

Report to
THE INTERNATIONAL JOINT COMMISSION

on

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

by

E. F. DURRANT
representing Canada

and

J. S. CRAGWALL, Jr.
representing United States

1974

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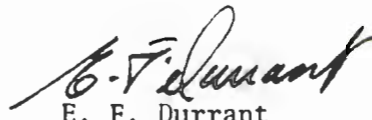
March 17, 1975

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

Gentlemen:

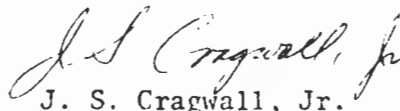
In compliance with the provisions of Clause VIII (c) of your Order of October 4, 1921, directing the division of the waters of St. Mary and Milk Rivers between the United States and Canada, we are transmitting herewith a report on the operations during the irrigation season ended October 31, 1974.

Respectfully submitted,



E. F. Durrant

Accredited Officer of Her Majesty



J. S. Cragwall, Jr.

Accredited Officer of the United States

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SYNOPSIS

During the 1974 irrigation season, the natural runoff of the St. Mary River, Milk River and the principal eastern tributaries of the Milk River were near normal, being 117, 81, and 94 percent of the long term natural runoff respectively.

The natural runoff of the St. Mary River was 689,000 acre-feet, of which Canada received 511,000 acre-feet, 109,000 acre-feet more than its allotment under the 1909 Boundary Waters Treaty.

The natural runoff of the Milk River was 94,600 acre-feet, of which the United States received almost the entire amount, 28,000 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 125,500 acre-feet, of which the United States received 85,400 acre-feet, 22,700 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 1974.

The prospect of different schedules for conversion to metric measurement in the United States and Canada was identified as a potential problem by the field representatives. They have recommended that the International Joint Commission give consideration to the preparation of a schedule for the metric conversion of their reports.

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. An additional twenty-eight gauging stations were operated by Canada 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 1974, 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 1974 are included in Appendix B.

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 1974 irrigation season the natural runoff of the St. Mary River, Milk River and the principal Eastern Tributaries of the Milk River was near normal, being 117% and 81% of the average long term natural flows for the St. Mary and Milk Rivers respectively. The corresponding values for the Eastern Tributaries were 67% for Lodge Creek, 69% for Battle Creek and 114% for the Frenchman River. The flow across the boundary 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 1974 irrigation season.

The annual conference between the staffs of the field officers was held in Calgary, Alberta, on January 28-30, 1975. 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 1975 adopted.

A number of recommendations on changes in the natural flow computational procedures were prepared by representatives of both countries based on the report entitled "Frenchman River Hydrology Study" by Environment Canada. These recommendations were considered at the January 28-30, 1975 meeting of the field representatives and the following changes will be incorporated into the 1975 natural flow computations for the St. Mary River, Milk River and Eastern Tributaries.

1. Use 25% return flow from major irrigation diversions, with some discretion being left to the field representatives to vary this percentage according to season, moisture conditions and irrigation operational practices.

2. Amend the Cypress Lake Natural Overflow computations to apply evaporation losses to the natural lake area rather than to the new reservoir area.
3. Observation of evaporation pan water-level change, which is equal to pan evaporation minus precipitation, will be used as a measure of reservoir evaporation and adjusted by a coefficient of 0.7. This method will be used for all reservoir computations in the area of jurisdiction.

The prospect of different schedules for metric conversion in Canada and the United States was identified as a potential problem. Canada is in the process of conversion, with hydrometric data for 1975 to be published in metric units. Conversion of field activities is scheduled to start in 1976 which would result in complications at International Gauging Stations visited by both countries. The field representatives feel that the data collection problems can be resolved, but recommend strongly that the International Joint Commission give consideration to a schedule for conversion to metric units for IJC reports. Such a schedule would enable the field representatives to take those steps necessary to convert computations and data processing systems to meet the IJC requirements.

ST. MARY RIVER

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

To comply with the above order, field engineers of both countries made semi-monthly computations of the daily natural flow of St. Mary River during the 1974 irrigation season. Regular interim reports of these computations were sent to all agencies involved in the water use and distribution of the flow of the St. Mary River in order to keep them informed as to the amount of water available as well as to ensure that any appropriation by the United States in excess of her share could be adjusted by a subsequent delivery of an equivalent amount at the earliest opportunity.

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

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

passing through Canada, for irrigation in the lower Milk River valley. Storage in Lake Sherburne was 12,000 acre-feet on October 31, 1973, and had increased to 39,800 acre-feet just prior to the irrigation season on March 31, 1974. The storage reached a maximum of 66,500 acre-feet on July 2, and had declined to 10,200 acre-feet by the end of the irrigation season on October 31.

Water was diverted from the St. Mary River into the St. Mary Canal from March 17 to 22 and March 26 to September 30. The diversion in early March did not reach the North Milk River until March 27th because of snow-banks and ice formation during cold periods.

March is considered to be in the non-irrigation season and, therefore, the diversion for this month was computed on an equal share basis. An excess delivery to Canada of 4,680 acre-feet was recorded at the International Boundary in March. The total recorded flow past the gauging station on the St. Mary Canal at St. Mary Crossing was 206,000 acre-feet. Any seepage from the canal between the point of diversion and the crossing of the St. Mary River is assumed to return to the river and eventually become available to Canada.

The total natural flow of the St. Mary River at the International Boundary for the period November 1, 1973 to October 31, 1974 was 795,000 acre-feet, of which 689,000 acre-feet occurred during the irrigation season, April 1 to October 31, 1974. For the irrigation season the Canadian and United States shares were 402,000 acre-feet and 287,000 acre-feet respectively. The United States used 178,000 acre-feet or 62 percent of her share. In addition, the United States used 2,100 acre-feet during March. No problems

were encountered in the apportionment of natural flow. The computed natural flow during the irrigation season was 117 percent of the average of the previous seventy-one 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-third annual international snow survey was conducted on April 30 and May 1, 1974. The 1974 snowpack water equivalent was much above normal, being 155% of the average for the previous 52 years. Based on the snow survey results, personnel of the United States Geological Survey prepared forecasts of runoff at three sites in the basin with the predicted runoff being 132% of normal. Actual runoff was 117% 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 - 1974

Quantities in Acre-Feet

Month	St. Mary River at International Boundary				Excess Rec'd by Canada	Storage Lake Sherburne	Total Available for Diversion	Canal at St. Mary Crossing	Milk * River at Eastern Crossing
	Recorded Flow	Natural Flow	U.S. Share	Canada Share					
April	25,091	32,803	10,126	22,677	2,414	-19,490	29,616	27,202	43,360
May	79,739	123,098	51,293	71,805	7,934	9,787	41,506	33,573	62,780
June	201,345	271,174	125,659	145,516	55,830	35,364	90,295	34,465	42,380
July	116,154	158,952	69,220	89,732	26,422	522	68,698	42,276	45,710
August	46,456	59,660	19,579	40,081	6,375	-26,474	46,053	39,678	41,200
Sept.	31,732	30,209	7,599	22,610	9,122	-29,875	37,474	28,352	35,530
Oct.	10,703	13,103	3,275	9,828	875	2,400	875	0	4,490
Total Irrig. Season	511,220	688,999	286,751	402,249	108,972	-27,766	314,517	205,546	275,450
Period Nov. to Oct.	588,348	794,804	339,653	455,152					

Mean Flow for 15 Day Periods in CFS

Division Period at International Boundary	Natural Flow (cfs)	Canada's Share (cfs)	Received by Canada (cfs)	Received by Canada	
				Above Share (cfs)	Below Share (cfs)
April 1 - April 15	4,014	3,011	3,829	818	
April 16 - April 30	12,524	8,422	8,821	399	
May 1 - May 15	31,531	18,267	22,210	3,943	
May 16 - May 31	30,530	17,934	17,991	57	
June 1 - June 15	51,669	28,335	32,430	4,095	
June 16 - June 30	85,046	45,028	69,080	24,052	
July 1 - July 15	46,273	25,638	35,330	9,692	
July 16 - July 31	33,864	19,601	23,230	3,629	
Aug. 1 - Aug. 15	18,269	11,636	12,637	1,001	
Aug. 16 - Aug. 31	11,809	8,571	10,784	2,213	
Sept. 1 - Sept. 15	8,110	6,079	7,263	1,184	
Sept. 16 - Sept. 30	7,120	5,320	8,735	3,415	
Oct. 1 - Oct. 15	4,089	3,067	3,312	245	
Oct. 16 - Oct. 31	2,517	1,888	2,084	196	

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

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, except for a few small unmeasured diversions above the eastern crossing of the International Boundary, the entire natural flow of the Milk River was delivered to the United States.

The computed natural flow of the Milk River at its eastern crossing of the International Boundary during the period March 1 to October 31, 1974, was 94,600 acre-feet. This is 81 percent of the average natural flow of the previous sixty-two years of record. The United States and Canadian shares were 66,600 acre-feet and 28,000 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 1974 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.

A miscellaneous suspended sediment program was conducted at a number of the Milk River gauging stations during the 1974 irrigation season. This program is to be continued in 1975.

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 in April in the Lodge Creek, Battle Creek, and Frenchman River did not create a significant problem this year since runoff was near 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, 1974 was 141,600 acre-feet, or 107 percent of the average of the previous forty-seven years. The quantities delivered to the United States by the various tributaries are listed in Table 2 on Page 13 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 1974
 (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.	956	1,700	828	1,330	594	5,600	6,050	3,010	2,560
Apr.	4,380	2,990	792	408	764	1,160	25,300	19,450	9,900
May	4,810	3,740	1,260	1,420	749	416	19,700	2,600	1,540
June	1,120	2,090	2	1	5	35	6,820	494	70
July	59	633	0	0	0	3	1,170	326	12
Aug.	436	785	0	0	0	5	1,750	404	126
Sept.	1	89	0	0	0	4	1	80	0
Oct.	0	326	0	0	0	5	517	181	0
TOTAL	11,762	12,353	2,882	3,159	2,112	7,228	61,308	26,545	14,208
Total - Milk River Eastern Tributaries - 141,557									

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 flow and reported usage for the same year. Natural flow

for the forthcoming year is estimated based on the results of snow surveys conducted about March 1 and the minor diversions for the year are estimated as a percentage of natural flow from the correlation relationship. 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. If the forecast flow is obviously incorrect, an adjustment may be made in mid-season. A list of reported and estimated diversions for 1974 are contained in Appendix B.

The twenty-second annual Cypress Hills Snow Survey in the basins of Lodge Creek, Battle Creek and Frenchman River was conducted by the Water Survey of Canada during the period February 26 to March 6, 1974. The 1974 water equivalent of the snowpack was about normal, being 103 percent of the twenty-two year average.

The return flows from the Vidora, Richardson and McKinnon projects on Battle Creek were considerably 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 32.0 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 234 acre-feet or 8.9 percent of the 2,618 acre-feet diverted. The actual values of return flow were used in the computation of natural flow.

A supplementary gauging station was operated during 1974 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 586 acre-feet was recorded at this station during 1974.

Canada carried out upgrading during 1974 of the gauging station on Battle Creek at the International Boundary with the construction of a rock measuring weir and a new larger shelter to house a Leupold & Stevens Memomark and ERTS platform satellite communications system. Data from this gauging station will be available daily via Telex from the satellite tracking station. Delays in delivery of some ERTS components prevented placing this satellite communications system in operation during the 1974 season.

A revised method of computing evaporation, as described on page 4 and used on a trial basis at Middle Creek Reservoir, has eliminated most of the small apparent deficits that would have occurred late in the season if the former years' method of computing evaporation from this reservoir had been used. Further study of indirect methods of determining reservoir evaporation will be carried out during 1975 by Atmospheric Environment Service at Val Marie Main Reservoir.

LODGE CREEK

The computed natural runoff of Lodge Creek at the International Boundary for the period March 1 to October 31, 1974, was 21,900 acre-feet or 67 percent of the average natural runoff of the previous twenty-four years of record. Each country was entitled to 10,950 acre-feet, which is 50 percent of the natural runoff. A total runoff of 11,800 acre-feet was recorded at the International Boundary which is 108 percent of the United States share.

Deficit deliveries to the U.S.A. were recorded in five of the twenty-four division periods during the season. All deficits were refunded within 30 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
1974

Division Period at International Boundary	Natural Flow cfs days	U.S.A. Share cfs days	Received by U.S.A. cfs days	Received by U.S.A.	
				Above Share cfs days	Below Share cfs days
Mar. 1 - Mar. 10	4	2	4	2	
Mar. 11 - Mar. 20	47	24	47	23	
Mar. 21 - Mar. 31	475	238	431	193	
Apr. 1 - Apr. 10	2,357	1,178	650		528
Apr. 11 - Apr. 20	2,424	1,212	764		448
Apr. 21 - Apr. 30	1,150	575	792	217	
May 1 - May 10	418	209	659	450	
May 11 - May 20	1,022	511	639	128	
May 21 - May 31	2,503	1,252	1,129		123
June 1 - June 10	521	260	472	212	
June 11 - June 20	21	10	59	49	
June 21 - June 30	32	16	32	16	
July 1 - July 10	0	0	27	27	
July 11 - July 20	12	6	3		3
July 21 - July 31	4	2	0		2
Aug. 1 - Aug. 10	0	0	95	95	
Aug. 11 - Aug. 20	0	0	81	81	
Aug. 21 - Aug. 31	38	19	44	25	
Sept. 1 - Sept. 10	0	0	0	0	
Sept. 11 - Sept. 20	0	0	0	0	
Sept. 21 - Sept. 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	11,028	5,514	5,928		
- acre feet	21,874	10,937	11,758		

BATTLE CREEK

The computed natural runoff of Battle Creek at the International Boundary for the period March 1 to October 31, 1974, was 19,200 acre-feet or 69 percent of the average natural runoff of the previous thirty-four years of record. Each country was entitled to 9,600 acre-feet, which is 50 percent of the natural runoff. A total runoff of 12,400 acre-feet was recorded at the International Boundary which is 129 percent of the United States share.

Deficit deliveries were recorded in six division periods during the season of which three deficit periods during April totalled 1,420 acre-feet. In consideration of a request from the Battle Creek Water Users' 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 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
1974

Division Period at International Boundary	Natural Flow cfs days	U.S.A. Share cfs days	Received by U.S.A. cfs days	Received by U.S.A.-----	
				Above Share cfs days	Below Share cfs days
Mar. 1 - Mar. 14	38	19	34	15	
Mar. 15 - Mar. 25	65	32	58	26	
Mar. 26 - Apr. 4	1,950	975	1,709	734	
Apr. 5 - Apr. 14	1,530	765	481		284
Apr. 15 - Apr. 24	524	262	47		215
Apr. 25 - May 4	547	274	59		215
May 5 - May 14	384	192	408	216	
May 15 - May 25	1,471	735	1,174	439	
May 26 - June 4	1,748	874	553		321
June 5 - June 14	626	313	232		81
June 15 - June 24	0	0	211	211	
June 25 - July 4	31	16	441	425	
July 5 - July 14	152	76	136	60	
July 15 - July 25	143	72	58		14
July 26 - Aug. 4	0	0	140	140	
Aug. 5 - Aug. 14	137	68	172	104	
Aug. 15 - Aug. 25	89	44	80	36	
Aug. 26 - Sept. 4	42	21	38	17	
Sept. 5 - Sept. 14	23	12	21	9	
Sept. 15 - Sept. 24	9	4	8	4	
Sept. 25 - Oct. 4	10	5	9	4	
Oct. 5 - Oct. 14	35	18	31	13	
Oct. 15 - Oct. 25	82	41	73	32	
Oct. 26 - Oct. 31	60	30	54	24	
TOTAL - cfs days	9,696	4,848	6,227		
- acre feet	19,232	9,616	12,351		

FRENCHMAN RIVER

The computed natural runoff of the Frenchman River at the International Boundary for the period March 1 to October 31, 1974, was 84,400 acre-feet or 114 percent of the average natural runoff of the previous thirty-four years of record. Each country was entitled to 42,200 acre-feet, which is 50 percent of the natural runoff. A total runoff of 61,300 acre-feet was recorded at the International Boundary which is 145 percent of the United States share.

Deficit deliveries were recorded in nine division periods during the season. A request was made to release water from Val Marie Reservoir during the first period of October to refund the 350 acre-foot deficit which had accumulated since the last period of August. A 65 acre-foot deficit was recorded in the last two division periods of the season.

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
1974

Division Period at International Boundary	Natural Flow cfs days	U.S.A. Share cfs days	Received by U.S.A. cfs days	Received by U.S.A.	
				Above Share cfs days	Below Share cfs days
Mar. 1 - Mar. 10	395	198	337	139	
Mar. 11 - Mar. 20	1,180	590	877	287	
Mar. 21 - Mar. 31	2,368	1,184	1,837	653	
Apr. 1 - Apr. 10	12,700	6,350	9,376	3,026	
Apr. 11 - Apr. 20	5,747	2,874	2,514		360
Apr. 21 - Apr. 30	2,697	1,348	877		471
May 1 - May 10	1,816	908	1,639	731	
May 11 - May 20	950	475	1,327	852	
May 21 - May 31	7,588	3,794	6,951	3,157	
June 1 - June 10	2,705	1,352	2,320	968	
June 11 - June 20	814	407	559	152	
June 21 - June 30	663	332	557	225	
July 1 - July 10	413	206	301	95	
July 11 - July 20	350	175	43		132
July 21 - July 31	312	156	248	92	
Aug. 1 - Aug. 10	248	124	338	214	
Aug. 11 - Aug. 20	937	468	509	41	
Aug. 21 - Aug. 31	271	136	36		100
Sept. 1 - Sept. 10	86	43	0		43
Sept. 11 - Sept. 20	56	28	0		28
Sept. 21 - Sept. 30	13	6	0		6
Oct. 1 - Oct. 10	58	29	201	172	
Oct. 11 - Oct. 20	78	39	7		32
Oct. 21 - Oct. 31	106	53	52		1
TOTAL - cfs days	42,551	21,275	30,906		
- acre-feet	84,400	42,199	61,302		

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 1974.

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. Also included are the month-end contents of seven international reservoir stations operated jointly by the United States and Canada, and nine reservoir 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.

GAUGING STATIONS OPERATED JOINTLY
BY
CANADA AND UNITED STATES
ST. MARY AND MILK RIVER DRAINAGE BASINS
- 1974 -

Map Index	Stream and Location	Remarks
<u>ST. MARY RIVER BASIN</u>		
05AE027	St. Mary River at International Boundary	Int. a
05AE036	Lake Sherburne at Sherburne, Montana	Int. R ^a
05AE033	Swiftcurrent Creek at Sherburne, Montana	Int. a
05AE029	St. Mary Canal at St. Mary Crossing near Babb, Montana	Int. a
<u>MILK RIVER BASIN</u>		
11AA025	Milk River at Western Crossing of International Boundary	Int. a
11AA005	Milk River at Milk River	Int. a
11AA031	Milk River at Eastern Crossing of International Boundary	Int. a
11AA033	South Fork Milk River near Babb, Montana	Int. a
11AA032	North Fork Milk River above St. Mary Canal near Browning, Mt.	Int. a
11AA001	North Milk River near International Boundary	Int. a
<u>LODGE CREEK TRIBUTARY BASIN</u>		
11AB089	Altawan Reservoir near Govenlock	Int. R ^a
11AB083	Lodge Creek below McRae Creek at International Boundary	Int. a
11AB086	Walburger Coulee below Diversions	Int. a
11AB060	Spangler Ditch near Govenlock	Int. a
11AB009	Middle Creek near Alberta Boundary	Int. a
11AB080	Middle Creek Reservoir	Int. R ^a
11AB001	Middle Creek below Middle Creek Reservoir	Int. a

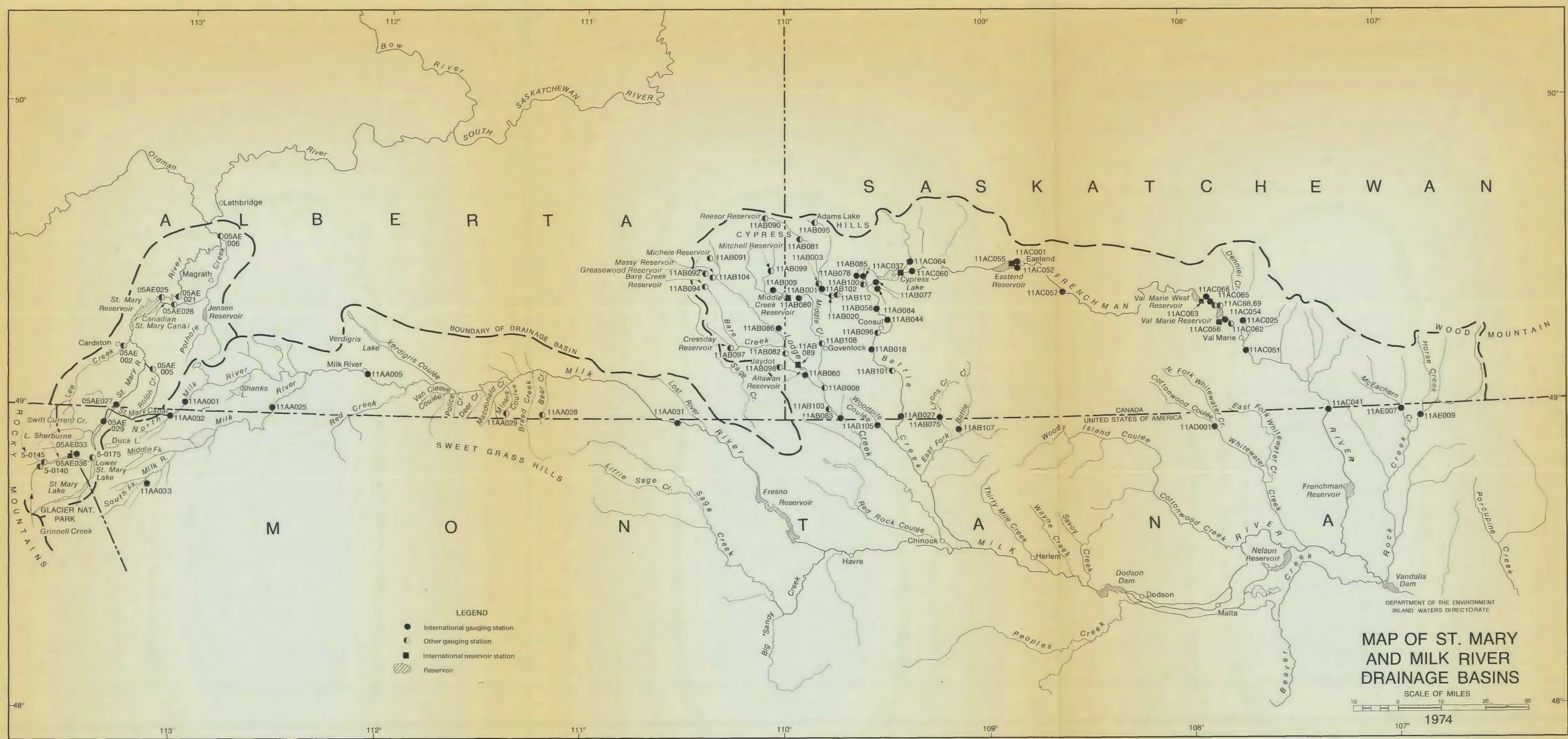
Map Index	Stream and Location	Remarks
<u>BATTLE CREEK TRIBUTARY BASIN</u>		
11AB027	Battle Creek at International Boundary	Int. a
11AB102	Gaff Ditch near Merryflat	Int. a
11AB078	Cypress Lake West Inflow Canal	Int. a
11AB085	Cypress Lake West Inflow Canal Drain	Int. a
11AB077	Cypress Lake West Outflow Canal	Int. a
11AB084	Vidora Ditch near Consul	Int. a
11AB058	Richardson Ditch near Consul	Int. a
11AB044	McKinnon Ditch near Consul	Int. a
11AB018	Nashlyn Canal near Consul	Int. a
11AB105	Woodpile Coulee near International Boundary	Int. a
11AB107	East Fork Battle Creek near International Boundary	Int. a
11AB075	Lyons Creek at International Boundary	Int. a
<u>WHITEWATER CREEK TRIBUTARY BASIN</u>		
11AD001	Whitewater Creek near International Boundary	Int. a
<u>FRENCHMAN RIVER TRIBUTARY BASIN</u>		
11AC055	Eastend Reservoir	Int. R ^a
11AC001	Frenchman River below Eastend Reservoir	Int. a
11AC057	Frenchman River below Eastend Irrigation Project	Int. a
11AC063	Val Marie West Reservoir	Int. R ^a
11AC056	Val Marie Reservoir	Int. R ^a
11AC051	Frenchman River below Val Marie	Int. a
11AC041	Frenchman River at International Boundary	Int. a
11AC060	Cypress Lake East Outflow Canal	Int. a
11AC037	Cypress Lake	Int. R ^a
11AC064	Belanger Creek Diversion to Cypress Lake	Int. a
11AC052	Eastend Canal	Int. a
11AC066	Val Marie West Pumping Canal	Int. a
11AC065	Val Marie West Gravity Canal	Int. a
11AC054	Val Marie Main Canal	Int. a
11AC025	Denniel Creek near Val Marie	Int. a

Map Index	Stream and Location	Remarks
<u>ROCK CREEK TRIBUTARY BASIN</u>		
11AE009	Rock Creek below Horse Creek near International Boundary	Int. ^a
11AE007	McEachern Creek at International Boundary	Int. ^a
<u>GAUGING STATIONS OPERATED INDEPENDENTLY</u>		
<u>BY EITHER</u>		
<u>CANADA OR UNITED STATES</u>		
<u>IN THE</u>		
<u>ST. MARY AND MILK RIVER DRAINAGE BASINS</u>		
<u>ST. MARY RIVER BASIN</u>		
5-0175	St. Mary River near Babb, Montana	U.S.A. ^C
05AE025	St. Mary Reservoir near Spring Coulee	Canada ^{R^C}
05AE006	St. Mary River near Lethbridge	Canada ^C
5-0140	Grinnell Creek near Many Glacier, Montana	U.S.A. ^C
5-0145	Swiftcurrent Creek at Many Glacier, Montana	U.S.A. ^C
05AE005	Rolph Creek near Kimball	Canada ^C
05AE002	Lee Creek at Cardston	Canada ^C
05AE026	Canadian St. Mary Canal near Spring Coulee	Canada ^C
05AE021	Magrath Irrigation District Canal near Spring Coulee	Canada ^C
<u>MILK RIVER BASIN - SOUTHERN TRIBUTARIES</u>		
11AA029	Miners Coulee near International Boundary	Canada ^C
11AA028	Bear Creek near International Boundary	Canada ^C
<u>LODGE CREEK TRIBUTARY BASIN</u>		
11AB082	Lodge Creek at Alberta Boundary	Canada ^C
11AB091	Michele Reservoir near Elkwater	Canada ^{R^a}
11AB092	Greasewood Reservoir near Elkwater	Canada ^{R^a}
11AB104	Massy Reservoir near Elkwater	Canada ^{R^a}
11AB094	Bare Creek Reservoir near Elkwater	Canada ^{R^a}
11AB097	Cressday Reservoir near Cressday	Canada ^{R^a}
11AB098	Jaydot Reservoir near Jaydot	Canada ^{R^a}
11AB099	Mitchell Reservoir near Elkwater	Canada ^{R^a}

Map Index	Stream and Location	Remarks
11AB113	Middle Creek Reservoir Main Outlet	Canada a*
11AB114	Middle Creek Reservoir Bedford Outlet	Canada a*
11AB115	Middle Creek Reservoir Flood Spillway	Canada a*
11AB108	Middle Creek near Govenlock	Canada c
11AB008	Middle Creek above Lodge Creek	Canada c
11AB103	Squaw Coulee near Willow Creek	Canada a
<u>BATTLE CREEK TRIBUTARY BASIN</u>		
11AB081	Battle Creek at Ranger Station	Canada c
11AB003	Battle Creek above Gaff Ditch	Canada c
11AB112	Battle Creek below Gaff Ditch	Canada c
11AB100	Battle Creek above Cypress Lake West Outflow Canal	Canada c
11AB096	Battle Creek near Consul	Canada c
11AB101	Battle Creek below Nashlyn Project	Canada c
11AB095	Adams Lake	Canada R ^a
11AB090	Reesor Reservoir	Canada R ^a
11AB020	Shepherd Ditch near Consul	Canada c
<u>FRENCHMAN RIVER TRIBUTARY BASIN</u>		
11AC062	Frenchman River below Val Marie Reservoir	Canada c
11AC068	Val Marie Electric Pump No. 1	Canada a
11AC069	Val Marie Electric Pump No. 2	Canada a

SYMBOL CODE

- Int. - International Gauging Station
- Int. R - International Station on Reservoir
- U.S.A. - Operation by United States Geological Survey
- Canada - Operation by Water Survey of Canada
- a - Monthly and daily discharge data or reservoir contents contained in Appendix B
- c - Data not included in this report or appendices
- * - Same location as 11AB080



- LEGEND
- International gauging station
 - ◐ Other gauging station
 - International reservoir station
 - ▨ Reservoir

MAP OF ST. MARY
AND MILK RIVER
DRAINAGE BASINS

SCALE OF MILES

10 0 10 20 30

1974

HD
1694
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1974

Report to the International Joint
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of the waters of the St. Mary and
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