apr 15 - Apr 24	2267	1134	2011	877	
Apr 25 - May 4	2544	1272	1041		231
May 5 - May 14	6552	3276	1724		1552
May 15 - May 25	2496	1248	940		308
May 26 - Jun 4	1359	679	909	230	
Jun 5 - Jun 14	654	327	993	666	
Jun 15 - Jun 24	1606	803	1565	762	
Jun 25 - Jul 4	1033	517	740	223	
Jul 5 - Jul 14	351	175	327	152	
Jul 15 - Jul 25	284	142	161	19	
Jul 26 - Aug 4	291	146	541	395	
Aug 5 - Aug 14	235	117	343	226	
Aug 15 - Aug 25	606	303	564	261	
Aug 26 - Sep 4	550	275	373	98	
Sep 5 - Sep 14	266	133	90		43
Sep 15 - Sep 24	134	67	53		14
Sep 25 - Oct 4	118	59	71	12	
Oct 5 - Oct 14	273	137	254	117	
Oct 15 - Oct 25	338	169	283	114	
Oct 26 - Oct 31	129	64	120	56	
TOTAL - cfs days	22,252	11,126	13,258		
- acre-feet	44,137	22,068	26,297		

FRENCHMAN RIVER

The computed natural runoff of the Frenchman River at the International Boundary for the period March 1 to October 31, 1975 was 92,000 cubic decametres (74,600 acre-feet) or 101 percent of the average runoff of the previous thirty-five years of record. Each country was entitled to 46,000 cubic decametres (37,300 acre-feet) which is 50 percent of the natural runoff. A total runoff of 60,700 cubic decametres (49,200 acre-feet) was recorded at the International Boundary which is 132 percent of the United States share.

Deficit deliveries were recorded in seven of the twenty-four division periods during the season. All deficits were refunded except for the 200 cubic decametres (162 acre-feet) deficit that occurred at the end of October.

The division of the Frenchman River natural flow is summarized in Table 5. The detailed computation of the natural flow is given in Table 14 and the historical summary in Table 15 of Appendix A.

TABLE 5
SUMMARY OF FRENCHMAN RIVER DIVISION
1975
 (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	232	232	
Mar 11 - Mar 20	193	96	298	202	
Mar 21 - Mar 31	543	272	296	24	
Apr 1 - Apr 10	391	196	218	22	
Apr 11 - Apr 20	1813	906	1571	665	
Apr 21 - Apr 30	24501	12250	16268	4018	
May 1 - May 10	26399	13200	15588	2388	
May 11 - May 20	17019	8509	13865	5356	
May 21 - May 31	3719	1859	888		971
Jun 1 - Jun 10	3036	1518	1238		280
Jun 11 - Jun 20	2500	1250	1879	629	
Jun 21 - Jun 30	3027	1513	993		520
Jul 1 - Jul 10	1436	718	462		256
Jul 11 - Jul 20	509	254	1270	1016	
Jul 21 - Jul 31	722	361	1067	706	
Aug 1 - Aug 10	751	376	695	319	
Aug 11 - Aug 20	665	333	568	235	
Aug 21 - Aug 31	1671	836	1189	353	
Sep 1 - Sep 10	347	174	225	51	
Sep 11 - Sep 20	590	295	159		136
Sep 21 - Sep 30	313	157	120		37
Oct 1 - Oct 10	338	169	313	144	
Oct 11 - Oct 20	732	366	1125	759	
Oct 21 - Oct 31	783	391	191		200
TOTAL - cubic decametres	91,998	45,999	60,718		

TABLE 5-A
SUMMARY OF FRENCHMAN RIVER DIVISION
1975
 (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	95	95	
Mar 11 - Mar 20	79	39	122	83	
Mar 21 - Mar 31	222	111	121	10	
Apr 1 - Apr 10	160	80	89	9	
Apr 11 - Apr 20	741	370	642	272	
Apr 21 - Apr 30	10014	5007	6649	1642	
May 1 - May 10	10790	5395	6371	976	
May 11 - May 20	6956	3478	5667	2189	
May 21 - May 31	1520	760	363		397
Jun 1 - Jun 10	1241	620	506		114
Jun 11 - Jun 20	1022	511	768	257	
Jun 21 - Jun 30	1237	618	406		212
Jul 1 - Jul 10	587	294	189		105
Jul 11 - Jul 20	208	104	519	415	
Jul 21 - Jul 31	295	148	436	288	
Aug 1 - Aug 10	307	154	284	130	
Aug 11 - Aug 20	272	136	232	96	
Aug 21 - Aug 31	683	342	486	144	
Sep 1 - Sep 10	142	71	92	21	
Sep 11 - Sep 20	241	120	65		55
Sep 21 - Sep 30	128	64	49		15
Oct 1 - Oct 10	138	69	128	59	
Oct 11 - Oct 20	299	150	460	310	
Oct 21 - Oct 31	320	160	78		82
TOTAL - cfs days	37,602	18,801	24,817		
- acre-feet	74,584	37,292	49,225		

APPENDICES

Appendices A and B are submitted with this report under separate cover. Appendix A contains the natural flow computations for the St. Mary River, Milk River, Lodge Creek, Battle Creek and Frenchman River. It also contains historical summaries of the natural flows, recorded runoff, United States shares and Canadian shares of the St. Mary River; historical summaries of natural flows, United States and Canadian shares and recorded runoff of Milk River; historical summaries of natural and recorded runoff of Lodge Creek, Battle Creek and Frenchman River; the historical summary of the March to October runoff of the Eastern Tributaries of the Milk River; and the month-end contents of the major reservoirs in the Lodge, Battle and Frenchman basins for 1975.

Appendix B contains the daily discharge data for forty international gauging stations operated jointly by the United States and Canada, and six stations used in the natural flow computations which are operated by Canada. The details of the minor diversions in Canada are also contained in Appendix B.

INTERNATIONAL GAUGING STATIONS OPERATED JOINTLYBYCANADA AND UNITED STATESST. MARY AND MILK RIVER DRAINAGE BASINS1975

<u>Map Index</u>	<u>Stream and Location</u>
<u>ST. MARY RIVER BASIN</u>	
05AE027	St. Mary River at International Boundary
05AE036	Lake Sherburne at Sherburne, Montana
05AE033	Swiftcurrent Creek at Sherburne, Montana
05AE029	St. Mary Canal at St. Mary Crossing near Babb, Montana
<u>MILK RIVER BASIN</u>	
11AA025	Milk River at Western Crossing of International Boundary
11AA005	Milk River at Milk River
11AA031	Milk River at Eastern Crossing of International Boundary
11AA033	South Fork Milk River near Babb, Montana
11AA032	North Fork Milk River above St. Mary Canal near Browning, Montana
11AA001	North Milk River near International Boundary
<u>LODGE CREEK TRIBUTARY BASIN</u>	
11AB089	Altawan Reservoir near Govenlock
11AB083	Lodge Creek below McRae Creek at International Boundary
11AB086	Walburger Coulee below Diversions
11AB060	Spangler Ditch near Govenlock
11AB009	Middle Creek near Alberta Boundary
11AB080	Middle Creek Reservoir
11AB001	Middle Creek below Middle Creek Reservoir
<u>BATTLE CREEK TRIBUTARY BASIN</u>	
11AB027	Battle Creek at International Boundary
11AB102	Gaff Ditch near Merryflat
11AB078	Cypress Lake West Inflow Canal
11AB085	Cypress Lake West Inflow Canal Drain
11AB077	Cypress Lake West Outflow Canal
11AB084	Vidora Ditch near Consul

Map Index

Stream and Location
BATTLE CREEK TRIBUTARY BASIN (continued)

11AB058 Richardson Ditch near Consul
 11AB044 McKinnon Ditch near Consul
 11AB018 Nashlyn Canal near Consul
 11AB105 Woodpile Coulee near International Boundary
 11AB107 East Fork Battle Creek near International Boundary
 11AB075 Lyons Creek at International Boundary

FRENCHMAN RIVER TRIBUTARY BASIN

11AC055 Eastend Reservoir
 11AC001 Frenchman River below Eastend Reservoir
 11AC057 Frenchman River below Eastend Irrigation Project
 11AC063 Val Marie West Reservoir
 11AC056 Val Marie Reservoir
 11AC051 Frenchman River below Val Marie
 11AC041 Frenchman River at International Boundary
 11AC060 Cypress Lake East Outflow Canal
 11AC037 Cypress Lake
 11AC064 Belanger Creek Diversion to Cypress Lake
 11AC052 Eastend Canal
 11AC066 Val Marie West Pumping Canal
 11AC065 Val Marie West Gravity Canal
 11AC054 Val Marie Main Canal
 11AC025 Denniel Creek near Val Marie

WHITEWATER CREEK TRIBUTARY BASIN

11AD001 Whitewater Creek near International Boundary

ROCK CREEK TRIBUTARY BASIN

11AE009 Rock Creek below Horse Creek near International Boundary
 11AE007 McEachern Creek at International Boundary

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

Map Index	Stream and Location	Operated By
<u>ST. MARY RIVER BASIN</u>		
5-0175*	St. Mary River near Babb, Montana	U.S.A.
05AE025*	St. Mary Reservoir near Spring Coulee	Canada
05AE006*	St. Mary River near Lethbridge	Canada
5-0140*	Grinnell Creek near Many Glacier, Montana	U.S.A.
5-0145*	Swiftcurrent Creek at Many Glacier, Montana	U.S.A.
05AE005*	Rolph Creek near Kimball	Canada
05AE002*	Lee Creek at Cardston	Canada
05AE026*	Canadian St. Mary Canal near Spring Coulee	Canada
05AE021*	Magrath Irrigation District Canal near Spring Coulee	Canada
<u>MILK RIVER BASIN - SOUTHERN TRIBUTARIES</u>		
11AA029*	Miners Coulee near International Boundary	Canada
11AA028*	Bear Creek near International Boundary	Canada
<u>LODGE CREEK TRIBUTARY BASIN</u>		
11AB082*	Lodge Creek at Alberta Boundary	Canada
11AB091	Michele Reservoir near Elkwater	Canada
11AB092	Greasewood Reservoir near Elkwater	Canada
11AB104	Massy 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
11AB113	Middle Creek Reservoir Main Outlet	Canada

Map Index	Stream and Location	Operated By
<u>LODGE CREEK TRIBUTARY BASIN (continued)</u>		
11AB008*	Middle Creek above Lodge Creek	Canada
11AB114	Middle Creek Reservoir Bedford Outlet	Canada
11AB115	Middle Creek Reservoir Flood Spillway	Canada
11AB108*	Middle Creek near Govenlock	Canada
11AB103	Squaw Coulee near Willow Creek	Canada
11AB088*	Lodge Creek below Spangler Project	Canada
<u>BATTLE CREEK TRIBUTARY BASIN</u>		
11AB117*	Battle Creek at Alberta Boundary	Canada
11AB003*	Battle Creek above Gaff Ditch	Canada
11AB112*	Battle Creek below Gaff Ditch	Canada
11AB100*	Battle Creek above Cypress Lake West Outflow Canal	Canada
11AB096*	Battle Creek near Consul	Canada
11AB101*	Battle Creek below Nashlyn Project	Canada
11AB095	Adams Lake	Canada
11AB090	Reesor Reservoir	Canada
11AB020*	Shepherd Ditch near Consul	Canada
<u>FRENCHMAN RIVER TRIBUTARY BASIN</u>		
11AC062*	Frenchman River below Val Marie Reservoir	Canada
11AC068	Val Marie Electric Pump No. 1	Canada
11AC069	Val Marie Electric Pump No. 2	Canada

* Data not included in this report or appendices



MAP OF ST. MARY
AND MILK RIVER
DRAINAGE BASINS

SCALE OF MILES

1975

HD
1694
.A2
R424
1975

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

DATE DUE	BORROWER'S NAME

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R424
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