Report to

THE INTERNATIONAL JOINT COMMISSION

on

THE DIVISION AND USE MADE OF THE WATERS OF

ST. MARY AND MILK RIVERS

by

J. D. McLEOD
representing Canada

and

L. B. LEOPOLD
representing United States

1962

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International Joint Commission,

Washington, D.C., and Ottawa, Ontario.

Gentlemen:

In compliance with the Provisions of Clause VIII (c) of your Order of the 4th October, 1921, directing the division of the waters of St. Mary and Milk Rivers between the United States and Canada, we are transmitting herewith a report on the operations during the irrigation season ended October 31, 1962.

Respectfully submitted,

J. D. McLeod
Accredited Officer of Her Majesty.

Luna B. Leopold
L. B. Leopold
Accredited Officer of the United States.

March 19 , 1963.
(date)

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Introduction

The field work incidental to the division and administration of the waters of the St. Mary and Milk Rivers in Alberta, Saskatchewan and Montana was conducted during the irrigation season of 1962 by representatives of the Water Resources Branch (Canada) and the United States Geological Survey.

Mr. J. D. McLeod, Chief Engineer, Water Resources Branch, Department of Northern Affairs and National Resources, acting in the capacity of accredited officer of Her Majesty, was represented in the field by Mr. R. D. May, District Engineer, Calgary, Alberta. Dr. L. B. Leopold, Chief Hydraulic Engineer, United States Geological Survey, as accredited officer of the United States, was represented in the field by Mr. F. Stermitz, District Engineer, Helena, Montana.

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

The waters of the two rivers were divided between the two countries in accordance with the Order of the International Joint Commission dated at Ottawa, Canada, on the 4th day of October, 1921.

The hydrometric data upon which this report is based were collected and compiled jointly for 34 international stations. Data for another 22 stations in Canada and 7 stations in the United States were collected independently by the same engineers in their respective countries. The United States Bureau of Reclamation furnished data for 8 canal and 2 reservoir stations and the United States Bureau of Indian Affairs furnished data for one other canal station in Montana.

Summary data on the division of water during the 1962 irrigation season and on reservoir storage are given in the tables on page 2.

Summary of Division of Water during 1962 Irrigation Season

St. Mary River.....April to October
Eastern Tributaries of Milk River...March to October

Quantities in acre-feet

Stream	Natural Flow at International Boundary	Canada			United States		
		Share	Received	Deficit (-) Surplus (+)	Share	Received	Deficit (-) Surplus (+)
St. Mary River	495,300	308,900	308,900	0	186,400	186,400	0
Lodge Creek	20,780	10,390	5,500 *	-4,890	10,390	15,280	+4,890
Battle Creek	7,370	3,680	2,500 *	-1,180	3,690	4,870	+1,180
Frenchman River	63,310	31,650	24,190	-7,460	31,650	39,110	+7,460

* - Quantities are obtained by deducting the recorded flow from the natural flow at the international boundary.

Summary of Reservoir Storage at end of 1961 and 1962 Irrigation Seasons

Quantities in acre-feet

Reservoir	F.S.L.	Dead Storage	Live Storage	Total Storage	
				31 Oct 61	31 Oct 62
Lake Sherburne	66,200	Negligible	66,200	7,320	15,500
St. Mary	320,000	35,000	285,000	236,400	227,400
Fresno	127,200	1,860	125,340	19,650	41,100
Nelson	66,800	18,650	48,150	18,250	53,050
Middle Creek	16,500*	Negligible**	16,500	1,990**	0
Altawan	5,800	Negligible	5,800	69	1,910
Cypress Lake	110,300	30,500	79,800	56,600	46,970
Eastend	2,240*	Negligible	2,240	532	540
Val Marie West	3,540*	Negligible	3,540	67**	1,860
Val Marie	11,060*	830***	10,230	1,720	9,620

* F.S.L. revised in 1962.
** Reservoir capacity tables revised in 1962.
*** Minimum reservoir level revised in 1962.

WATER SUPPLY

St. Mary River

The total natural flow of the St. Mary River at the international boundary for the year 1 November 1961 to 31 October 1962 was 556,000 acre-feet. Of this total, 495,300 acre-feet occurred during the irrigation season 1 April to 31 October. The natural flow during the irrigation season was 84 percent of 587,900 acre-feet, the average of the previous 59 years of record. 356,700 acre-feet was delivered to Canada during the year with 308,900 being delivered during the irrigation season.

The forty-first annual international survey of snow conditions in the St. Mary River drainage basin was conducted on 1 and 2 May 1962. The survey provided advance information on the probable run-off during the irrigation season. The tabulated results of the forecasts and measured discharge at three locations are shown below.

Location	Period of Correlation	Forecast of 1962 Run-off		Measured Run-off	
		Acre-feet	% of Average	Acre-feet	% of Average
Swiftcurrent Creek at Many Glacier	1923-60	67,500 (May to July)	(1923-61) 98	54,330 (May to July)	(1923-61) 79
Natural Flow Swiftcurrent Creek at Sherburne	1922-60	113,000 (May to Sept.)	(1922-61) 99	91,690 ~~90,400~~ (May to Sept.)	(1922-61) 79
Natural Flow St. Mary River at International Boundary	1922-60	496,000 (May to Sept.)	(1922-61) 99	415,700 (May to Sept.)	(1922-61) 83

Milk River

The estimated natural flow of Milk River at its eastern crossing of the international boundary, during the period 1 March to 31 October 1962, was 59,000 acre-feet or 52 percent of 114,000 acre-feet, the average of estimated natural flows of the previous 50 years of record.

Eastern Tributaries of Milk River

The total quantity of water delivered to the United States by the eastern tributaries of Milk River during the period, 1 March to 31 October 1962, was 88,910 acre-feet or 62 percent of 142,400 acre-feet, the average of the previous 35 years. The quantities delivered to the United States by the various tributaries are listed in Table 4.

During the season a total of 35,840 acre-feet was diverted from the eastern tributaries in Canada to irrigation canals or storage. These diversions are listed in Tables 9, 10 and 11 of this report. The consumptive use by Canada was 31,690 acre-feet. Measured diversions in Montana amounted to 12,930 acre-feet. These are listed in Table 3.

The tenth annual snow survey in the basins of the eastern tributaries of Milk River was conducted by the Water Resources Branch, Canada from 28 February to 1 March 1962. The correlation of snow survey data and subsequent run-off will be attempted after several more years of record have been obtained. For comparison purposes the average snow cover and the average water content for the history of the survey are listed below:

Year	Average Snow Cover	Average Water Content
1953	10.3 inches	2.1 inches
1954	4.4 "	1.2 "
1955	10.4 "	2.8 "
1956	13.0 "	3.4 "
1957	7.7 "	2.1 "
1958	7.9 "	1.2 "
1959	9.8 "	3.4 "
1960	9.1 "	2.4 "
1961	4.7 "	1.8 "
1962	5.0 "	1.2 "

DIVISION OF WATER

St. Mary River

The division of the waters of the St. Mary River was carried out in accordance with the Order of the International Joint Commission dated October 4, 1921.

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

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

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

The natural flow of the St. Mary River having been determined, the division of its waters was carried out in accordance with the above order.

During the irrigation season, 1 April to 31 October, field engineers of both countries made frequent computations of the daily natural flow of the river and each country's share thereof, in order that any appropriation by the United States in excess of their share could be adjusted by a subsequent delivery to Canada of an equivalent amount at the earliest opportunity.

Regular interim reports on the progress of the division of the natural flow at the international boundary were made to interested agencies throughout the irrigation season.

During the non-irrigation season, 1 November 1961 to 31 March 1962, no interim reports were made as the only United States use during this period was storage in Lake Sherburne where the contributing drainage area is about 14 percent of the total area of the St. Mary River drainage basin in the United States.

Storage in Lake Sherburne was 7,320 acre-feet on 31 October 1961 and had increased to 19,940 acre-feet by 31 March 1962 and to 41,340 acre-feet by 30 June 1962. On 31 October 1962 the storage was 15,500 acre-feet.

The St. Mary Canal was operated between 3 April and 12 September and water was delivered to the North Milk River from 7 April to 10 September.

Seepage from the canal between the point of diversion and the crossing of the St. Mary River is assumed to return to the river and eventually become available to Canada. The discharge of 189,500 acre-feet which passed the gauging station on the St. Mary Canal at St. Mary Crossing near Babb between 3 April and 12 September was considered to be the quantity diverted from the St. Mary River by the United States. A total of 183,200 acre-feet was delivered to the North Milk River at Hudson Bay Divide during the season, from where it was conveyed to irrigation projects in Montana via the Milk River.

Canada diverted 452,600 acre-feet of water from the St. Mary River Reservoir in 1962 as measured at the Canadian St. Mary Canal and Magrath Irrigation District Canal gauging stations near Spring Coulee.

An enquiry was made by the Alberta Water Resources Branch on 9th July 1962 regarding the feasibility of releasing water from the St. Mary Canal to the Rolph Creek basin.

Subsequent investigation revealed that an outlet structure was available on the canal which could release water to the Rolph Creek basin via Willow Creek.

The officials of the United States Bureau of Reclamation were willing to divert some water to Rolph Creek providing that the Alberta Government assumed financial responsibility for flooded lands and the metered releases were used as adjustments to the American diversion on the natural flow computation for the St. Mary River.

The Alberta Government is considering the merits of the above proposal for any future water supply problems with respect to the recurrence of low flows.

Milk River

No division of the flow of Milk River at Eastern Crossing was made in 1962. Except for a few small unmeasured diversions above the eastern crossing of the international boundary, the entire natural flow of the Milk River at that point was delivered to the United States.

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

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

No flow was recorded on the 6th and 7th of September in the Milk River at the western crossing of the international boundary.

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

Stream gauging stations within the area will be operated jointly by the United States and Canada during the 1963 season.

Eastern Tributaries of Milk River.

The excess deliveries by Canada to the United States of 13,530 acre-feet in the Lodge, Battle and Frenchman basins are due to excessive rains which occurred during June and July in the area just north of the international boundary and below the Canadian reservoirs and irrigation projects.

Minor Diversions: Estimates for a number of small diversions from the eastern tributaries of Milk River in Saskatchewan were provided by the Water Rights Division of the Province of Saskatchewan and are based on reports from the individual licensed irrigators. These estimates are not used in the Lodge Creek and Battle Creek division computations in Table 2, except as an adjustment to the totals for the season. The estimated quantities reported to date for 1962 are detailed in the Appendix to this report.

Lodge Creek: The computed natural flow of Lodge Creek at the international boundary for the period 1 March to 31 October 1962 was 20,780 acre-feet of which each country was entitled to fifty percent (10,390). The details of this division are summarized in Table 2, and shown in Table 9.

A total of 15,280 acre-feet was recorded at the international boundary, which is 147 percent of the United States share.

The seasonal summary of the Lodge Creek division on page 2 indicates a Canadian use of 5,500 acre-feet in the Lodge Creek Basin.

Battle Creek: The computed natural flow of Battle Creek at the international boundary for the period 1 March to 31 October 1962 was 7,370 acre-feet of which each country was entitled to fifty percent. The details of this division are summarized in Table 2, and shown in Table 10.

A total of 4,870 acre-feet was recorded at the international boundary, which is 132 percent of the United States share.

The seasonal summary of the Battle Creek division on page 2, indicates a Canadian use of 2,500 acre-feet in the Battle Creek Basin.

During the past two seasons 1961 and 1962 the minor diversion total reported on an annual basis was approximately 25% of the apparent natural flow of the Battle Creek at the International Boundary. The minor diversions are therefore of sufficient significance that they should be considered in the current computations of the division.

An adjustment for minor diversions will be applied to the ten-day provisional balances during the 1963 season. The percent adjustment to be used will be selected from the curve established by a graphical comparison of the last twelve years of annual minor diversion data to that of the computed apparent natural flow of the Battle Creek at the international boundary.

Two large storage projects, Reesor Lake Reservoir and Adams Lake Reservoir, will enter the current computations for the first time in 1963.

It is expected that progress will be made in 1963 in co-operation with the Saskatchewan Provincial Authorities in compiling a complete list of water users in the Battle Creek Basin, that will include domestic and stockwatering projects as well as minor diversions. When this has been completed it is expected that the evaluation of the individual reports of water used may be greatly improved.

Frenchman River: The computed natural flow of the Frenchman River at the international boundary for the period 1 March to 31 October 1962 was 63,310 acre-feet of which each country was entitled to fifty percent. The details of this division are summarized in Table 2 and shown in Table 11.

A total of 39,110 acre-feet was recorded at the international boundary which is 124 percent of the United States share.

The seasonal summary of the Frenchman River division on page 2, indicates a Canadian use of 24,190 acre-feet in the Frenchman River Basin.

The natural flow of the Frenchman River at the international boundary was computed using a nine-day time lag for Cypress Lake storage and diversion, seven-day time lag for Eastend Reservoir storage and diversion, and a three-day time lag for Val Marie storage and diversion, to synchronize the flow with flow quantities at the international boundary.

Appendix

An Appendix, submitted with this report under separate cover, contains the result of discharge measurements, summary of monthly discharge and the daily gauge height and discharge data for 53 gauging stations operated during 1962 in the St. Mary and Milk River drainage basins. Details of the Canadian minor diversions, as grouped in Table 2 of the report, are included.

Table 1
Page 1

Summary of Division of St. Mary River
and Diversion to Milk River for 1962
in acre-feet

Month	St. Mary River at Int. Boundary				Excess Received by Canada	Storage Lake Sherburne	Total Available for Diversion	U.S. St.Mary Canal	Milk River at Eastern Crossing*
	Recorded Flow	Natural Flow	United States Share	Canadian Share					
April	31,047	47,986	16,931	31,053	-6	-11,210t	28,141	28,149	41,540
May	67,684	113,139	46,314	66,825	+859	+4,371	41,943	41,084	46,960
June	85,486	154,104	67,129	86,975	-1,490	+28,742	38,387	39,876	41,820
July	50,239	77,756	28,625	49,131	+1,109	-13,739t	42,364	41,256	38,750
Aug.	29,677	44,773	12,988	31,785	-2,108	-22,814t	35,802	37,910	35,010
Sept.	22,635	25,907	6,472	19,434	+3,201	+1,736	4,736	1,540	8,190
Oct.	22,147	31,662	7,968	23,695	-1,547	+9,515	-1,547	0	1,430
Total Irrig. Season	308,915	495,327	186,427	308,898	+18	-3,399t	189,826	189,815	213,700
For Year Nov. to Oct.	356,722	556,013	216,770	339,241					

t Negative sign indicates a release from Lake Sherburne.

* Represents natural flow of Milk River and diversion from St. Mary River Basin.

Lake Sherburne quantities are corrected for evaporation.

Storage in Lake Sherburne on March 31 = 19,940 acre-feet.
October 31 = 15,500 acre-feet.

Storage in Fresno Reservoir on March 31 = 37,770 acre-feet.
October 31 = 41,100 acre-feet.

DIVISION OF FLOW OF ST. MARY RIVER
1962

Water Available to Canada at Spring Coulee from St. Mary River
(Acre-feet)

Month	St. Mary River Int. Boundary	Rolph Creek Kimball	Lee Creek Cardston	Total Available at Spring Coulee
April	31,047	817	7,620	39,484
May	67,684	291	7,710	75,685
June	85,486	145	6,400	92,031
July	50,239	39	2,070	52,348
August	29,677	146	724	30,547
September	22,635	222	715	23,572
October	22,147	24	722	22,893
Total	308,915	1,684	25,961	336,560

DISPOSITION OF WATER AVAILABLE TO CANADA

Water Used in St. Mary and Milk Rivers Development
(Acre-feet)

Month	Canada's Share Natural Flow: Int. Boundary	Canadian St. Mary Canal: Spring Coulee	Magrath I.D. Canal: Spring Coulee	Total Diverted to S.M.R.D.
April	31,053	10,280	2	10,282
May	66,825	103,100	2,100	105,200
June	86,975	123,500	2,670	126,170
July	49,131	96,310	3,860	100,170
August	31,785	56,260	3,110	59,370
September	19,434	30,370	1,070	31,440
October	23,695	18,760	1,180	19,940
Total	308,898	438,580	13,992	452,572

Storage in St. Mary Reservoir March 31, Elev. 3614.94 = 275,700 acre-feet
October 31, Elev. 3608.13 = 227,400 acre-feet

Table 1
Page 3

MAJOR DIVERSIONS FROM MILK RIVER
IN THE UNITED STATES

1962

(Acre-feet)

Month	Fort Belknap Canal	Paradise Canal	Harlem Canal	Harlem No. 2	Agency Canal	Dodson North	Dodson South	Vandalia Canal	Wiota Pumping Plant
March	0	0	0	0	0	0	496	0	0
April	595	0	278	0	1,680	119	6,640	0	0
May	14,300	6,330	3,010	641	4,920	5,120	28,970	6,690	1,780
June	7,970	1,490	2,140	942	3,970	3,890	24,560	5,530	0
July	16,570	7,990	2,700	1,170	6,010	4,630	22,760	4,380	0
Aug.	15,930	6,440	4,880	1,170	3,550	3,950	17,680	7,380	971
Sept.	10,670	3,460	1,710	490	2,070	2,080	13,290	7,420	402
Oct.	3,140	575	793	0	218	516	8,780	5,210	2,460
Nov.	0	0	0	0	0	0	2,630	0	0
Total	69,175	26,285	15,511	4,413	22,418	20,305	125,806	36,610	5,613

Total of Major Diversions from Milk River
in the United States = 326,100

Storage in Nelson Reservoir on March 31, 15,440
on October 31, 53,050

Table 2
Page 1

SUMMARY OF NATURAL FLOW AND DIVISION OF
EASTERN TRIBUTARIES OF MILK RIVER IN CANADA

Lodge Creek at International Boundary

1962

Quantities in cfs days

Period 1 to 31	Storage Middle Creek Reservoir and Bedford Slough	Storage Spangler Project	Lodge Creek at International Boundary	Natural Run-off from Project Areas	Natural Flow Lodge Creek at International Boundary	United States	
						Share	Received in Excess
March	+ 57	+ 786	384	181	1,430	715	- 331
April	- 5	+ 395	753	165	1,308	654	99
May	- 23	0	35	6	22	10	25
June	- 25	-1,648	6,328	2,513	7,204	3,602	2,726
July	- 15	+ 191	117	44	337	170	53
Aug.	- 12	- 123	83	6	17	8	75
Sept.	- 15	0	2	0	0	0	2
Oct.	- 21	0	0	0	0	0	0
Total	- 59	- 399	7,702	2,915	10,318	5,159	2,543
Acre-feet	- 117	- 791	15,277	5,782	20,465	10,233	5,044

Estimated acre-feet total of minor diversions detailed in Appendix B to this report 320 *

20,785

* - Does not include 300 acre-feet reported by Mitchell Ranching Company as this water has already been included in the computations for Middle Creek Reservoir and Bedford Slough storage.

SUMMARY OF NATURAL FLOW AND DIVISION OF EASTERN TRIBUTARIES OF MILK RIVER IN CANADA

Battle Creek at International Boundary

1962

Quantities in cfs days

Period 5 to 4	Diversion to Cypress Lake	Diversion to Irrigated Land	Total Used by Canada	Battle Creek		United States	
				Flow at International Boundary	Natural Flow	Share	Received in Excess
23 Feb. to 4 Mar.	0	0	0	0	0	0	0
5 Mar. to 4 Apr.	+ 209	215	424	1,075	1,499	749	326
5 Apr. to 4 May	+ 35	326	361	677	1,038	519	158
5 May to 4 June	- 1,452	1,285	- 167	355	188	94	261
5 June to 4 July	- 563	561	- 2	223	293	147	76
5 July to 4 Aug.	- 120	109	- 11	126	115	58	68
5 Aug. to 4 Sept.	0	1	1	0	1	0	0
5 Sept. to 4 Oct.	- 7	0	- 7	0	0	0	0
5 Oct. to 31 Oct.	- 43	27	- 16	0	0	0	0
Total	- 1,941	2,524	583	2,456	3,134	1,567	889
Acre-feet	- 3,850	5,006	1,156	4,871	6,216	3,108	1,763
Estimated acre-feet total of minor diversions detailed in Appendix B to this report			1,155		1,155		
			2,311		7,371	3,686	1,185

Table 2
Page 3

SUMMARY OF NATURAL FLOW AND DIVISION OF
EASTERN TRIBUTARIES OF MILK RIVER IN CANADA

Frenchman River at International Boundary

1962

Quantities in cfs days

Period 1 to 31	Depletion in Canada	Frenchman River at Int. Boundary		Adjustments for Minor Diversions in Canada	Frenchman River at International Boundary		
		Recorded Flow	Apparent Natural Flow		Natural Flow	U.S. Share	Received in Excess
March	+ 1,074	2,393	3,467	104	3,571	1,786	607
April	+ 6,745	4,242	10,987	330	11,317	5,659	-1,417
May	- 449	1,337	888	27	915	457	880
June	+ 1,059	1,187	2,246	67	2,313	1,156	31
July	+ 2,700	9,556	12,256	368	12,624	6,312	3,244
Aug.	- 116	520	404	12	416	207	313
Sept.	+ 183	92	278	9	287	144	-52
Oct.	+ 69	392	461	13	474	238	154
Total	+ 11,265	19,719	30,987	930	31,917	15,959	3,760
Acre-feet	+ 22,344	39,112	61,462	1,845 *	63,306	31,654	7,458

* - 3% of the apparent natural flow was used for the adjustments for minor diversions in Canada. This figure is based on the 1,820 estimated acre-feet total of minor diversions detailed in Appendix B to this report.

Table 3

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

1962

Quantities in acre-feet

Month	Lodge Creek Basin	Battle Creek Basin	Frenchman River Basin
	North Chinook Canal	Matheson Canal Pumping	Frenchman Canal
March	345	-	0
April	1,260	-	686
May	29	-	745
June	1,650	-	1,320
July	241	-	1,970
Aug.	11	-	1,650
Sept.	0	-	922
Oct.	0	-	26
Total	3,540	2,070 [a]	7,320

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

Total of Measured Diversions from the Eastern Tributaries of Milk River in the United States = 12,930 acre-feet.

Table 4

Measured Run-off of Eastern Tributaries of Milk River
at International Boundary for period March to October
1962
(Acre-feet)

Month	Lodge Creek	Battle Creek	Woodpile Coulee	East Fork Battle Creek	Lyons Creek	Whitewater Creek	Frenchman River	Rock Cr. below Horse Cr.	McEachern Creek
March	762	2,040	714	1,530	889	1,020	4,750	3,180	362
April	1,490	1,310	15	56	120	90	8,410	5,900	1,520
May	68	721	0	0	0	10	2,650	311	1
June	12,550	506	2	0	95	61	2,350	1,800	835
July	231	289	2	134	99	6,790	18,950	1,050	2,740
Aug.	166	5	0	0	0	31	1,030	158	4
Sept.	5	0	0	0	0	2	182	15	0
Oct.	0	0	0	0	0	10	778	136	0
Totals	15,270	4,870	733	1,720	1,200	8,010	39,100	12,550	5,460

Total measured run-off of Eastern Tributaries of Milk River
at International Boundary from March to October = 88,910 acre-feet.

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

1962 Day APRIL	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) than share +	Canada received more (+) or less (-) than share -	U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied) Stored	Storage Factors Lake Sherburne (1-day lag applied) Released	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) than share +	U.S. Used more (+) or less (-) than share -
1	175	131	140	9		44	35		0	35		9
2	211	158	150		8	53	61		0	61	8	
3	220	165	160		5	55	55		5.0	60.0	5	
4	284.2	213	180		33	71	20		84.2	104.2	33	
5	310.5	232	245	13		78		25	90.5	65.5		13
6	253	190	285	95		63		146	114	-32		95
7	169	127	297	170		42		345	217	-128		170
8	189	142	268	126		47		391	312	-79		126
9	185	139	246	107		46		458	397	-61		107
10	263	197	304	107		66		485	444	-41		107
11	231	173	274	101		58		582	539	-43		101
12	289	217	297	80		72		563	555	- 8		80
13	386	290	322	32		96		507	571	64		32
14	442	332	373	41		110		514	583	69		41
15	631	473	439		34	158		418	610	192	34	
16	677	505	419		86	172		354	612	258	86	
17	718	526	392		134	192		288	614	326	134	
18	770	552	412		140	218		260	618	358	140	
19	839	586	453		133	253		234	620	386	133	
20	1,018	676	574		102	342		187	631	444	102	
21	1,249	791	687		104	458		81	643	562	104	
22	1,385	859	782		77	526		47	650	603	77	
23	1,363	848	830		18	515		119	652	533	18	
24	1,471	902	922	20		569		105	654	549		20
25	1,779	1,056	1,080	24		723	41		658	699		24
26	1,960	1,147	1,090		57	813	208		662	870	57	
27	1,864	1,099	1,060		39	765	140		664	804	39	
28	1,777	1,055	1,040		15	722	71		666	737	15	
29	1,589	961	999	38		628		74	664	590		38
30	1,495	914	933	19		581		100	662	562		19
31												
Total Sec.-ft.	24,192.7	15,656	15,653	(982)	(985) 3	8,536	631	6,283	14,191.7	8,539.7	(985) 3	(982)
Mean	806	522	522		0.1	285	21.0	209	473	285	0.1	
Ac.-ft.	47,986	31,053	31,047		6.0	16,931	1,252	12,462	28,149	16,938	6.0	

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

1962 Day MAY	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) than share		U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied)		Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) than share	
				+	-		Stored	Released			+	-
1	1,315	824	850	26		491		195	660	465		26
2	1,263	798	782		16	465		173	654	481	16	
3	1,187	760	756		4	427		225	656	431	4	
4	1,218	776	747		29	442		185	656	471	29	
5	1,161	747	687		60	414		180	654	474	60	
6	1,171	752	662		90	419		143	652	509	90	
7	1,129	731	645		86	398		168	652	484	86	
8	1,072	703	670		33	369		250	652	402	33	
9	1,076	705	738	33		371		316	654	338		33
10	1,096	715	721	6		381		277	652	375		6
11	1,208	771	712		59	437		156	652	496	59	
12	1,250	792	704		88	458		108	654	546	88	
13	1,271	802	730		72	469		113	654	541	72	
14	1,457	895	810		85	562		9	656	647	85	
15	1,595	964	850		114	631	93		652	745	114	
16	1,714	1,024	1,030	6		690	24		660	684		6
17	1,826	1,080	1,060		20	746	106		660	766	20	
18	1,852	1,093	1,120	27		759	70		662	732		27
19	2,007	1,170	1,240	70		837	103		664	767		70
20	2,256	1,295	1,400	105		961	188		668	856		105
21	2,486	1,410	1,470	60		1,076	343		673	1,016		60
22	2,530	1,432	1,510	78		1,098	335		685	1,020		78
23	2,410	1,372	1,540	168		1,038	181		689	870		168
24	2,442	1,388	1,540	152		1,054	213		689	902		152
25	2,606	1,470	1,580	110		1,136	334		692	1,026		110
26	2,651	1,492	1,550	58		1,159	409		692	1,101		58
27	2,596	1,465	1,500	35		1,131	407		689	1,096		35
28	2,602	1,468	1,510	42		1,134	400		692	1,092		42
29	2,797	1,565	1,620	55		1,232	483		694	1,177		55
30	2,900	1,617	1,680	63		1,283	524		696	1,220		63
31	2,897	1,615	1,710	95		1,282	489		698	1,187		95
Total Sec.-ft.	57,041	33,691	34,124	(1,189) 433	(756)	23,350	4,702	2,498	20,713	22,917	(756)	(1,189) 433
Mean	1,840	1,087	1,101	14.0		753	152	80.6	668	739		14.0
Ac.-ft.	113,139	66,825	67,684	859		46,314	9,326	4,955	41,084	45,455		859

JUNE 1962
Table 5

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

1962 Day JUNE	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) than share +	Canada received more (+) or less (-) than share -	U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied) Stored	Storage Factors Lake Sherburne (1-day lag applied) Released	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) than share +	U.S. Used more (+) or less (-) than share -
1	2,829	1,581	1,640	59		1,248	493		696	1,189		59
2	2,722	1,528	1,550	22		1,194	476		696	1,172		22
3	2,651	1,492	1,450		42	1,159	507		694	1,201	42	
4	2,687	1,510	1,430		80	1,177	576		681	1,257	80	
5	2,545	1,439	1,590	151		1,106	461		494	955		151
6	2,164	1,249	1,640	391		915	403		121	524		391
7	1,929	1,131	977		154	798	288		664	952	154	
8	1,852	1,093	880		213	759	289		683	972	213	
9	1,904	1,119	922		197	785	303		679	982	197	
10	2,288	1,311	1,030		281	977	575		683	1,258	281	
11	2,533	1,433	1,130		303	1,100	714		689	1,403	303	
12	2,488	1,411	1,270		141	1,077	522		696	1,218	141	
13	2,484	1,409	1,440	31		1,075	342		702	1,044		31
14	2,800	1,567	1,710	143		1,233	384		706	1,090		143
15	2,880	1,607	1,660	53		1,273	516		704	1,220		53
16	2,876	1,605	1,580		25	1,271	592		704	1,296	25	
17	2,870	1,602	1,570		32	1,268	596		704	1,300	32	
18	3,032	1,683	1,640		43	1,349	688		704	1,392	43	
19	3,056	1,695	1,680		15	1,361	670		706	1,376	15	
20	3,079	1,706	1,680		26	1,373	695		704	1,399	26	
21	2,967	1,650	1,660	10		1,317	603		704	1,307		10
22	2,941	1,637	1,640	3		1,304	597		704	1,301		3
23	2,875	1,604	1,570		34	1,271	603		702	1,305	34	
24	2,674	1,504	1,480		24	1,170	492		702	1,194	24	
25	2,643	1,488	1,430		58	1,155	515		698	1,213	58	
26	2,671	1,502	1,410		92	1,169	563		698	1,261	92	
27	2,627	1,480	1,370		110	1,147	559		698	1,257	110	
28	2,451	1,392	1,380		12	1,059	375		696	1,071	12	
29	2,100	1,217	1,370	153		883	34		696	730		153
30	2,076	1,205	1,320	115		871	60		696	756		115
31												
Total Sec.-ft.	77,694	43,850	43,099	(1,131)	(1,882) 751	33,844	14,491		20,104	34,595	(1,882) 751	(1,131)
Mean	2,590	1,462	1,437		25.0	1,128	483		670	1,153	25.0	
Ac.-ft.	154,104	86,975	85,486		1,490	67,129	28,742		39,876	68,618	1,490	

Table 5

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

1962 Day JULY	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) than share +	Canada received more (+) or less (-) than share -	U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied) Stored	Storage Factors Lake Sherburne (1-day lag applied) Released	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) than share +	U.S. Used more (+) or less (-) than share -
1	2,036	1,185	1,280	95		851	62		694	756		95
2	2,045	1,189	1,270	81		856	81		694	775		81
3	1,925	1,129	1,180	51		796	56		689	745		51
4	1,748	1,041	1,040		1	707	23		685	708	1	
5	1,616	975	922		53	641	13		681	694	53	
6	1,524	929	840		89	595	9		675	684	89	
7	1,420	877	756		121	543		7	671	664	121	
8	1,352	843	704		139	509		18	666	648	139	
9	1,305	819	670		149	486		27	662	635	149	
10	1,259	796	712		84	463		117	664	547	84	
11	1,258	796	756		40	462		164	666	502	40	
12	1,267	800	820	20		467		224	671	447		20
13	1,233	783	870	87		450		312	675	363		87
14	1,224	779	890	111		445		341	675	334		111
15	1,240	787	890	103		453		325	675	350		103
16	1,203	768	870	102		435		342	675	333		102
17	1,175	754	850	96		421		348	673	325		96
18	1,137	735	810	75		402		344	671	327		75
19	1,051	692	765	73		359		382	668	286		73
20	1,014	674	730	56		340		384	668	284		56
21	952	643	687	44		309		401	666	265		44
22	975	654	653		1	321		342	664	322	1	
23	952	643	628		15	309		338	662	324	15	
24	937	635	628		7	302		351	660	309	7	
25	944	639	636		3	305		352	660	308	3	
26	968	651	636		15	317		328	660	332	15	
27	980	657	670	13		323		350	660	310		13
28	1,081	707	765	58		374		350	666	316		58
29	1,131	732	810	78		399		347	668	321		78
30	1,129	731	800	69		398		339	668	329		69
31	1,121	727	791	64		394		338	668	330		64
Total Sec.-ft.	39,202	24,770	25,329	(1,276) 559	(717)	14,432	244	7,171	20,800	13,873	(717)	(1,276) 559
Mean	1,265	799	817	18.0		466	7.9	231	671	448		18.0
Ac.-ft.	77,756	49,131	50,239	1,109		28,625	484	14,223	41,256	27,517		1,109

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

Table 5

1962 Day AUGUST	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) than share +	-	U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied) Stored	Released	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) than share +	-
1	1,006	670	756	86		336		416	666	250		86
2	1,001	667	730	63		334		391	662	271		63
3	969	651	704	53		318		395	660	265		53
4	913	623	670	47		290		417	660	243		47
5	922	628	662	34		294		400	660	260		34
6	978	656	645		11	322		325	658	333	11	
7	986	660	636		24	326		308	658	350	24	
8	1,012	673	628		45	339		274	658	384	45	
9	943	638	613		25	305		326	656	330	25	
10	891	612	597		15	279		360	654	294	15	
11	875	604	566		38	271		343	652	309	38	
12	837	585	530		55	252		343	650	307	55	
13	759	546	501		45	213		389	647	258	45	
14	760	547	480		67	213		365	645	280	67	
15	693	513	480		33	180		432	645	213	33	
16	669	501	466		35	168		442	645	203	35	
17	663	497	446		51	166		426	643	217	51	
18	656	492	419		73	164		402	639	237	73	
19	576	432	426		6	144		489	639	150	6	
20	565	424	412		12	141		486	639	153	12	
21	522	392	386		6	130		501	637	136	6	
22	519	389	386		3	130		504	637	133	3	
23	558	418	373		45	140		450	635	185	45	
24	384	288	341	53		96		590	633	43		53
25	570	428	279		149	142		335	626	291	149	
26	730	532	224		308	198		112	618	506	308	
27	678	506	187		319	172		119	610	491	319	
28	574	430	178		252	144		185	581	396	252	
29	536	402	279		123	134		264	521	257	123	
30	379	284	439	155		95		411	351	-60		155
31	449	337	523	186		112		302	228	-74		186
Total Sec.-ft.	22,573	16,025	14,962	(677)	(1,740) 1,063	6,548		11,502	19,113	7,611	(1,740) 1,063	(677)
Mean	728	517	483		34.3	211		371	617	246	34.3	
Ac.-ft.	44,773	31,785	29,677		2,108	12,988		22,814	37,910	15,096	2,108	

SEPTEMBER 1962
Table 5

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

1962 Day SEPTEMBER	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) than share +	-	U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied) Stored	Released	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) than share +	-
1	408	306	566	260		102		293	135	-158		260
2	421	316	508	192		105		219	132	- 87		192
3	503	377	466	89		126		93	130	37		89
4	443	332	406	74		111		91	128	37		74
5	389	292	380	88		97		117	126	9		88
6	595.3	446	366		80	149	135		94.3	229.3	80	
7	630.6	473	386		87	158	233		11.6	244.6	87	
8	489.8	368	373	5		122	110		6.8	116.8		5
9	473.3	355	354		1	118	114		5.3	119.3	1	
10	432.2	324	328	4		108	100		4.2	104.2		4
11	428.8	322	328	6		107	100		0.8	100.8		6
12	424.2	318	322	4		106	102		0.2	102.2		4
13	441	331	322		9	110	119		0.0	119	9	
14	441	331	322		9	110	119		0	119	9	
15	466	350	328		22	116	138		0	138	22	
16	457	343	335		8	114	122		0	122	8	
17	461	346	335		11	115	126		0	126	11	
18	469	352	341		11	117	128		0	128	11	
19	463	347	335		12	116	128		0	128	12	
20	435	326	328	2		109	107		0	107		2
21	420	315	328	13		105	92		0	92		13
22	404	303	316	13		101	88		0	88		13
23	409	307	316	9		102	93		0	93		9
24	401	301	316	15		100	85		0	85		15
25	314	236	386	150		78		72	0	-72		150
26	262	196	453	257		66		191	0	-191		257
27	302	226	487	261		76		185	0	-185		261
28	337	253	516	263		84		179	0	-179		263
29	453	340	466	126		113		13	0	-13		126
30	488	366	399	33		122	89		0	89		33
31												
Total Sec.-ft.	13,061.2	9,798	11,412	(1,864) 1,614	(250)	3,263	2,328	1,453	774.2	1,649.2	(250)	(1,864) 1,614
Mean	435	327	380	53.8		109	77.6	48.4	25.8	55.0		53.8
Ac.-ft.	25,907	19,434	22,635	3,201		6,472	4,618	2,882	1,540	3,271		3,201

Table 5

NATURAL FLOW OF ST. MARY RIVER AT INTERNATIONAL BOUNDARY AND ITS DIVISION BETWEEN CANADA AND UNITED STATES (Cu. ft. per sec.)

1962 Day OCTOBER	Computed Natural Flow St. Mary River at Int. Bdry.	Canada's share of St. Mary River Natural Flow	Recorded Flow of St. Mary River near Int. Bdry.	Canada received more (+) or less (-) than share +	Canada received more (+) or less (-) than share -	U.S. share of St. Mary River	Storage Factors Lake Sherburne (1-day lag applied) Stored	Storage Factors Lake Sherburne (1-day lag applied) Released	Diverted by U.S. St. Mary Canal	Net Used by United States	U.S. Used more (+) or less (-) than share +	U.S. Used more (+) or less (-) than share -
1	419	314	354	40		105	65		0	65		40
2	390	292	322	30		98	68		0	68		30
3	401	301	304	3		100	97		0	97		3
4	387	290	285		5	97	102		0	102	5	
5	360	270	279	9		90	81		0	81		9
6	338	254	268	14		84	70		0	70		14
7	331	248	257	9		83	74		0	74		9
8	350	262	257		5	88	93		0	93	5	
9	329	247	240		7	82	89		0	89	7	
10	329	247	240		7	82	89		0	89	7	
11	297	223	229	6		74	68		0	68		6
12	348	261	251		10	87	97		0	97	10	
13	391	293	257		36	98	134		0	134	36	
14	557	418	279		139	139	278		0	278	139	
15	651	488	328		160	163	323		0	323	160	
16	651	488	360		128	163	291		0	291	128	
17	634	476	380		96	158	254		0	254	96	
18	623	467	399		68	156	224		0	224	68	
19	485	364	399	35		121	86		0	86		35
20	630	472	412		60	158	218		0	218	60	
21	524	393	406	13		131	118		0	118		13
22	610	458	399		59	152	211		0	211	59	
23	634	476	426		50	158	208		0	208	50	
24	678	506	460		46	172	218		0	218	46	
25	694	514	480		34	180	214		0	214	34	
26	692	513	501		12	179	191		0	191	12	
27	681	507	494		13	174	187		0	187	13	
28	700	517	494		23	183	206		0	206	23	
29	633	475	487	12		158	146		0	146		12
30	612	459	466	7		153	146		0	146		7
31	604	453	453	0		151	151		0	151		0
Total Sec.-ft.	15,963	11,946	11,166	(178)	(958) 780	4,017	4,797		0	4,797	(958) 780	(178)
Mean	515	385	360		25.2	130	155		0	155	25.2	
Ac.-ft.	31,662	23,695	22,147		1,547	7,968	9,515		0	9,515	1,547	

TABLE 6
Page 1

Historical Summary of Natural Flow of St. Mary River at International Boundary

Year	Mean Monthly Discharge In Cubic Feet Per Second During Irrigation Season April - October							Run-off in Acre-feet		
	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1901-02	-	-	-	-	-	618 d	477 d	-	66,111 z	66,111 z
1902-03	568	1726	5200	2924	1404	1109	917	57,965	837,816	895,781
1903-04	724	2022	2936	1903	933	420	221	96,361	555,162	651,523
1904-05	304	1215	2461	1642	847	371	772	39,128	461,855	500,983
1905-06	481	1504	2285	1826	946	628	756	51,592	511,307	562,899
1906-07	489	1931	4259	3117	1335	1214	632	124,082	785,988	910,070
1907-08	844	2485	7500	2488	834	462	481	62,436	910,631	973,067
1908-09	350	1904	5169	3000	1460	640	450	65,276	785,464	850,740
1909-10	1188	2315	2243	1175	580	553	1036	87,729	551,042	638,771
1910-11	520	2035	3470	1679	1053	1380	621	97,349	650,860	748,209
1911-12	542	2031	2347	1582	887	524	423	59,092	505,795	564,887
1912-13	749	1913	4519	2024	1162	574	448	69,604	688,735	758,339
1913-14	637	2230	2298	1430	719	584	841	58,564	530,307	588,871
1914-15	575	1644	2251	1722	969	842	739	83,970	530,287	614,257
1915-16	664	1707	4634	3463	1228	947	391	109,773	789,058	898,831
1916-17	453	2215	4104	2427	759	470	378	58,828	654,520	713,348
1917-18	661	1875	3093	1185	763	489	394	91,256	511,779	603,035
1918-19	340	1978	2116	919	498	336	186	49,684	386,325	436,009
1919-20	429	1720	3133	2355	800	572	557	61,025	579,977	641,002
1920-21	646	2664	3713	1809	755	416	499	72,117	636,167	708,284
1921-22	282	2293	3835	1578	642	420	301	64,657	565,880	630,537
1922-23	422	2286	3359	1726	788	482	560	47,191	583,204	630,395
1923-24	393	2080	3152	1534	728	397	302	51,406	520,145	571,551
1924-25	1272	3461	3512	1893	807	542	406	78,619	720,710	799,329
1925-26	670	1264	1078	818	405	751	1141	49,198	371,837	421,035
1926-27	600	2685	5434	2812	1274	1509	1143	74,838	935,423	1,010,261
1927-28	546	3695	2940	2594	921	513	863	112,116	734,376	846,492
1928-29	314	1837	2558	1272	493	291	289	66,040	427,448	493,488
1929-30	1477	2425	2489	1264	511	370	314	52,374	535,575	587,949
1930-31	224	1957	1838	796	592	464	294	38,856	374,083	412,939
1931-32	567	2497	2896	1409	595	307	240	83,750	515,819	599,569
1932-33	416	1764	4339	2169	766	492	685	67,488	643,242	710,730
1933-34	1734	3441	2929	1155	540	323	269	168,272	629,044	797,316
1934-35	392	1841	2716	1516	630	387	235	136,576	467,568	604,144
1935-36	617	2417	2152	823	420	252	162	30,004	414,845	444,849
1936-37	267	1797	3752	1409	475	298	285	34,013	500,701	534,714
1937-38	696	2611	3323	1622	510	360	322	65,262	571,983	637,245
1938-39	640	2271	1721	1069	459	292	188	59,359	402,996	462,355
1939-40	381	1860	1802	737	382	427	415	37,815	364,056	401,871
1940-41	364	1333	1429	879	359	520	635	32,842	334,846	367,688
1941-42	676	1890	2773	1824	754	526	397	94,304	535,668	629,972
1942-43	1240	1996	3722	2691	810	376	328	63,366	675,767	739,133
1943-44	197	1273	1634	809	536	424	374	36,343	318,121	354,464
1944-45	153	2000	3382	1455	457	486	421	46,471	505,676	552,147
1945-46	658	2361	2731	1500	571	495	521	76,816	535,571	612,387
1946-47	913	2729	2585	1634	657	526	1250	86,866	624,962	711,828
1947-48	621	2963	5486	1576	758	329	266	71,379	725,024	796,403
1948-49	526	2337	2272	991	471	532	404	35,419	456,637	492,056
1949-50	462	1969	4537	3159	1100	492	929	96,111	766,778	862,889
1950-51	819	3366	3431	3230	1128	1209	1390	141,366	885,233	1,026,599
1951-52	969	2408	2204	1433	839	409	264	82,832	517,093	599,925
1952-53	635	2716	5534	2519	887	438	283	62,545	786,960	849,505
1953-54	435	3237	3637	3184	1100	771	736	62,618	795,874	858,492
1954-55	267	1491	3755	2248	799	363	810	79,260	589,738	668,998
1955-56	525	2793	3631	2027	828	441	513	89,020	652,395	741,415
1956-57	275	3569	2947	1077	478	303	332	59,363	545,264	604,627
1957-58	401	2754	2847	1182	556	482	529	58,512	530,645	589,157
1958-59	702	2110	4056	2128	799	1035	979	93,513	714,693	808,206
1959-60	688	1387	3049	1604	646	374	237	95,385	482,907	578,292
1960-61	415	2223	3774	1324	566	406	658	58,502	566,754	625,256
Average	593	2212	3271	1785	762	548	532	71,805	587,943	659,748

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

d - 1902 data not used.
z - Partial record not included in average.

TABLE 6
Page 1

Historical Summary
of
Natural Flow of St. Mary River at International Boundary

TABLE 6
Page 2

Mean Monthly Discharge In Cubic Feet Per Second During Irrigation Season April - October								Run-off in Acre-feet		
Year	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1961-62	806	1840	2590	1265	728	435	515	60,686	495,327	556,013
Average	597	2206	3259	1777	762	546	532	71,620	586,399	658,019

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

TABLE 7
Page 1

Historical Summary of United States Share of Natural Flow of St. Mary River at International Boundary

Year	Mean Monthly Discharge In Cubic feet per second During Irrigation Season April - October							Run-off in Acre-feet		
	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1901-02	-	-	-	-	-	156 d	119 d	-	16,637 z	16,637 z
1902-03	170	696	2433	1306	535	388	295	28,983	352,098	381,081
1903-04	221	844	1301	784	302	105	55.2	48,180	218,938	267,118
1904-05	79.4	442	1064	654	268	92.4	241	19,564	172,185	191,749
1905-06	144	586	976	746	306	174	221	25,796	191,286	217,082
1906-07	122	801	1962	1392	500	440	174	62,041	326,525	388,566
1907-08	302	1076	3583	1077	256	115	120	31,218	393,572	424,790
1908-09	88	785	2418	1333	563	174	112	32,638	331,192	363,830
1909-10	430	991	954	421	150	150	351	43,865	208,947	252,812
1910-11	130	851	1568	672	360	523	170	48,674	258,357	307,031
1911-12	139	849	1006	624	280	131	106	29,546	190,175	219,721
1912-13	244	789	2092	845	414	150	112	34,802	280,792	315,594
1913-14	192	949	982	548	197	154	253	29,282	198,764	228,046
1914-15	167	655	958	694	318	256	205	41,985	197,290	239,275
1915-16	172	686	2150	1565	447	314	97.8	54,886	328,788	383,674
1916-17	116	949	1885	1047	215	117	94.6	29,414	267,802	297,216
1917-18	191	782	1380	426	218	122	98.4	45,628	194,448	240,076
1918-19	90.7	822	891	295	125	84.0	46.5	24,842	142,621	167,463
1919-20	116	699	1400	1011	241	146	142	30,512	227,566	258,078
1920-21	180	1165	1690	738	219	104	126	36,059	255,689	291,748
1921-22	75.8	980	1750	622	170	105	75.0	32,328	228,434	260,762
1922-23	109	976	1513	696	232	122	146	23,596	229,833	253,429
1923-24	98.7	878	1409	600	200	99.0	75.5	25,703	203,399	229,102
1924-25	470	1564	1589	779	238	136	102	39,310	295,509	334,819
1925-26	226	465	372	251	101	214	410	24,599	123,780	148,379
1926-27	208	1176	2550	1239	470	588	405	37,419	401,387	438,806
1927-28	152	1681	1303	1130	296	130	282	56,058	302,731	358,789
1928-29	78.5	752	1112	469	124	72.8	72.2	33,020	162,343	195,363
1929-30	572	1046	1078	465	128	92.5	78.8	26,187	209,274	235,461
1930-31	56.1	813	752	233	168	116	73.5	19,428	134,186	153,614
1931-32	153	1082	1281	537	151	76.8	59.9	41,875	202,453	244,328
1932-33	116	715	2003	918	220	123	223	33,744	261,031	294,775
1933-34	710	1554	1298	411	139	80.5	67.3	84,136	257,770	341,906
1934-35	103	754	1191	591	171	96.7	58.9	68,288	179,546	247,834
1935-36	191	1042	910	250	105	62.9	40.5	15,002	157,613	172,615
1936-37	66.8	734	1709	538	121	74.5	71.3	17,006	200,099	217,105
1937-38	225	1139	1495	644	129	90.1	80.5	32,631	230,229	262,860
1938-39	202	969	694	368	115	72.9	47.0	29,680	149,764	179,444
1939-40	95.9	764	734	208	95.5	109	104	18,907	127,835	146,742
1940-41	93.4	500	548	281	89.7	133	167	16,421	109,876	126,297
1941-42	215	778	1219	746	221	134	99.6	47,152	206,753	253,905
1942-43	465	831	1694	1179	251	94.0	82.1	31,683	278,134	309,817
1943-44	49.2	475	650	254	136	106	93.4	18,172	106,824	124,996
1944-45	38.3	841	1524	561	115	123	105	23,235	200,071	223,306
1945-46	211	1014	1199	583	149	124	135	38,408	206,912	245,320
1946-47	305	1198	1126	650	176	136	458	43,433	245,873	289,306
1947-48	201	1315	2576	621	223	82.1	66.6	35,690	306,970	342,660
1948-49	148	1002	969	329	118	143	101	17,709	170,269	187,978
1949-50	116	827	2102	1413	383	127	325	48,056	320,765	368,821
1950-51	251	1516	1549	1448	397	438	528	70,683	372,351	443,034
1951-52	348	1037	935	550	260	102	66.1	41,416	200,079	241,495
1952-53	218	1191	2600	1093	281	109	70.7	31,272	336,248	367,520
1953-54	111	1462	1652	1425	383	227	214	31,309	332,634	363,943
1954-55	66.9	590	1711	957	245	90.6	265	39,630	237,646	277,276
1955-56	153	1230	1649	847	250	111	130	44,510	264,855	309,365
1956-57	70.2	1618	1306	372	120	75.8	82.9	29,682	221,248	250,930
1957-58	100	1215	1257	424	143	128	132	29,256	206,065	235,321
1958-59	201	888	1861	897	237	351	325	46,756	287,954	334,710
1959-60	191	529	1358	635	183	93.6	59.3	47,693	184,278	231,971
1960-61	104	949	1720	495	144	101	188	29,251	223,748	252,999
Average	184	941	1468	727	234	156	156	35,903	234,132	270,035

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

d - 1902 data not used.
z - Partial record not included in average.

TABLE 7
Page 2

Historical Summary
of United States Share of
Natural Flow of St. Mary River at International Boundary

Mean Monthly Discharge In Cubic Feet Per Second During Irrigation Season April - October								Run-off in Acre-feet		
Year	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1961-62	285	753	1128	466	211	109	130	30,343	186,427	216,770
Average	186	938	1463	723	233	156	155	35,810	233,337	269,147

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

TABLE 8
Page 1

Historical Summary of Canadian Share of Natural Flow of St. Mary River at International Boundary

Year	Mean Monthly Discharge In Cubic feet per second During Irrigation Season April - October							Run-off in Acre-feet		
	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1901-02	-	-	-	-	-	462 d	358 d	-	49,474 z	49,474 z
1902-03	398	1030	2767	1618	869	721	622	28,982	485,718	514,700
1903-04	504	1178	1635	1118	631	315	166	48,181	336,224	384,405
1904-05	225	773	1397	988	580	278	531	19,564	289,670	309,234
1905-06	336	919	1309	1079	640	454	535	25,796	320,021	345,817
1906-07	366	1130	2296	1726	834	774	457	62,041	459,463	521,504
1907-08	542	1410	3917	1411	578	346	361	31,218	517,059	548,277
1908-09	262	1119	2752	1667	897	466	338	32,638	454,272	486,910
1909-10	757	1325	1288	754	430	403	685	43,864	342,095	385,959
1910-11	390	1185	1902	1006	694	857	452	48,675	392,503	441,178
1911-12	403	1182	1340	958	608	393	317	29,546	315,620	345,166
1912-13	506	1123	2426	1179	748	424	336	34,802	407,942	442,744
1913-14	444	1282	1316	882	522	430	587	29,282	331,543	360,825
1914-15	408	989	1292	1028	652	586	534	41,985	332,997	374,982
1915-16	492	1020	2484	1899	781	633	294	54,887	460,270	515,157
1916-17	337	1266	2219	1380	545	352	284	29,414	386,717	416,131
1917-18	470	1094	1713	759	545	367	295	45,628	317,332	362,960
1918-19	249	1156	1225	625	374	252	140	24,842	243,703	268,545
1919-20	313	1021	1733	1344	559	426	415	30,513	352,411	382,924
1920-21	466	1499	2023	1071	535	312	373	36,058	380,477	416,535
1921-22	206	1313	2085	956	472	315	226	32,329	337,446	369,775
1922-23	313	1310	1846	1030	556	360	414	23,595	353,371	376,966
1923-24	295	1202	1743	934	529	298	226	25,703	316,746	342,449
1924-25	802	1898	1923	1113	569	406	305	39,309	425,201	464,510
1925-26	444	799	706	568	304	537	731	24,599	248,057	272,656
1926-27	392	1509	2884	1573	804	921	738	37,419	534,036	571,455
1927-28	394	2014	1637	1464	625	383	581	56,058	431,645	487,703
1928-29	236	1085	1446	803	368	218	217	33,020	265,105	298,125
1929-30	906	1380	1411	799	383	278	235	26,187	326,301	352,488
1930-31	168	1144	1086	563	424	348	221	19,428	239,897	259,325
1931-32	415	1415	1615	872	444	230	180	41,875	313,367	355,242
1932-33	300	1049	2336	1251	546	369	462	33,744	382,211	415,955
1933-34	1024	1887	1631	744	401	242	201	84,136	371,274	455,410
1934-35	290	1087	1525	925	459	290	177	68,288	288,022	356,310
1935-36	426	1376	1243	574	315	189	122	15,002	257,232	272,234
1936-37	200	1063	2043	871	354	224	214	17,007	300,603	317,610
1937-38	471	1473	1828	978	380	270	241	32,631	341,754	374,385
1938-39	438	1302	1027	701	344	219	141	29,679	253,232	282,911
1939-40	285	1096	1068	530	287	319	311	18,908	236,221	255,129
1940-41	271	833	881	598	269	387	468	16,421	224,969	241,390
1941-42	461	1112	1553	1079	533	392	297	47,152	328,915	376,067
1942-43	775	1165	2028	1512	559	282	246	31,683	397,632	429,315
1943-44	148	798	984	555	400	318	280	18,171	211,297	229,468
1944-45	115	1158	1858	894	342	363	316	23,236	305,605	328,841
1945-46	446	1347	1532	917	422	371	386	38,408	328,659	367,067
1946-47	607	1531	1459	984	481	390	791	43,433	379,089	422,522
1947-48	420	1649	2910	955	535	247	200	35,689	418,054	453,743
1948-49	378	1335	1303	662	353	390	303	17,710	286,368	304,078
1949-50	346	1143	2435	1746	717	364	604	48,055	446,013	494,068
1950-51	568	1850	1882	1782	731	771	862	70,683	512,882	583,565
1951-52	621	1371	1269	883	578	307	198	41,416	317,014	358,430
1952-53	417	1525	2934	1426	606	328	212	31,273	450,712	481,985
1953-54	325	1775	1985	1759	717	544	522	31,309	463,240	494,549
1954-55	200	901	2044	1291	554	272	545	39,630	352,094	391,724
1955-56	372	1563	1982	1180	578	330	383	44,510	387,538	432,048
1956-57	205	1951	1640	705	358	227	249	29,681	324,016	353,697
1957-58	300	1539	1590	758	413	354	397	29,256	324,581	353,837
1958-59	501	1222	2195	1231	562	684	654	46,757	426,738	473,495
1959-60	496	858	1691	969	463	281	178	47,692	298,629	346,321
1960-61	311	1275	2054	828	422	305	470	29,251	343,007	372,258
Average	409	1271	1802	1059	528	392	377	35,903	353,810	389,713

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

d - 1902 data not used.
z - Partial record not included in average.

TABLE 8
Page 2

Historical Summary
of Canadian Share of
Natural Flow of St. Mary River at International Boundary

Mean Monthly Discharge In Cubic Feet Per Second During Irrigation Season April - October								Run-off in Acre-feet		
Year	April	May	June	July	August	September	October	Non Irrigation Season Nov.-Mar.	Irrigation Season Apr.-Oct.	For Year Nov.-Oct.
1961-62	522	1087	1462	799	517	327	385	30,343	308,898	339,241
Average	411	1268	1796	1054	528	391	377	35,810	353,062	388,872

This table contains revisions to formerly reported data.

Natural flow records computed on basis of Lake Sherburne storage and release records as published in the original reports to the International Joint Commission.

Table 9

DETERMINATION OF THE NATURAL FLOW OF
LODGE CREEK AT INTERNATIONAL BOUNDARY

1962

Quantities in c.f.s. days

Period at International Boundary	Middle Creek near Alberta Boundary	Middle Creek near Battle Creek	Walburger Coulee below Diversions	Middle Creek Reservoir and Bedford Slough Areas		Lodge Creek at Alberta Boundary	Lodge Creek below Spangler Project	Stored or Diverted at Spangler Project	Lodge Creek at International Boundary	Measured Flows below Major Projects in Canada	Natural Run-off from Project Areas in Canada	Natural Flow of Lodge Creek at International Boundary	United States	
				Releases	Storage Net								Share	Received in Excess of Share
Mar. 1 - Mar.10	0	10	0	10	-10	0	0	0	0	10	0	0	0	0
Mar.11 - Mar.20	0	12	0	12	-12	0	0	0	0	12	0	0	0	0
Mar.21 - Mar.31	124	21	24	45	+79	847	61	+786	384	82	181	1,430	715	-331
Apr. 1 - Apr.10	62	38	0	38	+24	723	126	+597	355	164	114	1,090	545	-190
Apr.11 - Apr.20	18	29	1	30	-12	55	250	-195	342	279	38	173	87	255
Apr.21 - Apr.30	5	22	0	22	-17	5	12	-7	56	34	13	45	22	34
May 1 - May 10	5	13	0	13	-8	0	0	0	23	13	6	21	10	13
May 11 - May 20	6	13	0	13	-7	0	0	0	8	13	0	1	0	8
May 21 - May 31	6	14	0	14	-8	0	0	0	4	14	0	0	0	4
June 1 -June 10	5	12	0	12	-7	0	159	-159	130	171	0	0	0	130
June 11-June 20	16	26	0	26	-10	474	1,961	-1,487	6,065	1,987	2,447	7,015	3,508	2,557
June 21-June 30	2	10	0	10	-8	11	13	-2	133	23	66	189	94	39
July 1-July 10	1	9	0	9	-8	0	0	0	10	9	1	3	2	8
July 11-July 20	5	9	0	9	-4	83	11	+72	57	20	22	147	74	-17
July 21-July 31	7	10	0	10	-3	124	5	+119	50	15	21	187	94	-44
Aug. 1- Aug.10	1	6	0	6	-5	0	0	0	16	6	6	17	8	8
Aug. 11- Aug.20	1	4	0	4	-3	0	0	0	0	4	0	0	0	0
Aug. 21- Aug.31	0	4	0	4	-4	0	123	-123	67	127	0	0	0	67
Sept. 1-Sept.10	0	5	0	5	-5	0	0	0	2	5	0	0	0	2
Sept.11-Sept.20	0	5	0	5	-5	0	0	0	0	5	0	0	0	0
Sept.21-Sept.30	0	5	0	5	-5	0	0	0	0	5	0	0	0	0
Oct. 1 - Oct.10	0	6	0	6	-6	0	0	0	0	6	0	0	0	0
Oct.11 - Oct.20	1	8	0	8	-7	0	0	0	0	8	0	0	0	0
Oct.21 - Oct.31	1	9	0	9	-8	0	0	0	0	9	0	0	0	0
Total	266	300	25	325	-59	2,322	2,721	-399	7,702	3,021	2,915	10,318	5,159	2,543
Acre-feet	528	595	50	645	-117	4,606	5,397	-791	15,277	5,992	5,782	20,465	10,233	5,044

Estimated acre-feet total of minor diversions detailed in Appendix B to this report 320

20,785

Table 10
Page 1

DETERMINATION OF NATURAL FLOW OF BATTLE CREEK
AT INTERNATIONAL BOUNDARY
1962

Diversion to Cypress Lake
Quantities in c.f.s. days

Period at International Boundary	West Inflow Canal	West Inflow Canal Drain	Diversion to Cypress Lake	West Outflow Canal	Net Diversion to Cypress Lake
Feb.23 - Mar. 4	0	0	0	0	0
Mar. 5 - Mar.14	0	0	0	0	0
Mar.15 - Mar.25	0	0	0	1	-1
Mar.26 - Apr. 4	224	10	214	4	210
Apr. 5 - Apr.14	73	3	70	9	61
Apr.15 - Apr.24	78	66	12	34	-22
Apr.25 - May 4	46	48	-2	2	-4
May 5 - May 14	1	0	1	0	1
May 15 - May 25	0	0	0	780	-780
May 26 - June 4	0	0	0	673	-673
June 5 -June 14	0	0	0	11	-11
June 15-June 24	20	13	7	118	-111
June 25-July 4	0	1	-1	440	-441
July 5-July 14	0	0	0	98	-98
July 15-July 25	2	0	2	24	-22
July 26-Aug. 4	0	0	0	0	0
Aug. 5 - Aug.14	0	0	0	0	0
Aug.15 - Aug.25	0	0	0	0	0
Aug.26 - Sept.4	0	0	0	0	0
Sept. 5-Sept.14	0	0	0	1	-1
Sept.15-Sept.24	0	0	0	2	-2
Sept.25- Oct. 4	0	0	0	4	-4
Oct. 5 - Oct.14	0	0	0	4	-4
Oct.15 - Oct.25	0	0	0	22	-22
Oct.26 - Oct.31	0	0	0	17	-17
Total	444	141	303	2,244	-1,941
Acre-feet	881	280	601	4,451	-3,850

Table 10
Page 2

DETERMINATION OF NATURAL FLOW OF BATTLE CREEK
AT INTERNATIONAL BOUNDARY
1962

Diversion to Irrigated Lands
Quantities in c.f.s. days

Period at International Boundary	Stirling & Nash Ditch	McKinnon Ditch	Richardson Ditch	Vidora Ditch	Total Diverted	Return Flow	Net Diversion to Irrigated Land
Feb.23 - Mar. 4	0	0	0	0	0	0	0
Mar. 5 - Mar.14	0	0	0	0	0	0	0
Mar.15 - Mar.25	0	0	0	0	0	0	0
Mar.26 - Apr. 4	269	0	0	0	269	54	215
Apr. 5 - Apr.14	225	0	0	0	225	45	180
Apr.15 - Apr.24	157	26	0	0	183	37	146
Apr.25 - May 4	0	0	0	0	0	0	0
May 5 - May 14	0	0	0	0	0	0	0
May 15 - May 25	0	257	260	326	843	168	675
May 26 - June 4	0	233	202	328	763	153	610
June 5 -June 14	0	20	2	0	22	4	18
June 15-June 24	139	32	39	47	257	51	206
June 25-July 4	0	13	48	360	421	84	337
July 5-July 14	0	0	0	123	123	25	98
July 15-July 25	0	0	0	10	10	2	8
July 26-Aug. 4	0	4	0	0	4	1	3
Aug. 5 - Aug.14	0	0	0	0	0	0	0
Aug.15 - Aug.25	1	0	0	0	1	0	1
Aug.26 - Sept.4	0	0	0	0	0	0	0
Sept. 5-Sept.14	0	0	0	0	0	0	0
Sept.15-Sept.24	0	0	0	0	0	0	0
Sept.25- Oct. 4	0	0	0	0	0	0	0
Oct. 5 - Oct.14	0	0	0	0	0	0	0
Oct.15 - Oct.25	2	13	0	0	15	3	12
Oct.26 - Oct.31	19	0	0	0	19	4	15
Total	812	598	551	1,194	3,155	631	2,524
Acre-feet	1,611	1,186	1,093	2,368	6,258	1,252	5,006

Table 10
Page 3

DETERMINATION OF NATURAL FLOW OF BATTLE CREEK
AT INTERNATIONAL BOUNDARY
1962

Quantities in c.f.s. days

Period at International Boundary	Net Diversion to Cypress Lake	Net Diversion to Irrigated Land	Total Used by Canada	Battle Creek		United States	
				Flow at Int'l Boundary	Natural Flow	Share	Received in Excess of Share
Feb.23 - Mar. 4	0	0	0	0	0	0	0
Mar. 5 - Mar.14	0	0	0	0	0	0	0
Mar.15 - Mar.25	-1	0	-1	166	165	82	84
Mar.26 - Apr. 4	210	215	425	909	1,334	667	242
Apr. 5 - Apr.14	61	180	241	184	425	212	-28
Apr.15 - Apr.24	-22	146	124	299	423	212	87
Apr.25 - May 4	-4	0	-4	194	190	95	99
May 5 - May 14	1	0	1	135	136	68	67
May 15 - May 25	-780	675	-105	130	25	12	118
May 26 - June 4	-673	610	-63	90	27	14	76
June 5 -June 14	-11	18	7	96	103	52	44
June 15-June 24	-111	206	95	95	190	95	0
June 25-July 4	-441	337	-104	32	0	0	32
July 5-July 14	-98	98	0	36	36	18	18
July 15-July 25	-22	8	-14	73	59	30	43
July 26-Aug. 4	0	3	3	17	20	10	7
Aug. 5 - Aug.14	0	0	0	0	0	0	0
Aug.15 - Aug.25	0	1	1	0	1	0	0
Aug.26 - Sept.4	0	0	0	0	0	0	0
Sept. 5-Sept.14	-1	0	-1	0	0	0	0
Sept.15-Sept.24	-2	0	-2	0	0	0	0
Sept.25- Oct. 4	-4	0	-4	0	0	0	0
Oct. 5 - Oct.14	-4	0	-4	0	0	0	0
Oct.15 - Oct.25	-22	12	-10	0	0	0	0
Oct.26 - Oct.31	-17	15	-2	0	0	0	0
Total	-1,941	2,524	583	2,456	3,134	1,567	889
Acre-feet	-3,850	5,006	1,156	4,871	6,216	3,108	1,763
Estimated acre-feet total of minor diversions detailed in appendix to this report.			1,155		1,155		
			2,311		7,371	3,686	1,185

DETERMINATION OF NATURAL FLOW OF
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY
1962

Cypress Lake Storage and Diversion
Quantities in c.f.s.-days

Period at International Boundary	Belanger Creek Diversion to Cypress Lake	Cypress Lake East Outflow Gate	Net Belanger Creek Diversion	Cypress Lake Natural Overflow computed	Gross Depletion at Cypress Lake	Adjustment for Channel Losses to International Boundary computed	Net Depletion at Cypress Lake
Mar. 1 - 10	0	0	0	0	0	0	0
Mar. 11 - 20	0	2	- 2	0	- 2	- 2	0
Mar. 21 - 31	2	9	- 7	0	- 7	- 7	0
Apr. 1 - 10	349	24	+ 325	0	+ 325	+ 92	+ 233
Apr. 11 - 20	628	93	+ 535	0	+ 535	+ 146	+ 389
Apr. 21 - 30	183	36	+ 147	0	+ 147	+ 76	+ 71
May 1 - 10	10	14	- 4	0	- 4	- 4	0
May 11 - 20	13	11	+ 2	0	+ 2	+ 2	0
May 21 - 31	0	12	- 12	0	- 12	- 12	0
June 1- 10	0	13	- 13	0	- 13	- 13	0
June 11- 20	0	14	- 14	0	- 14	- 14	0
June 21- 30	0	56	- 56	0	- 56	- 56	0
July 1- 10	0	15	- 15	0	- 15	- 15	0
July 11- 20	0	5	- 5	0	- 5	- 5	0
July 21- 31	0	24	- 24	0	- 24	- 24	0
Aug. 1- 10	0	3	- 3	0	- 3	- 3	0
Aug. 11- 20	0	0	0	0	0	0	0
Aug. 21- 31	0	0	0	0	0	0	0
Sept. 1- 10	0	0	0	0	0	0	0
Sept. 11- 20	0	0	0	0	0	0	0
Sept. 21- 30	0	0	0	0	0	0	0
Oct. 1- 10	0	0	0	0	0	0	0
Oct. 11- 20	0	0	0	0	0	0	0
Oct. 21- 31	0	10	- 10	0	- 10	- 10	0
Total	1,185	341	+ 844	0	+ 844	+ 151	+ 693
Acre-feet	2,350	676	+1,674	0	+1,674	+ 300	+1,375

DETERMINATION OF NATURAL FLOW OF
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY
1962

East End Reservoir Storage and Diversion
Quantities in c.f.s.-days

Period at International Boundary	East End Reservoir		East End Canal	Return Flow from East End District	Gross Depletion at East End	Adjustment for Channel Losses to International Boundary	Net Depletion at East End
	Stored	Released		computed		computed	
Mar. 1 - 10		2	0	0	- 2	- 2	0
Mar.11 - 20	1		0	0	+ 1	+ 1	0
Mar.21 - 31	13		0	0	+ 13	+ 13	0
Apr. 1 - 10	869		0	0	+ 869	+ 132	+ 737
Apr.11 - 20	166		38	8	+ 196	+ 72	+ 124
Apr.21 - 30	21		180	36	+ 165	+ 67	+ 98
May 1 - 10	31		252	50	+ 233	+ 77	+ 156
May 11 - 20		66	239	48	+ 125	+ 69	+ 56
May 21 - 31		95	321	64	+ 162	+ 82	+ 80
June 1- 10		129	327	66	+ 132	+ 70	+ 62
June 11- 20		8	201	40	+ 153	+ 91	+ 62
June 21- 30	164		2	0	+ 166	+ 96	+ 70
July 1- 10		9	17	3	+ 5	+ 5	0
July 11- 20		64	143	29	+ 50	+ 50	0
July 21- 31	209		20	4	+ 225	+ 123	+ 102
Aug. 1- 10	13		0	0	+ 13	+ 13	0
Aug. 11- 20		95	118	24	- 1	- 1	0
Aug. 21- 31		259	287	57	- 29	- 29	0
Sept. 1- 10		74	93	19	0	0	0
Sept.11- 20		82	0	0	- 82	- 58	- 24
Sept.21- 30		177	0	0	- 177	- 82	- 95
Oct. 1- 10		66	0	0	- 66	- 54	- 12
Oct. 11- 20	11		0	0	+ 11	+ 11	0
Oct. 21- 31		1	0	0	- 1	- 1	0
Total	1,498	1,127	2,238	448	+2,161	+ 745	+1,416
Acre-feet	2,971	2,235	4,439	889	+4,286	+1,478	+2,809

DETERMINATION OF NATURAL FLOW OF
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY
1962

Val Marie Storage
Quantities in c.f.s.-days

Period at International Boundary	Val Marie West Reservoir		Val Marie Reservoir		Total Change in Reservoir Contents at Val Marie	
	Stored	Released	Stored	Released	Stored	Released
Mar. 1 - 10	-	-	-	-	-	-
Mar. 11 - 20	-	-	-	-	-	-
Mar. 21 - 31	231	-	910	-	1,141	-
Apr. 1 - 10	1,359	-	1,766	-	3,125	-
Apr. 11 - 20	26	-	2,293	-	2,319	-
Apr. 21 - 30	99	-	-	65	34	-
May 1 - 10	24	-	-	333	-	309
May 11 - 20	-	58	-	1,018	-	1,076
May 21 - 31	-	424	-	422	-	846
June 1- 10	-	203	-	303	-	506
June 11- 20	267	-	129	-	396	-
June 21- 30	406	-	-	89	317	-
July 1- 10	2	-	-	195	-	193
July 11- 20	129	-	2,873	-	3,002	-
July 21- 31	66	-	-	269	-	203
Aug. 1- 10	58	-	1	-	59	-
Aug. 11- 20	-	88	-	109	-	197
Aug. 21- 31	-	151	-	256	-	407
Sept. 1- 10	-	78	-	111	-	189
Sept. 11- 20	-	178	66	-	-	112
Sept. 21- 30	-	176	160	-	-	16
Oct. 1- 10	-	192	97	-	-	95
Oct. 11- 20	93	-	-	75	18	-
Oct. 21- 31	-	16	-	43	-	59
Total	2,760	1,564	8,295	3,288	10,411	4,208
Acre-feet	5,474	3,102	16,453	6,522	20,650	8,346

DETERMINATION OF NATURAL FLOW OF
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY
1962

Diversion to Irrigated Lands
Quantities in c.f.s.-days

Period at International Boundary	Val Marie West Gravity Canal	Val Marie West Pumping Canal	Val Marie Main Canal	Electric Pumps	Total Canal Diversion at Val Marie	Return Flow from Val Marie Projects computed	Gross Depletion at Val Marie	Adjustment for Channel Losses to International Boundary computed	Net Depletion at Val Marie
Mar. 1 - 10	0	0	0	0	0	0	0	0	0
Mar. 11 - 20	0	0	0	0	0	0	0	0	0
Mar. 21 - 31	0	0	0	0	0	0	+ 1,141	+ 67	+ 1,074
Apr. 1 - 10	0	0	0	0	0	0	+ 3,125	+ 206	+ 2,919
Apr. 11 - 20	0	0	0	0	0	0	+ 2,319	+ 158	+ 2,161
Apr. 21 - 30	0	0	0	0	0	0	+ 34	+ 21	+ 13
May 1 - 10	0	0	0	8	8	2	- 303	- 48	- 255
May 11 - 20	36	38	535	32	641	128	- 563	- 74	- 489
May 21 - 31	213	240	601	34	1,088	217	+ 25	+ 22	+ 3
June 1 - 10	116	208	442	7	773	155	+ 112	+ 35	+ 77
June 11 - 20	28	5	183	18	234	47	+ 583	+ 110	+ 473
June 21 - 30	0	0	79	18	97	19	+ 395	+ 80	+ 315
July 1 - 10	0	0	230	7	237	47	- 3	- 3	0
July 11 - 20	30	0	317	6	353	71	+ 3,284	+ 542	+ 2,742
July 21 - 31	0	0	11	0	11	2	- 194	- 50	- 144
Aug. 1 - 10	0	0	1	0	1	0	+ 60	+ 26	+ 34
Aug. 11 - 20	0	0	80	7	87	17	- 127	- 37	- 90
Aug. 21 - 31	0	146	224	23	393	79	- 93	- 33	- 60
Sept. 1 - 10	27	6	57	18	108	22	- 103	- 28	- 75
Sept. 11 - 20	134	154	0	7	295	59	+ 124	+ 30	+ 94
Sept. 21 - 30	222	217	0	0	439	88	+ 335	+ 52	+ 283
Oct. 1 - 10	113	185	0	0	298	60	+ 143	+ 27	+ 116
Oct. 11 - 20	1	0	0	0	1	0	+ 19	+ 19	0
Oct. 21 - 31	0	0	0	0	0	0	- 59	- 24	- 35
Total	920	1,199	2,760	185	5,064	1,013	+10,254	1,098	9,156
Acre-feet	1,825	2,378	5,475	367	10,044	2,009	+20,339	2,178	18,161

DETERMINATION OF NATURAL FLOW OF
FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY
1962

Quantities in c.f.s.-days

Period at International Boundary	Net Depletion in Canada	Frenchman River at International Boundary	Apparent Natural Flow of Frenchman River at International Boundary	Adjustment for Minor Diversions in Canada	Frenchman River at International Boundary		
					Natural Flow	United States Share	Received in Excess of Share by U.S.A.
				computed			
Mar. 1 - 10	0	0	0	0	0	0	0
Mar. 11 - 20	0	12	12	0	12	6	6
Mar. 21 - 31	+ 1,074	2,381	3,455	104	3,559	1,780	601
Apr. 1 - 10	+ 3,889	3,354	7,243	217	7,460	3,730	- 376
Apr. 11 - 20	+ 2,674	376	3,050	92	3,142	1,571	- 1,195
Apr. 21 - 30	+ 182	512	694	21	715	358	154
May 1 - 10	- 99	403	304	9	313	156	247
May 11 - 20	- 433	623	190	6	196	98	525
May 21 - 31	+ 83	311	394	12	406	203	108
June 1 - 10	+ 139	232	371	11	382	191	41
June 11 - 20	+ 535	911	1,446	43	1,489	744	167
June 21 - 30	+ 385	44	429	13	442	221	- 177
July 1 - 10	0	125	125	4	129	64	61
July 11 - 20	+ 2,742	7,639	10,381	311	10,692	5,346	2,293
July 21 - 31	- 42	1,792	1,750	53	1,803	902	890
Aug. 1 - 10	+ 34	231	265	8	273	136	95
Aug. 11 - 20	- 90	127	37	1	38	19	108
Aug. 21 - 31	- 60	162	102	3	105	52	110
Sept. 1 - 10	- 75	72	0	0	0	0	72
Sept. 11 - 20	+ 70	18	88	3	91	46	- 28
Sept. 21 - 30	+ 188	2	190	6	196	98	- 96
Oct. 1 - 10	+ 104	1	105	3	108	54	- 53
Oct. 11 - 20	0	174	174	5	179	90	84
Oct. 21 - 31	- 35	217	182	5	187	94	123
Total	+11,265	19,719	30,987	930	31,917	15,959	3,760
Acre-feet	+22,344	39,112	61,462	1,845	63,306	31,654	7,458

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

- 1962 -

Map Index	Stream and Location	Remarks
	St. Mary River Basin	
5AE-27	St. Mary River at International Boundary	Int.[a]
5AE-0.5	Swiftcurrent Creek at Many Glacier, Montana	Int.[a]
5AE-0.9	Lake Sherburne at Sherburne, Montana	Int.R[a]
5AE-0.6	Swiftcurrent Creek at Sherburne, Montana	Int.[a]
5AE-0.2	St. Mary Canal at St. Mary Crossing, near Babb, Montana (United States St. Mary Canal at St. Mary Crossing)	Int.[a]
5AE-0.3	St. Mary Canal at Hudson Bay Divide, near Browning, Mont. (United States St. Mary Canal at Hudson Bay Divide)	Int.[a]
	Milk River Basin	
11AA-25	Milk River at Western Crossing of International Boundary	Int.[a]
11AA-5	Milk River at Milk River, Alberta	Int.[a]
11AA-0.2	Milk River at Eastern Crossing of International Boundary	Int.[a]
11AA-0.3	North Fork Milk River above St. Mary Canal, near Browning, Montana (North Fork Milk River above United States St. Mary Canal)	Int.[a]
11AA-1	North Milk River near International Boundary	Int.[a]
	Lodge Creek Tributary Basin	
11AB-83	Lodge Creek below McRae Creek at International Boundary (formerly below McRae Coulee at International Boundary)	Int.[a]
	Battle Creek Tributary Basin	
11AB-76	Battle Creek above Cypress Lake West Inflow Canal, Saskatchewan	Int.[a]
11AB-27	Battle Creek at International Boundary	Int.[a]

Map Index	Stream and Location	Remarks
	Battle Creek Tributary Basin	
11AB-0.1	Woodpile Coulee near International Boundary	Int.[a]
11AB-0.3	East Fork Battle Creek near International Boundary	Int.[a]
11AB-75	Lyons Creek at International Boundary (formerly Lyons Coulee at International Boundary)	Int.[a]
11AB-78	Cypress Lake West Inflow Canal	Int.[a]
11AB-77	Cypress Lake West Outflow Canal	Int.[a]
	Whitewater Creek Tributary Basin	
11AD-0.1	Whitewater Creek near International Boundary	Int.[a]
	Frenchman River Tributary Basin	
11AC-37	Cypress Lake, Saskatchewan	Int.R[a]
11AC-64	Belanger Creek Diversion to Cypress Lake	Int.[a]
11AC-60	Cypress Lake East Outflow Canal	Int.[a]
11AC-18	Frenchman River above Eastend Reservoir	Int.[a]
11AC-55	Eastend Reservoir at Eastend, Saskatchewan	Int.R[a]
11AC-52	Eastend Canal at Eastend, Saskatchewan	Int.[a]
11AC-1	Frenchman River below Eastend Reservoir	Int.[a]
11AC-63	Val Marie West Reservoir, Saskatchewan	Int.R[a]
11AC-65	Val Marie West Gravity Canal	Int.[a]
11AC-56	Val Marie Reservoir, Saskatchewan	Int.R[a]
11AC-54	Val Marie Main Canal	Int.[a]
11AC-41	Frenchman River at International Boundary	Int.[a]
	Rock Creek Tributary Basin	
11AE-0.6	Rock Creek below Horse Creek near International Boundary	Int.[a]
11AE-0.4	McEachern Creek at International Boundary	Int.[a]

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

- 1962 -

Map Index	Stream and Location	Remarks
	St. Mary River Basin	
175	St. Mary River near Babb, Montana	U.S.[c]
5AE-25	St. Mary Reservoir near Spring Coulee, Alberta	Canada R[a]
5AE-6	St. Mary River near Lethbridge, Alberta	Canada[c]
139	Grinnell Creek at Grinnell Glacier near Many Glacier, Montana	U.S.[c]
140	Grinnell Creek near Many Glacier, Montana	U.S.[c]
5AE-5	Rolph Creek near Kimball, Alberta	Canada[a]
5AE-2	Lee Creek at Cardston, Alberta	Canada[a]
5AE-26	Canadian St. Mary Canal near Spring Coulee, Alberta	Canada[a]
5AE-21	Magrath Irrigation District Canal near Spring Coulee, Alberta	Canada[a]
	Milk River Basin	
1322	South Fork Milk River near Babb, Montana	U.S.[c]
11AB-4	we have	
	Lodge Creek Tributary Basin	
11AB-82	Lodge Creek at Alberta Boundary	Canada[a]
11AB-89	Altawan Reservoir near Govenlock, Saskatchewan	Canada R[a]
11AB-88	Lodge Creek below Spangler Project	Canada[a]
11AB-60	Spangler Ditch near Govenlock, Saskatchewan	Canada[a]
11AB-9	Middle Creek near Alberta Boundary	Canada[a]
11AB-80	Middle Creek Reservoir	Canada R[a]
11AB-87	Middle Creek near Battle Creek	Canada[a]
11AB-86	Walburger Coulee below Diversions	Canada[a]
1460	North Chinook Canal near Havre, Montana	U.S.[b]

Map Index	Stream and Location	Remarks
	Battle Creek Tributary Basin	
11AB-81	Battle Creek at Ranger Station	Canada[c]
11AB-85	Cypress Lake West Inflow Canal Drain	Canada[a]
11AB-84	Vidora Ditch near Consul, Saskatchewan	Canada[a]
11AB-58	Richardson Ditch near Consul, Saskatchewan	Canada[a]
11AB-44	McKinnon Ditch near Consul, Saskatchewan	Canada[a]
11AB-18	Stirling and Nash Ditch near Consul, Saskatchewan	Canada[a]
1525	Matheson Canal near Chinook, Montana	U.S.[b]
	Frenchman River Tributary Basin	
11AC-51	Frenchman River below Val Marie, Saskatchewan	Canada[c]
11AC-66	Val Marie West Pumping Canal, Saskatchewan	Canada[a]
1645	Frenchman Canal near Saco, Montana	U.S.[b]

Int. - International Gauging Station.

Int.R - International Station on Reservoir.

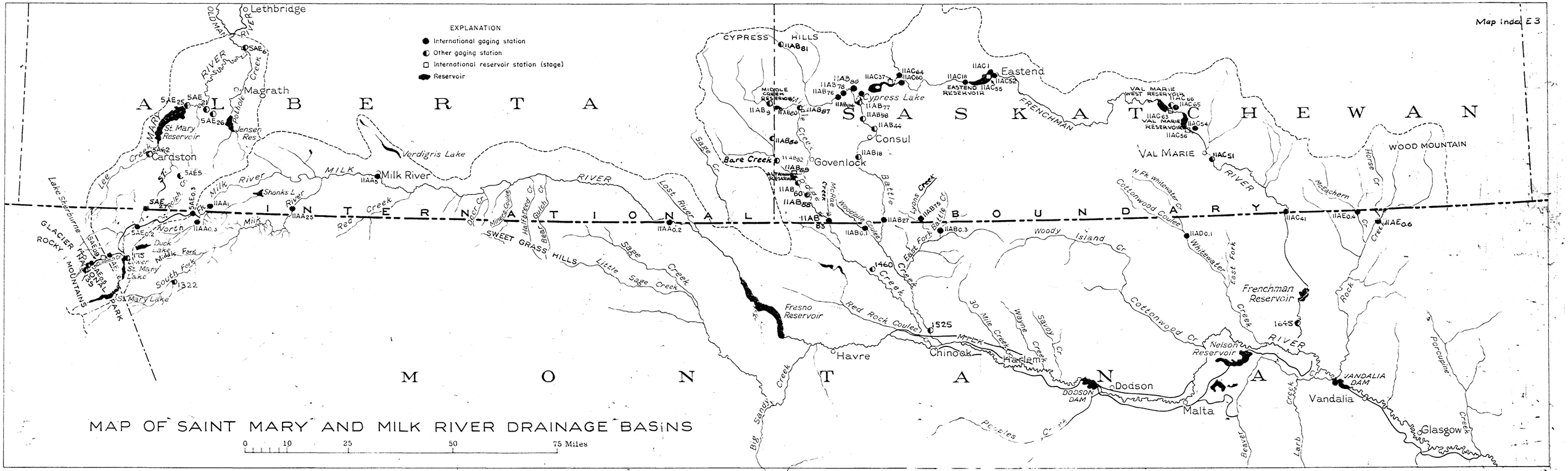
U.S. - Denotes operation by United States Geological Survey.

Canada - Denotes operation by Water Resources Branch, Canada.

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

b - Monthly Discharge data only tabulated in this report.

c - Data not included in this report or appendix.



MAP OF SAINT MARY AND MILK RIVER DRAINAGE BASINS

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