

Report to

THE INTERNATIONAL JOINT COMMISSION

On

THE DIVISION OF THE WATERS OF

THE ST. MARY AND MILK RIVERS

2016



Cover Photo:

Lake Sherburn Intake Tower and Glacier National Park

Photograph by Helena Field office, USGS

REPORT TO
THE INTERNATIONAL JOINT COMMISSION
ON
THE DIVISION OF THE WATERS OF
THE ST. MARY AND MILK RIVERS
FOR THE YEAR 2016

Submitted By

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Representing Canada

And

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Representing the United States

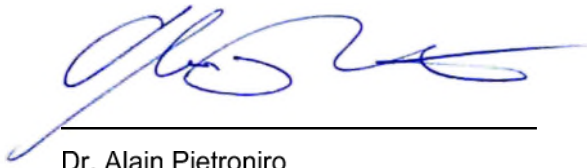
May 14, 2020

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


Commissioners:

In compliance with the provisions of Article VI of the Boundary Waters Treaty of 1909 and Clause VIII(c) of your Order of October 4, 1921, directing the division of the waters of the 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, 2016.

Respectfully submitted,



Dr. Alain Pietroniro
Accredited Officer of Her Majesty

 JOHN KILPATRICK
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John M Kilpatrick
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SYNOPSIS

During the 2016 irrigation season, the natural flow of the St. Mary River was 88 percent of the long-term average.

The natural flow of the St. Mary River at the International Boundary during the irrigation season, April 1 to October 31, 2016, was 624 700 cubic decametres (dam³) (506,400 acre-feet). Under the terms of the Boundary Waters Treaty, the Canadian allotment was 392 000 dam³ (317,800 acre-feet). The total flow recorded at the International Boundary during the irrigation season was 113 percent of the Canadian allotment.

The natural flow of the Milk River during the 2016 irrigation season was 27 percent of the long-term average.

The natural flow of the Milk River at the Eastern Crossing of the International Boundary from March 1 to October 31, 2016, was 37 150 dam³ (30,120 acre-feet). Under terms of the Treaty, the United States' allotment was 26 490 dam³ (21,480 acre-feet). The United States received 121 percent of its allotment at Eastern Crossing, in addition to its share of St. Mary River water diverted into the Milk River through the St. Mary Canal.

The March to October natural flows of the three apportioned tributaries of the Milk River were 11 percent of the long-term average for Lodge Creek at the International Boundary, 51 percent for Battle Creek at the International Boundary, and 77 percent for Frenchman River at the International Boundary. The total flow recorded at the International Boundary during the irrigation season for Lodge Creek, Battle Creek, and Frenchman River was 69 percent, 112 percent, and 165 percent, respectively, of the United States allotment.

The annual meeting of the Field Representatives was held via teleconference on February 15, 2017. Mutual problems, future plans, and changes in computational procedures were discussed and a schedule of field operations for 2017 was adopted.

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Map of St. Mary and Milk River Drainage Basins

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INTRODUCTION

The apportionment of the waters of the St. Mary and Milk Rivers is governed by Article VI of the Boundary Waters Treaty of 1909 between Great Britain and the United States. The terms of the Treaty were further clarified by the 1921 Order of the International Joint Commission. A copy of the 1921 Order, including Article VI, is contained in Annex A of this report.

To comply with this Treaty, staff of the United States Geological Survey and Environment and Climate Change Canada, National Hydrological Services/Water Survey of Canada collected, compiled, verified, and tabulated hydrometric data at 35 international gauging stations on a cooperative basis, under the direction of the Field Representatives of the United States and Canada. An additional 72 gauging stations were operated independently by the United States and Canada in the St. Mary and Milk River basins. Several of these stations were operated to obtain data on diversions, reservoir contents, return flows and index runoff which was used to improve the accuracy of natural-flow computations.

This report summarizes the year 2016 natural-flow computations, apportionment of the natural flow, unusual occurrences during the year, and procedural modifications designed to increase the accuracy of the natural-flow computations. Summary natural-flow tables are included. Detailed natural-flow computations are included in Appendix A. Daily discharge and other related data are included in Appendix B. Appendices A and B are submitted with this report under separate cover.

In accordance with the International System of Units (SI) conversion schedule adopted by the International Joint Commission, this report uses SI units first, followed by inch-pound units in parentheses. Data in tables are shown in SI units first, followed by the respective inch-pound units (for example, Tables 1 and 1A). The format for Appendices A and B of the report is SI units only. All Canadian data are collected, computed and published in SI units. The United States' data, which are collected and computed in inch-pound units, were converted to SI units using the appropriate conversion factors. A summary of the conversion factors is contained in Annex D.

Dr. Alain Pietroniro, as the Accredited Officer of Her Majesty, was represented in the field by Mr. Jeffrey Woodward, National Hydrological Services/Water Survey of Canada, Regina, Saskatchewan. Dr. Richard C. Ferrero, as the Accredited Officer of the United States, was represented in the field by Mr. John M. Kilpatrick, United States Geological Survey, Helena, Montana. This report was prepared jointly by personnel of Environment and Climate Change Canada, National Hydrological Services/Water Survey of Canada, and the United States Geological Survey, under the supervision of Messrs. Woodward and Kilpatrick.

The annual meeting of the Field Representatives was held via teleconference on February 15, 2017. Mutual concerns, future plans, and changes in computational procedures were discussed and a schedule of field operations for 2017 was adopted.

ST. MARY RIVER

During the irrigation season, April 1 to October 31, Canada's share of the natural flow of the St. Mary River at the International Boundary, as stipulated by the 1921 Order, is three-fourths of the natural flow when that flow is 666 cubic feet per second (18.86 cubic metres per second) or less. Flow in excess of that quantity is divided equally between Canada and the United States. During the non-irrigation season, November 1 to March 31, the flow is divided equally between the two countries.

To comply with the above Order, representatives of both countries make twice-monthly computations of the daily natural flow of the St. Mary River to determine flow apportionment during the irrigation season. These 15 to 16 day periods are termed 'division periods' and serve to provide an opportunity to respond to varying use and flow conditions. For example, if use by the United States is in excess of its share during a division period, then a surplus delivery (an amount in excess of its share in the subsequent division period) of an equivalent quantity of water is normally made to Canada at the earliest opportunity. Regular interim reports of these computations are sent to all agencies involved in the water use and management of the flow of the St. Mary River. The interim reports keep these agencies informed as to the quantity of water that is available and the status of apportionment.

Tentative computations and interim reports are not made during the non-irrigation season when use by the United States is limited to storage in Lake Sherburne. The flow into Lake Sherburne is considerably less than 50 percent of the natural flow. Occasionally, water is diverted into the St. Mary Canal during the non-irrigation season, necessitating additional computations.

Lake Sherburne, the only storage reservoir within the St. Mary River basin in the United States, is used to store part of the United States' share of flow for later diversion to the Milk River. This water, which passes through Canada, is used by the United States for irrigation in the eastern portion of the Milk River basin.

Storage in Lake Sherburne (station 05015500) was 23 290 dam³ (18,880 acre-feet) on October 31, 2015. Storage increased to 47 950 dam³ (38,870 acre-feet) on February 29, 2016, when the 2016 irrigation-season began. Maximum storage was 78 810 dam³ (63,890 acre-feet) on June 15 and 16, 2016 and storage had decreased to 22 190 dam³ (17,990 acre-feet) by the end of irrigation releases on September 8, 2016.

Water was diverted from the St. Mary River into the Milk River via the St. Mary Canal beginning on March 22, 2016 and continued through September 10, 2016. The total flow recorded at the gauging station on the St. Mary Canal at St. Mary Crossing (station 5018500) was 185 800 dam³ (150,700 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 computed natural flow of the St. Mary River at the International Boundary (station 05AE027) from November 1, 2015 to October 31, 2016 was 744 400 dam³ (603,500 acre-feet) of which 624 7000 dam³ (506,400 acre-feet) occurred during the irrigation season, April 1 to October 31, 2016. For the irrigation season, Canada's share was 392 000 dam³ (317,800 acre-feet) and the United States' share was 232 700 dam³ (188,600 acre-feet). During the irrigation season, a total discharge of 442 200 dam³ (358,500 acre-feet) was recorded at the International Boundary, which was 113 percent of the Canadian share. The computed natural flow during the irrigation season was 88 percent of the average of the previous 113 years of record.

A deficit delivery was recorded in 1 of the 16 division periods during the 2016 irrigation season. In accordance with the 2001 Letter of Intent respecting the St. Mary and Milk Rivers streamflow transfers (a copy is available in Annex B of this report), the United States is allowed to accumulate deficits on the St. Mary River of up to 4,000 cfs-days (9 800 dam³) (7,940 acre-feet) between March 1 and May 31 of each year. At the discretion of the United States, the deficits may be reduced to no less than 2,000 cfs-days (4 900 dam³) (3,970 acre-feet) between June 1 and July 15 of each year with surplus deliveries of St. Mary River water. The remaining deficits incurred by the United States on the St. Mary River may be offset by deficits incurred by Canada on the Milk River from June 1 through September 15. Any outstanding deficits remaining on September 15 are to be equalized by October 31 of each year.

The United States accumulated a deficit within the LOI on the St. Mary River of 2 300 dam³ (1,860 acre-feet) for the April 1-15, 2016 division period. On September 15, the incurred deficit on the St. Mary River was offset by the outstanding deficit on the Milk River as outlined by the LOI along with a surplus delivery for the September 16-30 period. By October 31, 2016, there was no deficit on the St. Mary River.

The division of St. Mary River natural flow is summarized in Tables 1 and 1A and Figure 1, which follow. The detailed computation of the natural flow is given in Table 6 and the historical summary is given in Table 7 of Appendix A.

Table 1: Summary of St. Mary River Division for 2016

Quantities in Cubic Decametres

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	10,520	5,260	7,293	2,033	
MAR 16 - MAR 31	13,791	6,895	10,568	3,673	
APR 1 - APR 15	26,670	18,625	16,328		2,297
APR 16 - APR 30	56,562	34,389	39,749	5,360	
MAY 1 - MAY 15	69,967	41,091	43,187	2,096	
MAY 16 - MAY 31	79,689	46,362	58,594	12,232	
JUNE 1 - JUNE 15	99,364	55,791	74,303	18,512	
JUNE 16 - JUNE 30	52,516	32,368	34,601	2,233	
JULY 1 - JULY 15	47,389	29,802	30,120	318	
JULY 16 - JULY 31	32,087	22,561	23,185	624	
AUG 1 - AUG 15	22,406	16,803	17,441	638	
AUG 16 - AUG 31	18,508	13,882	14,935	1,053	
SEP 1 - SEP 15	13,614	10,211	11,598	1,387	
SEP 16 - SEP 30	24,029	17,485	18,531	1,046	
OCT 1 - OCT 15	27,004	18,670	19,340	670	
OCT 16 - OCT 31	54,865	33,948	40,280	6,332	
TOTAL	648,981	404,143	460,053		

* This is a summary of data from Table 6, Appendix A.

Note:

Canadian share of St. Mary River waters deficit outstanding:
as of May 31, 2016: 2 300 dam³ (1,870 acre-feet) (940 cfs-days)
as of June 15, 2016: 2 300 dam³ (1,870 acre-feet) (940 cfs-days)
as of September 15, 2016: 0 dam³ (0 acre-feet) (0 cfs-days).

U.S.A. share of Milk River waters outstanding as of September 15, 2016: 1 380 dam³ (1,120 acre-feet) (564 cfs-days).

Allowable deficit carryovers, as per 2001 Letter of Intent respecting St. Mary-Milk Rivers streamflow transfers, are:
as of May 31, 2016: 9 800 dam³ (7,940 acre-feet) (4,000 cfs-days)
as of July 15, 2016: 4 900 dam³ (3,970 acre-feet) (2,000 cfs-days).

Any deficits outstanding as of September 15 are to be equalized by October 31 of each year.

**Table 1A: Summary of St. Mary River Division for 2016
Quantities in Acre-Feet**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	CANADA'S SHARE	RECEIVED BY CANADA	RECEIVED BY CANADA	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	8,529	4,264	5,912	1,648	
MAR 16 - MAR 31	11,180	5,590	8,567	2,978	
APR 1 - APR 15	21,621	15,099	13,237		1,862
APR 16 - APR 30	45,855	27,879	32,225	4,345	
MAY 1 - MAY 15	56,722	33,313	35,012	1,699	
MAY 16 - MAY 31	64,604	37,586	47,502	9,916	
JUNE 1 - JUNE 15	80,555	45,230	60,238	15,008	
JUNE 16 - JUNE 30	42,575	26,241	28,051	1,810	
JULY 1 - JULY 15	38,418	24,161	24,418	258	
JULY 16 - JULY 31	26,013	18,290	18,796	506	
AUG 1 - AUG 15	18,165	13,622	14,139	517	
AUG 16 - AUG 31	15,004	11,254	12,108	854	
SEP 1 - SEP 15	11,038	8,278	9,403	1,124	
SEP 16 - SEP 30	19,480	14,175	15,023	848	
OCT 1 - OCT 15	21,892	15,136	15,679	543	
OCT 16 - OCT 31	44,479	27,522	32,655	5,133	
TOTAL	526,131	327,639	372,966		

* All values are conversions of data from Table 1. Totals and shares may not add or subtract exactly as a result of rounding.

Note:

Canadian share of St. Mary River waters deficit outstanding:

as of May 31, 2016: 2 300 dam³ (1,870 acre-feet) (940 cfs-days)

as of June 15, 2016: 2 300 dam³ (1,870 acre-feet) (940 cfs-days)

as of September 15, 2016: 2 300 dam³ (1,870 acre-feet) (940 cfs-days)

U.S.A. share of Milk River waters outstanding as of September 15, 2016: 1 380 dam³ (1,120 acre-feet) (564 cfs-days).

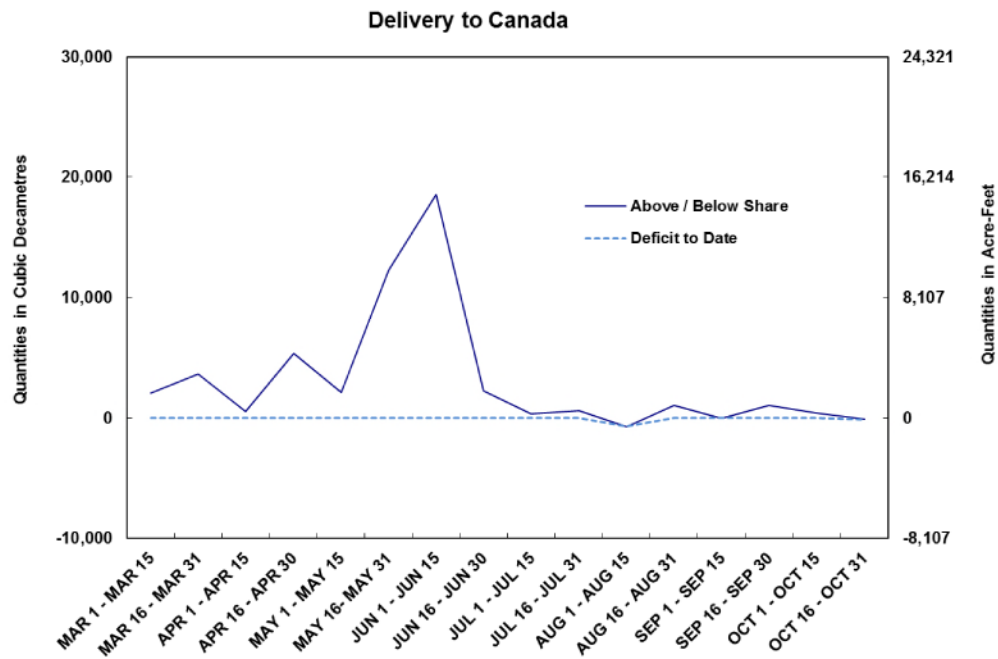
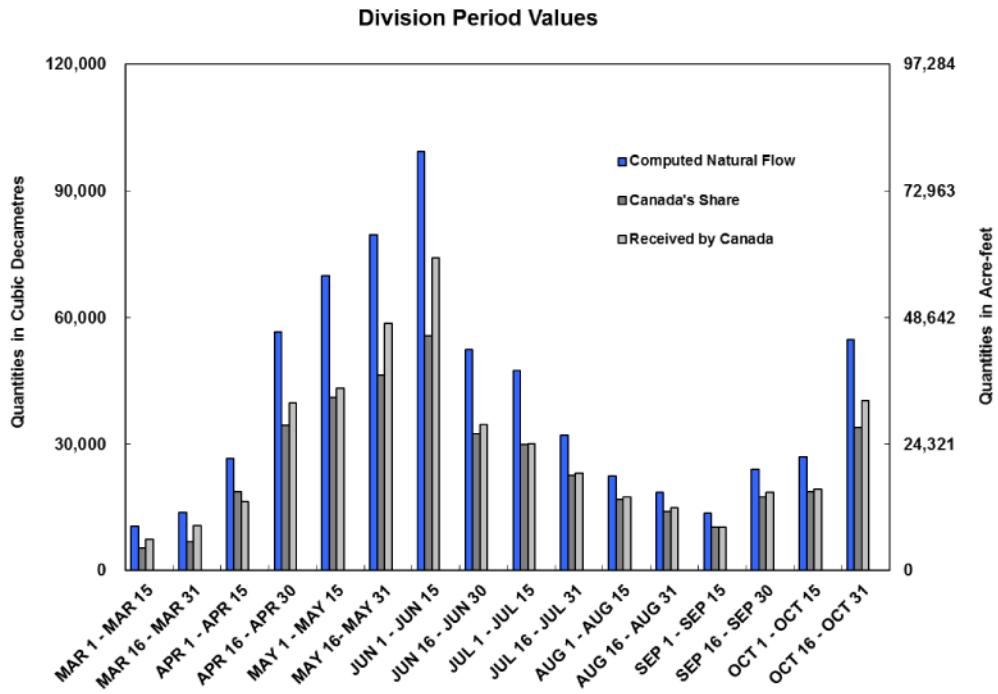
Allowable deficit carryovers, as per 2001 Letter of Intent respecting St. Mary-Milk Rivers streamflow transfers, are:

as of May 31, 2016: 9 800 dam³ (7,940 acre-feet) (4,000 cfs-days)

as of July 15, 2016: 4 900 dam³ (3,970 acre-feet) (2,000 cfs-days).

Any deficits outstanding as of September 15 are to be equalized by October 31 of each year.

Figure 1. St. Mary River Division, 2016



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MILK RIVER

During the irrigation season, April 1 to October 31, the United States' share of the natural flow of the Milk River at the Eastern Crossing of the International Boundary, as stipulated by the 1921 Order, is three-fourths of the natural flow when that flow is 666 cubic feet per second (18.86 cubic metres per second) or less. Flows in excess of that quantity are divided equally between the United States and Canada. During the non-irrigation season, November 1 to March 31, the entire flow is divided equally between the two countries.

Prior to the mid 1970's, uses of the natural flow of the Milk River by Canada and the United States upstream from Eastern Crossing were assumed to be less than their respective shares and no formal apportionment was made. By 1977, it became apparent that the increasing numbers of irrigation systems were capable of using all of the natural flow for long periods of time. Consequently, a more comprehensive natural flow computation and water-division procedure was developed and has been used since 1985. The revised computation procedure includes an approximate accounting of irrigation consumptive uses in both countries, and the inter-basin transfer of water in Canada. An additional refinement was made in 1988 when F.I. Morton's evapo-transpiration model replaced the adjusted pan evaporation method in the natural flow computations.

Data required for Morton's model is resource intensive. The equipment used to collect the data is highly specialized, less than robust, and located in a remote area. Data collected at the evapo-transpiration monitoring site near Milk River, Alberta needed frequent supplementation from the Onefour, Alberta pan evaporation site due to equipment malfunction. This coupled with the fact that the analysis program required extensive re-writing to port it from the obsolete DEC-VMS computer operating system suggested that an alternative needed to be investigated.

Data from the results of Morton's model were found to have a strong linear correlation with the Onefour, Alberta Class A evaporation pan results and therefore evapo-transpiration was estimated using the Onefour pan evaporation data as an index of Morton's model results.

The method for estimating evapo-transpiration losses has undergone another transition, moving from the Onefour, Alberta Class A pan derived method to a modified Penman application. Since 2013, a modified Penman equation has been used to estimate evaporative losses for interim and final natural flow computations for Milk River. Data for use in the modified Penman method have been collected from a weather station located near the Milk River at the Eastern Crossing of the International Boundary.

During 2016, the United States' estimated consumptive use was 5 050 dam³ (4,090 acre-feet) and Canada's estimated consumptive use was 5 160 dam³ (4,180 acre-feet). No inter-basin transfers from Verdigris Coulee near the Mouth (station 11AA038) were credited to the Canadian consumptive use.

The computed natural flow of the Milk River at the Eastern Crossing of the International Boundary (station 6135000) from March 1 to October 31, 2016 was 37 150 dam³ (30,120 acre-feet). This flow was 27 percent of the average computed natural flow of the previous 104 years of record. It is important to note, however, that natural-flow computations prior to 1985 did not account for consumptive use. Consequently, natural-flow values after 1985 are not directly comparable with natural-flow values of previous years. For the period March 1 to October 31, 2016, the United States' share was 26 490 dam³ (21,480 acre-feet) and Canada's share was 10 660 dam³ (8,640 acre-feet). The United States received 121 percent of its allotment at the Eastern Crossing, in addition to its share of St. Mary River water diverted into the Milk River through the St. Mary Canal.

There were five deficit deliveries recorded in the 16 division periods during the irrigation season on the Milk River. At present, Canada does not have facilities to store and release water into the Milk River Basin. Deficits are made up by transfer of Canada's share of St. Mary River water if excess capacity exists both in the stream and in the American St. Mary Canal, or as allowed by the 2001 Letter of Intent respecting the St. Mary and Milk Rivers streamflow transfers (a copy of which is available in Annex B of this report) whereby Canada is allowed to accumulate a deficit on the Milk River of up to 2,000 cfs-days (4 900 dam³) (3,970 acre-feet) between June 1 and September 15 of each year. The incurred deficits on the St. Mary and Milk Rivers may be offset and the outstanding deficits as of September 15 are to be equalized by October 31 of each year.

An outstanding deficit of 1 380 dam³ (1,120 acre-feet) remained as of September 15, 2016. On September 15, the incurred deficit on the Milk River was offset by the outstanding deficit on the St. Mary River as outlined by the LOI. By October 31, 2016, there was no deficit on the Milk River.

The division of Milk River natural flow is summarized in Table 2 and 2A and Figure 2, which follow. The detailed computation of the natural flow is given in Table 8 and the historical summary is given in Table 9 of Appendix A.

**Table 2: Summary of Milk River Division for 2016
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	3,193	1,597	3,193	1,596	
MAR 16 - MAR 31	2,297	1,149	2,297	1,148	
APR 1 - APR 15	1,243	932	1,243	311	
APR 16 - APR 30	1,303	977	1,303	326	
MAY 1 - MAY 15	985	739	985	246	
MAY 16 - MAY 31	8,660	6,495	7,679	1,184	
JUNE 1 - JUNE 15	4,961	3,721	4,003	282	
JUNE 16 - JUNE 30	280	210	0		293
JULY 1 - JULY 15	784	588	123		465
JULY 16 - JULY 31	1,574	1,181	869		312
AUG 1 - AUG 15	2,812	2,109	2,268	159	
AUG 16 - AUG 31	1,658	1,244	1,077		166
SEP 1 - SEP 15	881	661	518		143
SEP 16 - SEP 30	2,647	1,985	2,647	662	
OCT 1 - OCT 15	1,901	1,426	1,901	475	
OCT 16 - OCT 31	1,974	1,481	1,974	494	
TOTAL	37,154	26,493	32,079		

* This is a summary of data from Table 8, Appendix A.

Note:

U.S.A. share of Milk River waters deficit outstanding:
as of September 15, 2016: 1 380 dam³ (1,120 acre-feet) (564 cfs-days).

Canadian share of St. Mary River waters deficit outstanding:
as of May 31, 2016: 2 300 dam³ (1,870 acre-feet) (940 cfs-days).

Allowable deficit carryover from June 1 and September 15 as per 2001 Letter of Intent respecting St. Mary - Milk River streamflow transfers cannot be less than the outstanding deficit to Canada on St. Mary River Division as of May 31st, nor exceeding 4 900 dam³ (2,000 cfs-days) (3,970 acre-feet), whichever is less.

**Table 2A: Summary of Milk River Division for 2016
Quantities in Acre-Feet**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	2,589	1,295	2,589	1,294	
MAR 16 - MAR 31	1,862	931	1,862	931	
APR 1 - APR 15	1,008	756	1,008	252	
APR 16 - APR 30	1,056	792	1,056	264	
MAY 1 - MAY 15	799	599	799	199	
MAY 16 - MAY 31	7,021	5,266	6,225	960	
JUNE 1 - JUNE 15	4,022	3,017	3,245	229	
JUNE 16 - JUNE 30	227	170	0		238
JULY 1 - JULY 15	636	477	100		377
JULY 16 - JULY 31	1,276	957	704		253
AUG 1 - AUG 15	2,280	1,710	1,839	129	
AUG 16 - AUG 31	1,344	1,009	873		135
SEP 1 - SEP 15	714	536	420		116
SEP 16 - SEP 30	2,146	1,609	2,146	537	
OCT 1 - OCT 15	1,541	1,156	1,541	385	
OCT 16 - OCT 31	1,600	1,201	1,600	400	
TOTAL	30,121	21,478	26,006		

* All values are conversions of data from Table 2. Totals and shares may not add or subtract exactly as a result of rounding.

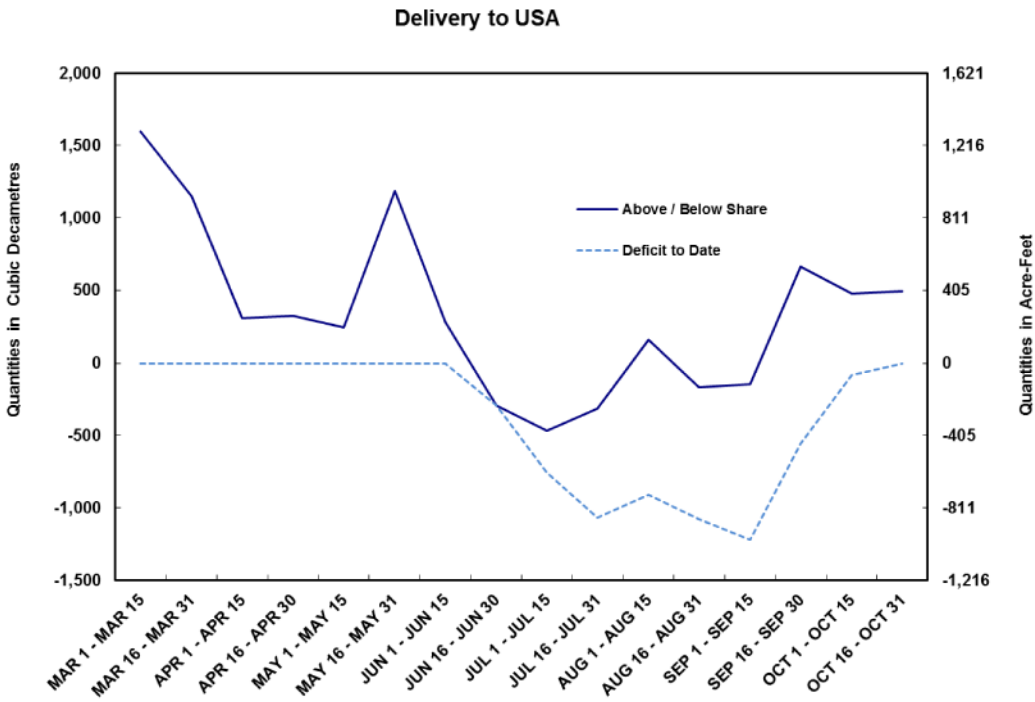
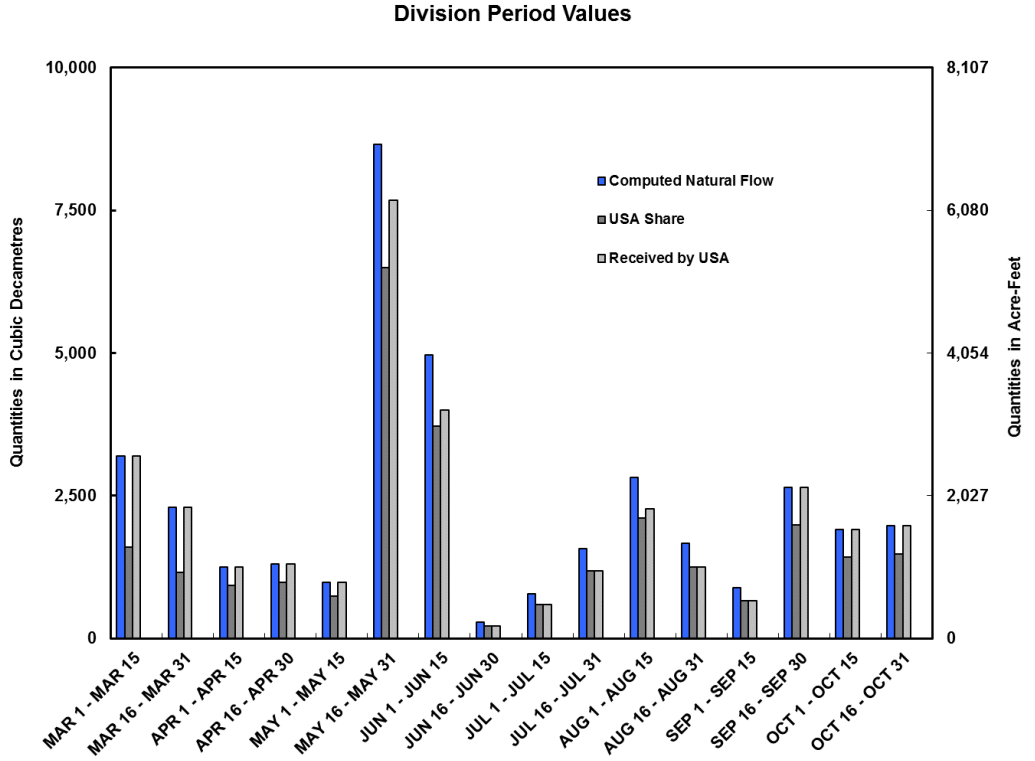
Note:

U.S.A. share of Milk River waters deficit outstanding:
as of September 15, 2016: 1 380 dam³ (1,120 acre-feet) (564 cfs-days).

Canadian share of St. Mary River waters deficit outstanding:
as of May 31, 2016: 2 300 dam³ (1,870 acre-feet) (940 cfs-days).

Allowable deficit carryover from June 1 and September 15 as per 2001 Letter of Intent respecting St. Mary - Milk River streamflow transfers cannot be less than the outstanding deficit to Canada on St. Mary River Division as of May 31st, nor exceeding 4 900 dam³ (2,000 cfs-days) (3,970 acre-feet), whichever is less.

Figure 2. Milk River Division, 2016



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SOUTHERN TRIBUTARIES OF THE MILK RIVER

Responding to concerns expressed by Canadian water users, the International Joint Commission at its executive session on December 8, 1986, agreed in principle that the issue of utilization of the southern tributaries should be addressed in an informal, pragmatic manner. The Commission instructed the Accredited Officers to proceed with discussions to resolve Canadian concerns. To assist them in implementing the Commission's instructions, the Accredited Officers established a four-member ad hoc task force composed of officials from the State of Montana and the Province of Alberta water-management agencies and the United States and Canadian Field Representatives for the St. Mary and Milk Rivers.

The task force met with United States and Canadian water users, conducted public meetings, toured water-use projects, compiled information on water availability and use, investigated ground-water supplies, and considered various options for resolving issues. The task force determined that United States water users were reluctant to participate in options that might limit their use of water and jeopardize their water claims in future adjudication of water rights. They also determined that basic Canadian water-user needs for domestic and stock-water use were being satisfied with wells and dugouts. Solutions to water-utilization problems were limited because the cost of storage facilities, pumpage from the Milk River, and formal apportionment of southern tributary waters would not be cost effective.

In September 1991, the Montana Department of Natural Resources and Conservation, in response to requests from the task force and others, issued an Order to close the southern tributaries to issuance of additional water permits.

The final report was forwarded to the International Joint Commission in May 1994. At its executive session on September 21, 1994, the Commission agreed that the task force should be terminated as recommended. The Commission also agreed not to act at that time on the three recommendations related to the adjudication process, but requested that the Accredited Officers continue to monitor the situation and report annually, or more frequently if appropriate, on such matters as complaints by Canadian ranchers and changes in the status of basin adjudication.

No Canadian complaints or changes in the Montana adjudication process were noted in 2016.

Flows for March through October 2016 for the southern tributaries were as follows:

- o Bear Creek near International Boundary – 445 dam³ (361 acre-feet)
- o Miners Coulee near International Boundary – 197 dam³ (160 acre-feet)

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EASTERN TRIBUTARIES OF THE MILK RIVER

The waters of the eastern tributaries of the Milk River are divided in accordance with the 1921 Order of the International Joint Commission, which stipulates under Rule III that “The natural flow of the eastern (otherwise known as the Saskatchewan or northern) tributaries of the Milk River at the points where they cross the International Boundary shall be divided equally between the two countries.” This order might well be interpreted as requiring that the division of water be made on a continuing daily basis; however, the physical limitation due to transit time in the flow system was recognized to be an impediment to the most beneficial use of the water if a daily apportionment were adopted. Further analysis showed that the minimum practical time frame for compilation of the natural flows at the International Boundary was every ten days. In 1994 the time frame was increased to twice monthly to reduce lag-time anomalies, reduce costs, and conform to St. Mary and Milk Rivers computation periods.

Prior to 1937, Canadian use along the eastern tributaries consisted of domestic projects, and the Canadian share of the natural flow was not fully used. In the late 1930s, the Government of Canada constructed three dams on the Frenchman River creating Eastend Reservoir (Water Survey of Canada station number 11AC055), Huff Lake (11AC063), and Newton Lake (11AC056) which necessitated an operational division of flow on this tributary by 1937. In 1938, dams were constructed at both ends of Cypress Lake (11AC037) near the Battle Creek-Frenchman River divide to allow inter-basin storage and transfers of water. In the early 1950s, the redevelopment of several private irrigation projects and the construction of the Vidora Irrigation Project resulted in increased use of Battle Creek water in Canada and made an operational division of the flow on this tributary necessary by 1957. In 1960, construction of Altawan Reservoir (11AB089) and Spangler Irrigation Project (11AB060) on Lodge Creek made an operational division of flow on this tributary necessary by 1961.

During the period March 1 to October 31, twice-monthly computations of the natural flow of Lodge Creek, Battle Creek, and the Frenchman River are made to determine each country's share. If use by Canada is in excess of its share, then a delivery of an equivalent quantity of water is made to the United States at the earliest opportunity. When mutually agreed to, the United States or Canada may request that deficit deliveries be delayed to allow for more efficient use of the water.

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 are distributed to interested agencies during the irrigation season. Additional computations may be made to account for significant usages before October 31. Generally, no division of flow is made during winter as flow and use are low and streamflow records are impractical to obtain.

Volumes for unmeasured diversions to private irrigation projects in the Lodge Creek, Battle Creek, and Frenchman River basins in Saskatchewan were based on year-end reports provided by the Saskatchewan Water Security Agency, and by Government of Alberta Environment and Parks Development for the Lodge Creek and Battle Creek basins located in Alberta. Lists of reported diversions are contained in Appendix B.

Lyons Creek (station 11AB075) is monitored by Canada, but does not have sufficient use in Canada at this time to warrant an operational division of flow. Total flow from March to October of 5.3 dam³ (4.3 acre-feet) was recorded on Lyons Creek for the year 2016.

The major reservoirs in the Lodge Creek, Battle Creek, and Frenchman River basins were at or near full storage by the end of April 2016. The Altawan Reservoir in Lodge Creek basin achieved a seasonal maximum storage of 5 070 dam³ (4,110 acre-feet) by the end of April, 75 percent of full storage capacity. In the Battle Creek basin, Cypress Lake was at 99 860 dam³ (80,960 acre-feet) storage by the end of April, 78 percent of full storage capacity. In the Frenchman River basin, Huff Lake and Newton Lake were at full storage by the end of April. Eastend Reservoir was above full storage by the end of April.

Net reservoir evaporation computations in the eastern tributaries of the Milk River were made using a modified Penman equation.

The Lodge Creek, Battle Creek, and Frenchman River basins received water for irrigation during the 2016 season. In the Lodge Creek basin, water was received for irrigation on the Spangler Project during May and June with a total flow of 1 510 dam³ (1,220 acre-feet) diverted down the Spangler Ditch. In the Battle Creek basin, the Vidora, Richardson, and McKinnon projects irrigated during division periods in May. Gaff Ditch was operated mainly from the end of March through to the middle of May. The Nashlyn Project received water in the March to mid-May division periods for the spring backflood irrigators. In the Frenchman River basin, the Eastend, Newton, and Huff Lake Projects irrigated from approximately early-May to mid-June.

In the Lodge Creek basin there was a 478 dam³ (388 acre-feet) year-end deficit for the 2016 irrigation season. The natural flow was negligible on Lodge Creek in July and September.

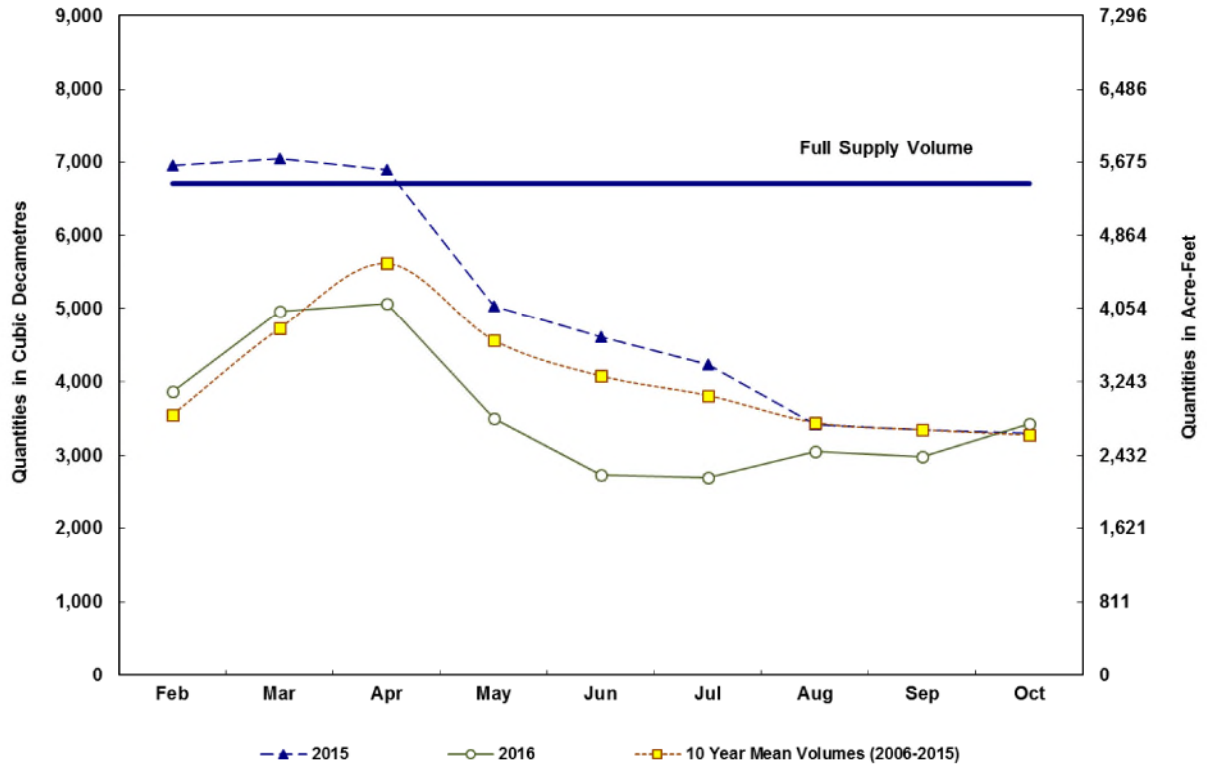
The Battle Creek basin finished the 2016 irrigation season with no year-end deficit.

The Frenchman River basin finished the 2016 irrigation season with no year-end deficit.

Figures 3a to 3e show month-end and mean contents of major reservoirs in Lodge Creek, Battle Creek, and Frenchman River basins.

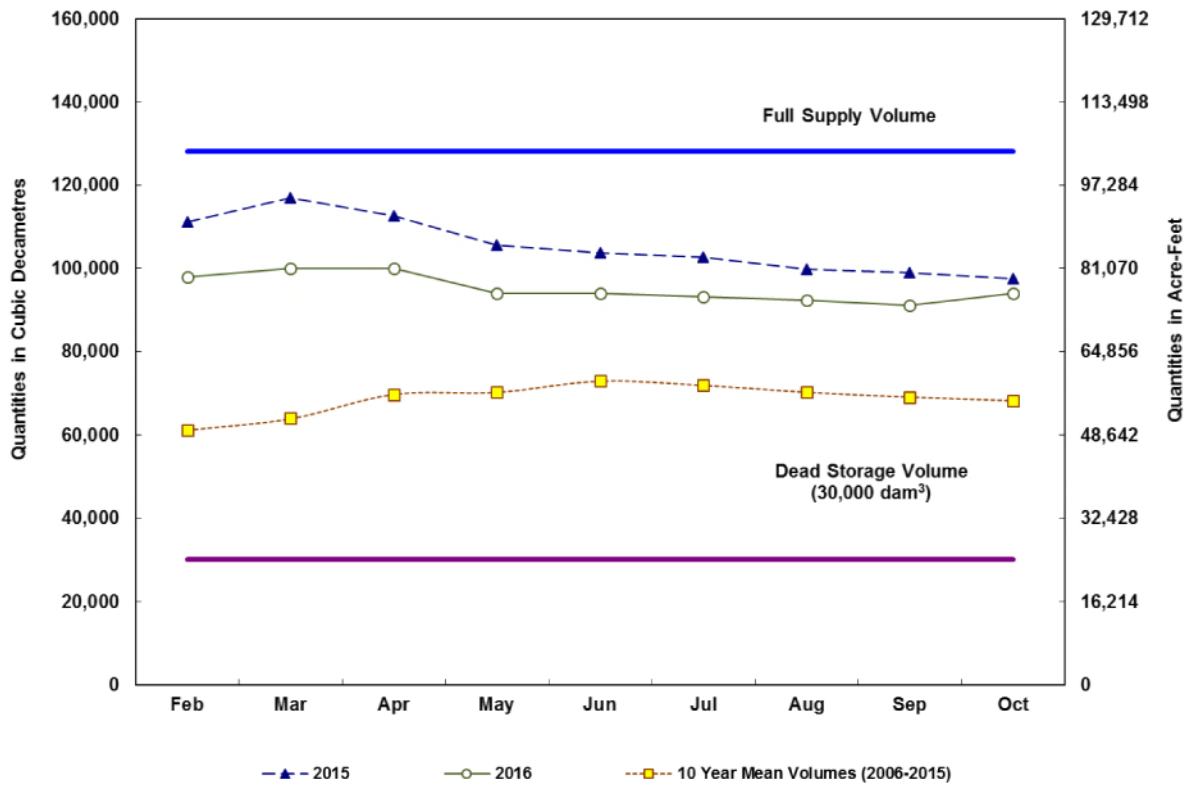
**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2015, 2016, and 2006-2015 Mean**

Figure 3a. Altawan Reservoir



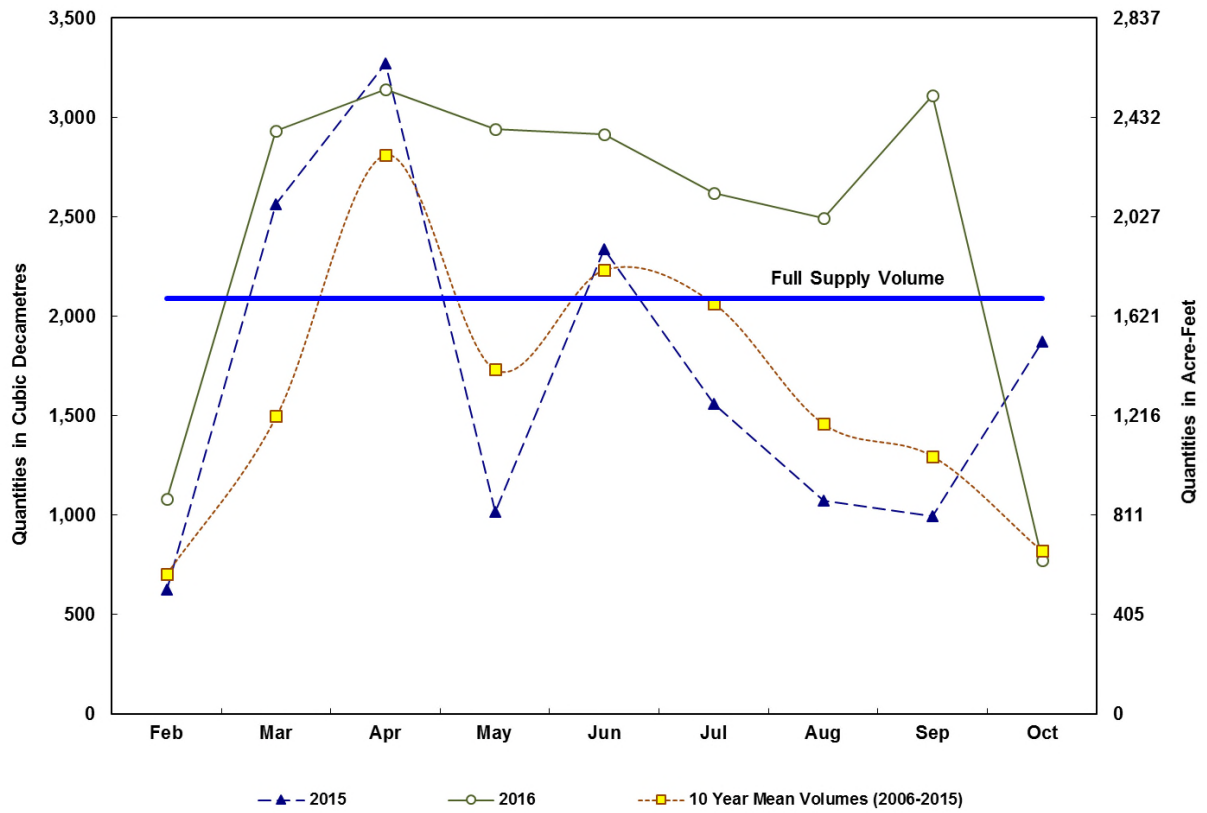
**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2015, 2016, and 2006-2015 Mean**

Figure 3b. Cypress Lake



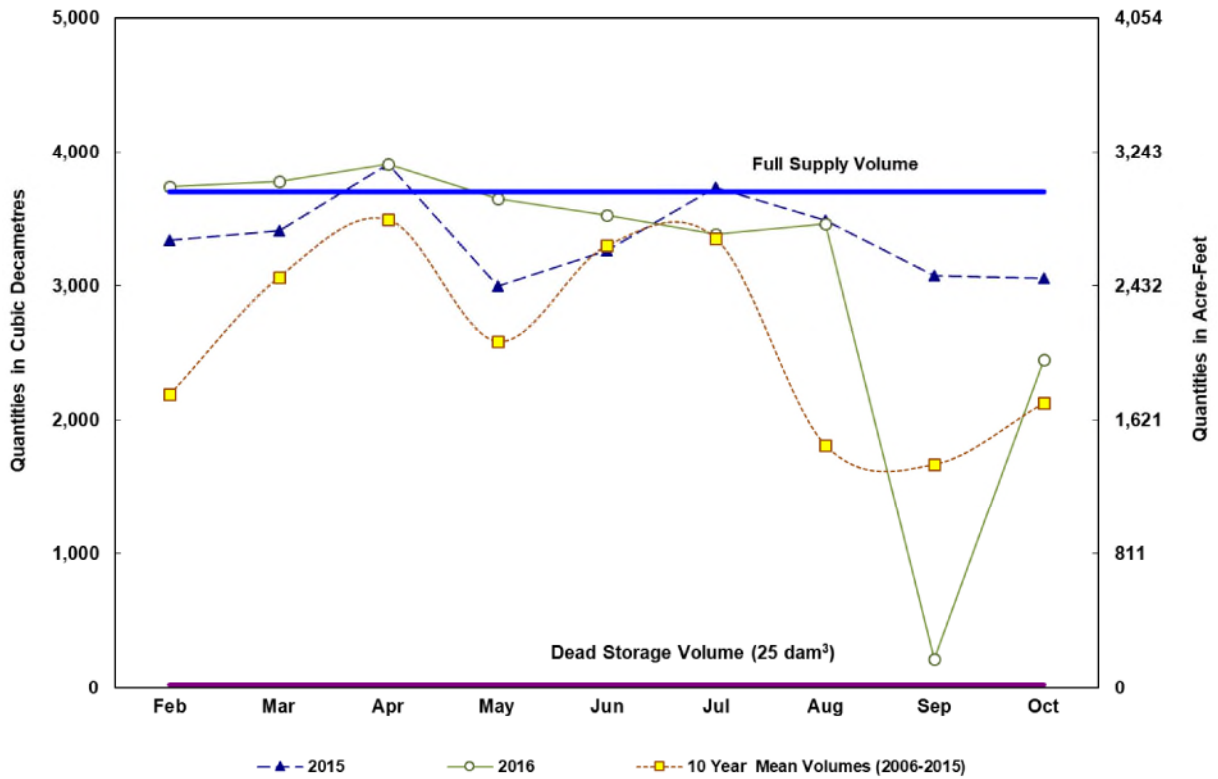
**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2015, 2016, and 2006-2015 Mean**

Figure 3c. Eastend Reservoir



**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2015, 2016, and 2006-2015 Mean**

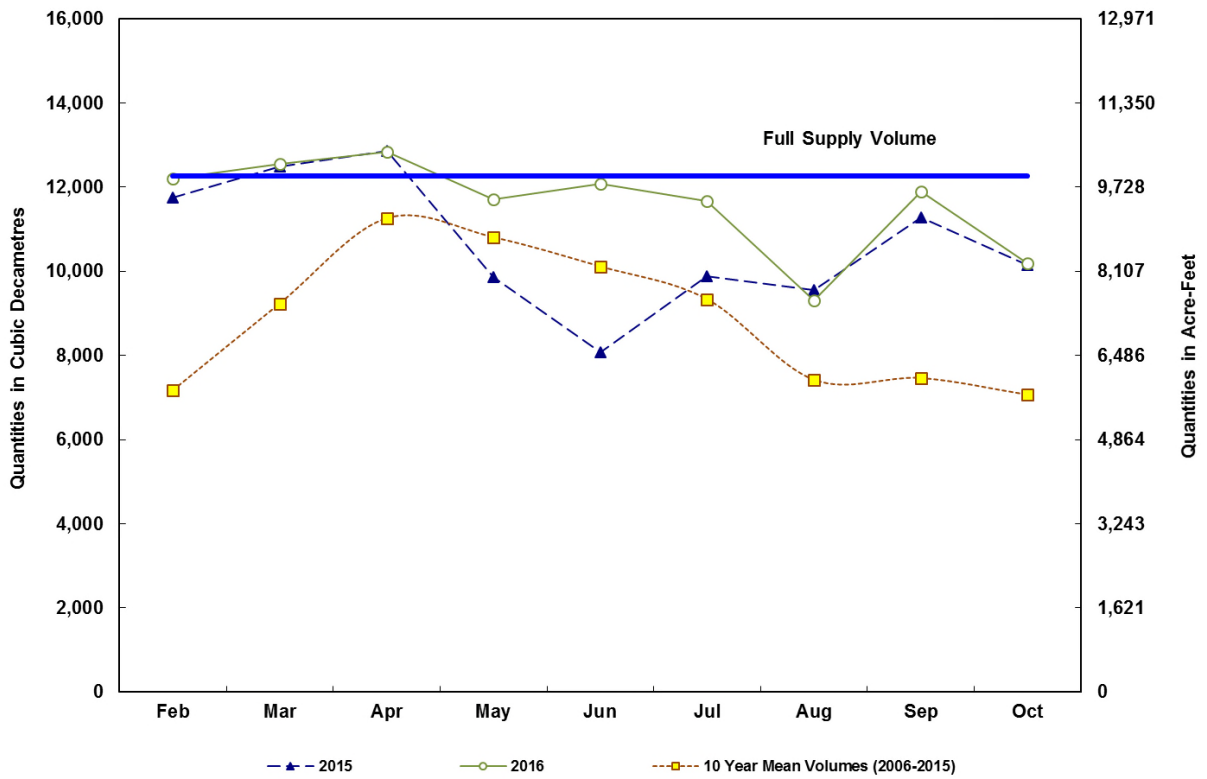
Figure 3d. Huff Lake



Huff Lake stage-storage table was revised in 2004, increasing the dead storage and decreasing the full supply storage volumes from previous years.

**Figure 3. Reservoirs in Lodge Creek, Battle Creek, and Frenchman River Basins
Month-End Contents: 2015, 2016, and 2006-2015 Mean**

Figure 3e. Newton Lake



LODGE CREEK

The computed natural flow of Lodge Creek at the International Boundary from March 1 to October 31, 2016 was 3 090 dam³ (2,510 acre-feet). This volume is 11 percent of the average natural flow of the previous 66 years of record. Each country is entitled to 50 percent of the natural flow, or 1 545 dam³ (1,250 acre-feet) for the irrigation season. A total flow of 1 070 dam³ (867 acre-feet) was recorded at Lodge Creek below McRae Creek at the International Boundary (station 11AB083) from March 1 to October 31. This volume was 69 percent of the United States allotment.

There were eight deficit deliveries during the 2016 irrigation season. There was a 478 dam³ (388 acre-feet) outstanding deficit for Lodge Creek in 2016.

The division of the Lodge Creek natural flow is summarized in Tables 3 and 3A and in Figure 4 which follow. The detailed computation of the natural flow is given in Table 10 and the historical summary is given in Table 11, both in Appendix A.

**Table 3: Summary of Lodge Creek Division for 2016*
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	1484	742	10		732
MAR 16 - MAR 31	99	49	1		48
APR 1 - APR 15	0	0	0		0
APR 16 - APR 30	128	64	0		64
MAY 1 - MAY 15	119	60	0		60
MAY 16 - MAY 31	237	118	155	37	
JUNE 1 - JUNE 15	124	62	754	692	
JUNE 16 - JUNE 30	132	66	138	72	
JULY 1 - JULY 15	1	1	1		0
JULY 16 - JULY 31	30	15	0		15
AUG 1 - AUG 15	303	152	0		152
AUG 16 - AUG 31	107	53	0		53
SEP 1 - SEP 15	0	0	0		0
SEP 16 - SEP 30	0	0	0		0
OCT 1 - OCT 15	1	0	1	1	
OCT 16 - OCT 31	325	162	5		157
TOTAL	3090	1544	1066		

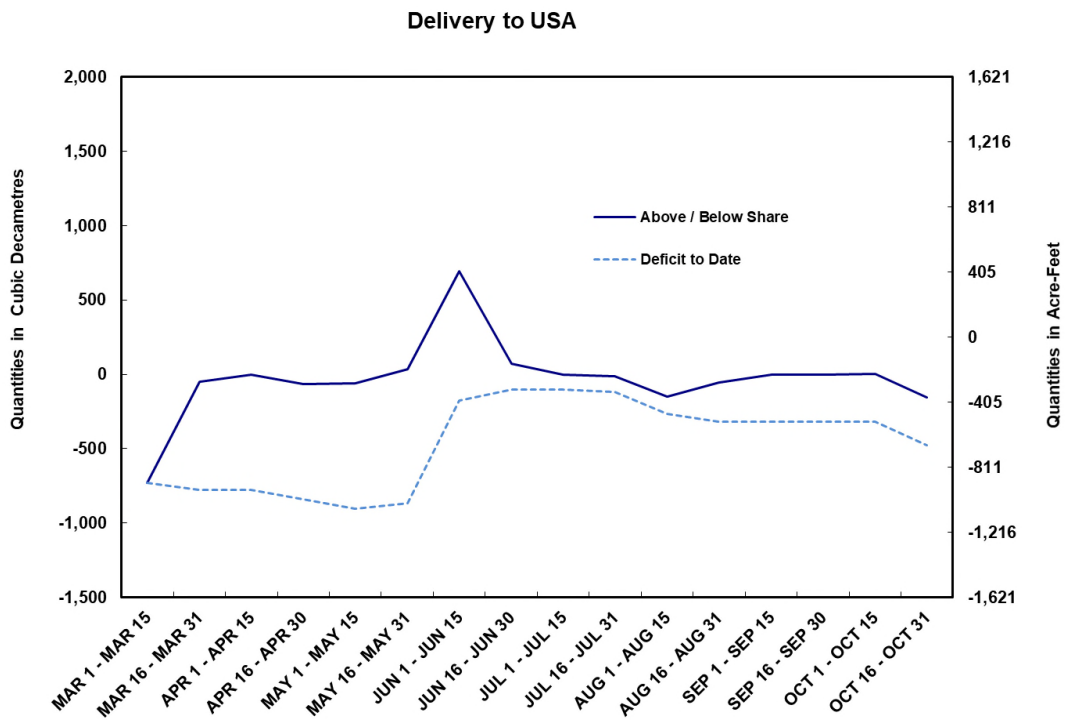
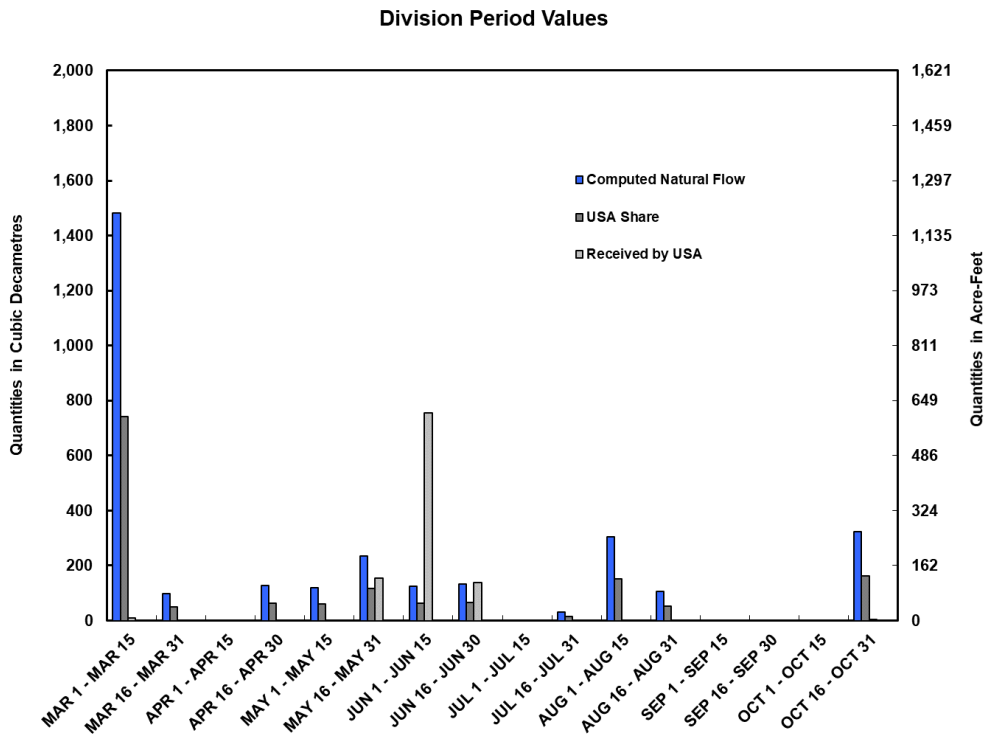
* This is a summary of data from Table 10, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

Table 3A: Summary of Lodge Creek Division for 2016*
Quantities in Acre-Feet

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	1,203	602	8		593
MAR 16 - MAR 31	80	40	1		39
APR 1 - APR 15	0	0	0		0
APR 16 - APR 30	104	52	0		52
MAY 1 - MAY 15	96	49	0		49
MAY 16 - MAY 31	192	96	126	30	
JUNE 1 - JUNE 15	101	50	611	561	
JUNE 16 - JUNE 30	107	54	112	59	
JULY 1 - JULY 15	1	1	1		0
JULY 16 - JULY 31	24	12	0		12
AUG 1 - AUG 15	246	123	0		123
AUG 16 - AUG 31	87	43	0		43
SEP 1 - SEP 15	0	0	0		0
SEP 16 - SEP 30	0	0	0		0
OCT 1 - OCT 15	1	0	1	1	
OCT 16 - OCT 31	263	131	4		127
TOTAL	2,505	1,252	864		

* All values are conversions of data from Table 3. Totals and shares may not add or subtract exactly as a result of rounding.

Figure 4. Lodge Creek Division, 2016



BATTLE CREEK

The computed natural flow of Battle Creek at the International Boundary from March 1 to October 31, 2016 was 15 270 dam³ (12,380 acre-feet). This volume is 51 percent of the average natural flow of the previous 76 years of record. Each country is entitled to 50 percent of the natural flow or 7 635 dam³ (6,190 acre-feet) for the irrigation season. A total flow volume of 8 590 dam³ (6,960 acre-feet) was recorded at Battle Creek at International Boundary (station 11AB027) from March 1 to October 31, 2016. This volume was 112 percent of the United States allotment.

There were eight deficit deliveries recorded for the 16 division periods during the irrigation season. There was no outstanding deficit for Battle Creek in 2016.

The division of the Battle Creek natural flow is summarized in Tables 4 and 4A and in Figure 5, which follow. The detailed computation of the natural flow is given in Table 12 and the historical summary is given in Table 13, both in Appendix A.

**Table 4: Summary of Battle Creek Division for 2016*
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 25	1,450	725	419		306
MAR 26 - APR 9	472	236	230		6
APR 10 - APR 24	664	332	147		185
APR 25 - MAY 9	732	366	55		311
MAY 10 - MAY 25	485	242	1,184	942	
MAY 26 - JUNE 9	1,887	944	1,244	300	
JUNE 10 - JUNE 24	790	395	414	19	
JUNE 25 - JULY 9	1,082	541	297		244
JULY 10 - JULY 25	885	443	241		202
JULY 26 - AUG 9	436	218	124		94
AUG 10 - AUG 25	1,342	671	528		143
AUG 26 - SEP 9	457	229	457	228	
SEP 10 - SEP 24	600	300	600	300	
SEP 25 - OCT 9	905	453	526	73	
OCT 10 - OCT 25	2,163	1,082	1,408	326	
OCT 26 - OCT 31	919	460	715	255	
TOTAL	15,269	7,637	8,589		

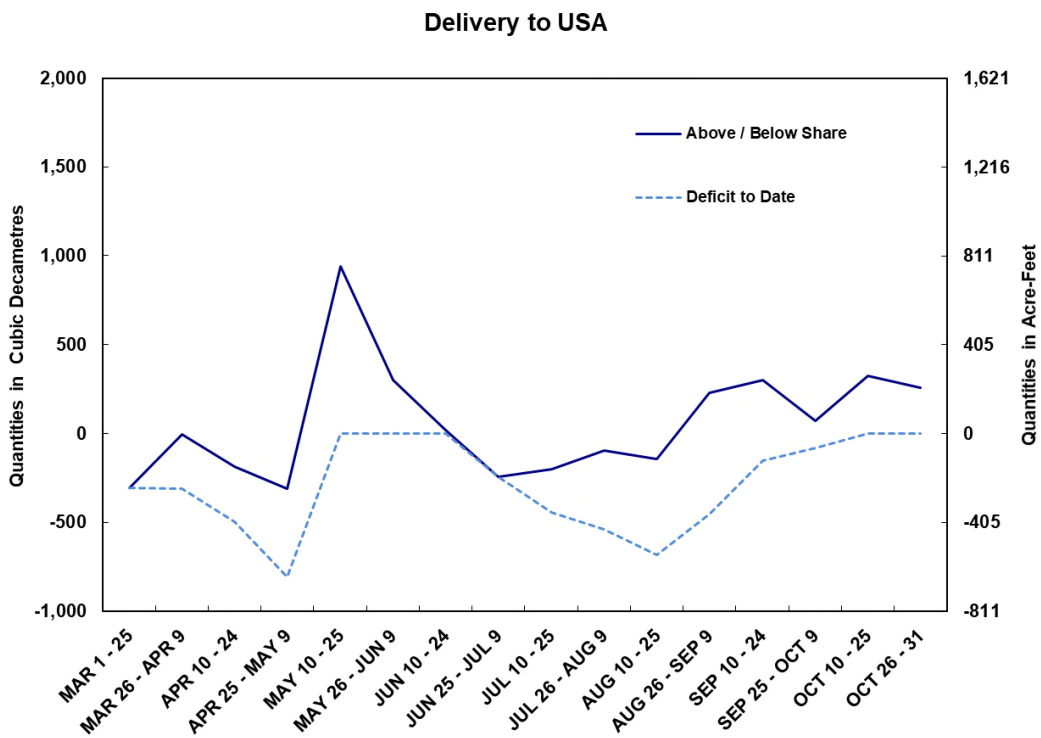
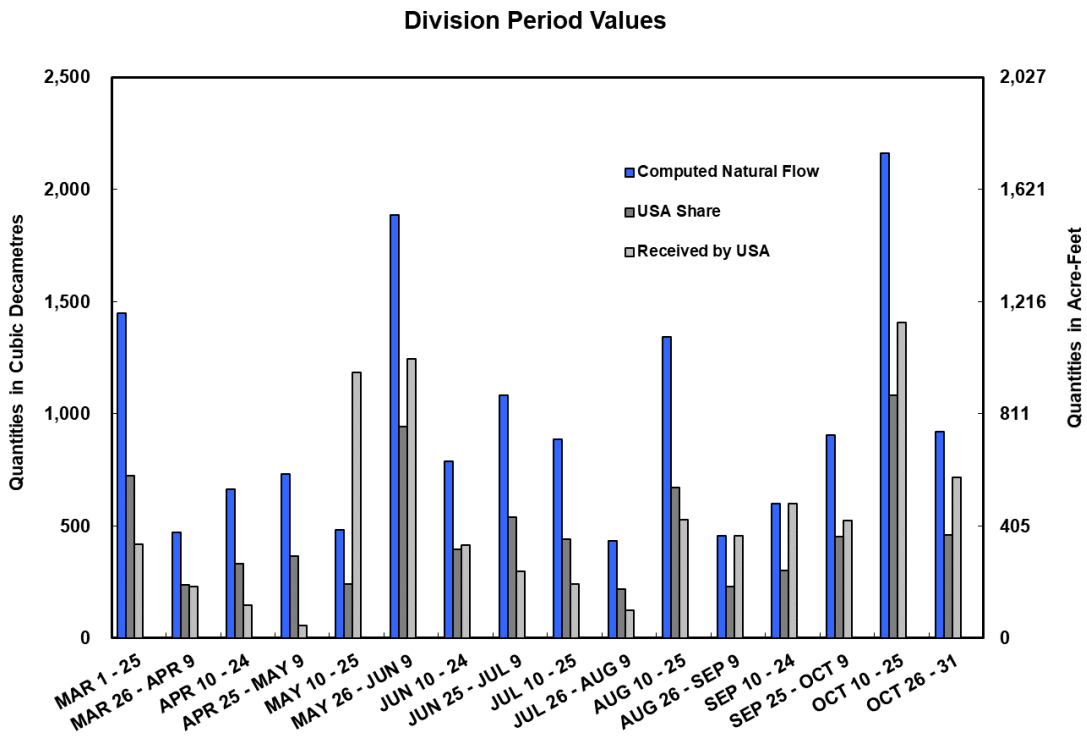
* This is a summary of data from Table 12, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

**Table 4A: Summary of Battle Creek Division for 2016*
Quantities in Acre-Feet**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 – MAR 25	1,176	588	340		248
MAR 26 – APR 9	383	191	186		5
APR 10 - APR 24	538	269	119		150
APR 25 – MAY 9	594	297	45		252
MAY 10 - MAY 25	393	196	960	763	
MAY 26 - JUNE 9	1,530	765	1,009	243	
JUNE 10 - JUNE 24	640	320	336	15	
JUNE 25 - JULY 9	877	439	241		198
JULY 10 - JULY 25	718	359	195		164
JULY 26 - AUG 9	353	177	100		77
AUG 10 – AUG 25	1,088	544	428		116
AUG 26 - SEP 9	371	186	371	185	
SEP 10 - SEP 24	486	243	486	243	
SEP 25 - OCT 9	734	367	427	59	
OCT 10 - OCT 25	1,754	877	1,142	265	
OCT 26 - OCT 31	745	373	580	207	
TOTAL	12,379	6,191	6,963		

* All values are conversions of data from Table 4. Totals and shares may not add or subtract exactly as a result of rounding.

Figure 5. Battle Creek Division, 2016



FRENCHMAN RIVER

The computed natural flow of the Frenchman River at the International Boundary from March 1 to October 31, 2016 was 60 390 dam³ (48,960 acre-feet). This volume of natural flow is 77 percent of the average natural flow of the previous 76 years of record. Each country is entitled to 50 percent of the natural flow, or 30 195 dam³ (24,480 acre-feet) for the irrigation season. A total flow of 49 890 dam³ (40,450 acre-feet) was recorded at Frenchman River at International Boundary (station 11AC041) from March 1 to October 31. This volume was 165 percent of the United States allotment.

Deficit deliveries were recorded in 2 of the 16 division periods during the irrigation season. There was no outstanding deficit at the end of October 2016.

The division of the Frenchman River natural flow is summarized in Tables 5 and 5A and in Figure 6, which follow. The detailed computation of the natural flow is given in Table 14 and the historical summary is given in Table 15, both in Appendix A.

**Table 5: Summary of Frenchman River Division for 2016*
Quantities in Cubic Decametres**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	6,590	3,295	3,942	647	
MAR 16 - MAR 31	3,703	1,851	3,109	1258	
APR 1 - APR 15	1,808	904	1,368	464	
APR 16 - APR 30	2,174	1,087	1,573	486	
MAY 1 - MAY 15	4,687	2,344	3,487	1143	
MAY 16 - MAY 31	4,303	2,151	2,165	14	
JUNE 1 - JUNE 15	4,269	2,135	1,808		327
JUNE 16 - JUNE 30	1,741	870	464		406
JULY 1 - JULY 15	4,038	2,019	3,661	1642	
JULY 16 - JULY 31	2,922	1,461	2,957	1496	
AUG 1 - AUG 15	1,063	532	1,043	511	
AUG 16 - AUG 31	906	453	1,844	1391	
SEP 1 - SEP 15	730	365	779	414	
SEP 16 - SEP 30	907	453	1,085	632	
OCT 1 - OCT 15	14,196	7,098	13,340	6242	
OCT 16 - OCT 31	6,356	3,178	7,263	4085	
TOTAL	60,389	30,196	49,890		

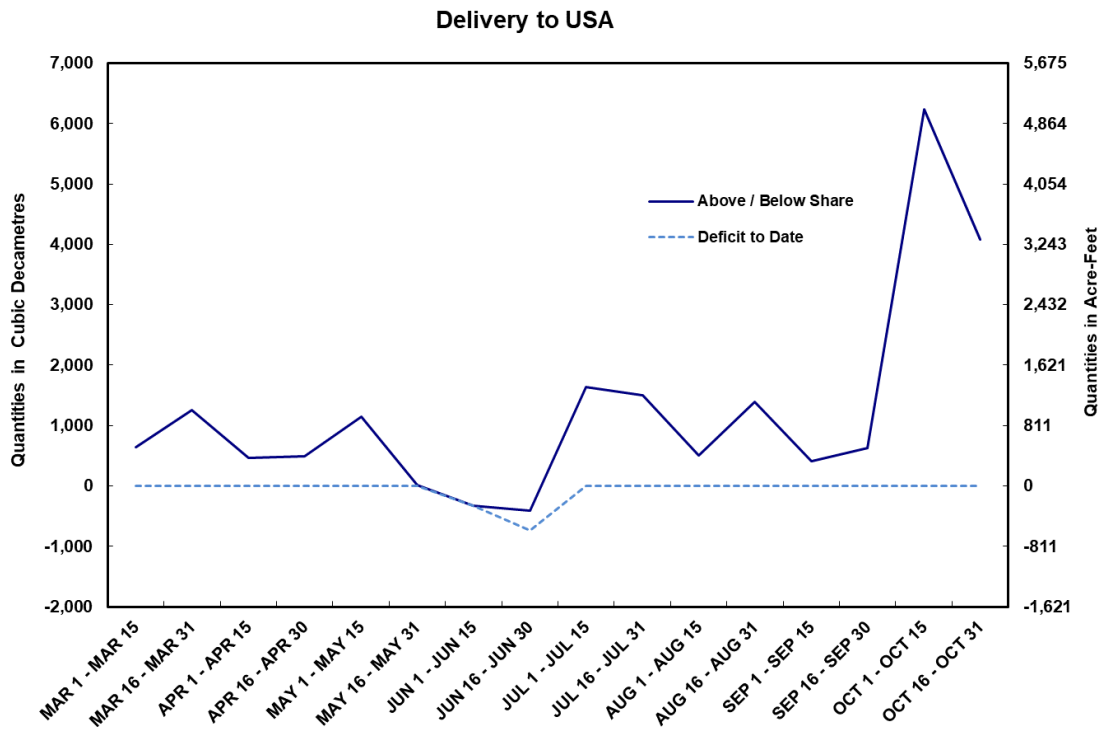
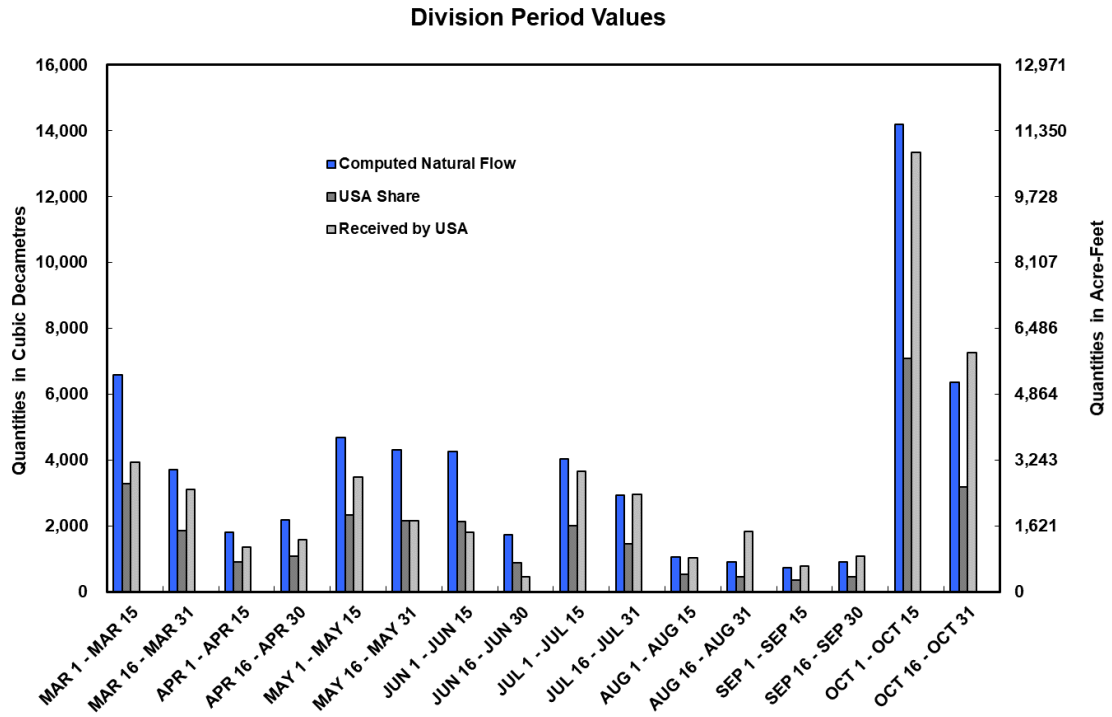
* This is a summary of data from Table 14, Appendix A. Totals and shares may not add or subtract exactly as a result of rounding.

**Table 5A: Summary of Frenchman River Division for 2016*
Quantities in Acre-Feet**

DIVISION PERIOD AT INTERNATIONAL BOUNDARY	NATURAL FLOW	U.S.A. SHARE	RECEIVED BY U.S.A.	RECEIVED BY U.S.A.	
				ABOVE SHARE	BELOW SHARE
MAR 1 - MAR 15	5,342	2,671	3,196	525	
MAR 16 - MAR 31	3,002	1,501	2,520	1020	
APR 1 - APR 15	1,465	733	1,109	376	
APR 16 - APR 30	1,762	881	1,275	394	
MAY 1 - MAY 15	3,800	1,900	2,827	927	
MAY 16 - MAY 31	3,488	1,744	1,755	12	
JUNE 1 - JUNE 15	3,461	1,731	1,466		265
JUNE 16 - JUNE 30	1,411	705	376		329
JULY 1 - JULY 15	3,273	1,637	2,968	1331	
JULY 16 - JULY 31	2,369	1,184	2,398	1213	
AUG 1 - AUG 15	862	431	845	414	
AUG 16 - AUG 31	735	367	1,495	1128	
SEP 1 - SEP 15	591	296	632	336	
SEP 16 - SEP 30	735	367	880	513	
OCT 1 - OCT 15	11,508	5,754	10,815	5061	
OCT 16 - OCT 31	5,152	2,576	5,888	3312	
TOTAL	48,958	24,480	40,446		

* All values are conversions of data from Table 5. Totals and shares may not add or subtract exactly as a result of rounding.

Figure 6. Frenchman River Division, 2016



ANNEX A

1921 Order of the International Joint Commission
Respecting the St. Mary-Milk Rivers

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

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

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

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

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

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

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

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

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

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

St. Mary River

I. (a) During the irrigation season when the natural flow of the St. Mary River at the point where it crosses the international boundary is six hundred and sixty-six (666) cubic feet per second or less Canada shall be entitled to three-fourths and the United States to one-fourth of such flow.

(b) During the irrigation season when the natural flow of the St. Mary River at the point where it crosses the international boundary is more than six hundred and sixty-six (666) cubic feet per second Canada shall be entitled to a prior appropriation of five hundred (500) cubic feet per second, and the excess over six hundred and sixty-six (666) cubic feet per second shall be divided equally between the two countries.

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

Milk River

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

(b) During the irrigation season when the natural flow of the Milk River at the Eastern Crossing is more than six hundred and sixty-six (666) cubic feet per second the United States shall be entitled to a prior appropriation of five hundred (500) cubic feet per second and the excess over six hundred and sixty-six (666) cubic feet per second shall be divided equally between the two countries.

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

Eastern Tributaries of Milk River

III. The natural flow of the eastern (otherwise known as the Saskatchewan or northern) tributaries of the Milk River at the points where they cross the international boundary shall be divided equally between the two countries.

Waters not naturally crossing the boundary

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

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

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

- (1) At the gauging station at the international boundary;
- (2) At all places where any of the waters which would naturally flow across the international boundary at that particular point are diverted in either country prior to such crossing;
- (3) At all places where any of the waters which would naturally flow across the international boundary at that particular point are stored, or the natural flow thereof increased or decreased prior to such crossing;

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

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

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

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

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

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

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

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

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

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

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

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

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

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ANNEX B

Letter of Intent Respecting the St. Mary - Milk Rivers
Streamflow Transfers

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**LETTER OF INTENT
TO BETTER UTILIZE THE WATERS OF THE ST. MARY AND MILK RIVERS**

Whereas Article VI of the Boundary Waters Treaty of 1909 states that the St. Mary and Milk Rivers and their tributaries are to be treated as one for the purposes of irrigation and power;

And whereas, the Boundary Waters Treaty of 1909 and the International Joint Commission Order of 1921 authorizes the Reclamation and Irrigation Officers of the United States and Canada (currently designated as the Accredited Officers of the United States and Canada) to make the greatest beneficial use of the waters of the St. Mary and Milk Rivers;


And whereas, Canada finds it beneficial to use more than its share of the Milk River in the June-September period each year to supply water to Canadian Milk River irrigators;

And whereas, the United States finds it beneficial to use more than its share of the St. Mary River in the March-May period each year to supply water to United States Milk River irrigators;

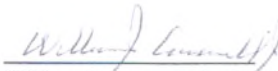
It is therefore ordered and directed by said Accredited Officers or their designates that the United States be allowed to accumulate a deficit on the St. Mary River of up to 4,000 cfs-days (9 800 dam³) between March 1 and May 31 of each year which, at the discretion of the United States, may be reduced to no less than 2,000 cfs-days (4 900 dam³) between June 1 and July 15 of each year with surplus deliveries of St. Mary River water, and that Canada be allowed to accumulate a deficit on the Milk River of up to 2,000 cfs-days (4 900 dam³) between June 1 and September 15 of each year. The incurred deficits on the St. Mary and Milk Rivers can be offsetting and the outstanding deficits as of September 15 will be equalized by October 31 of each year under administration by Field Representatives of the Accredited Officers. Detailed accounting procedures for the computation of deficit and surplus deliveries under this Letter Of Intent are outlined in Appendix A, " Procedures for the Computation of Deficit and Surplus Deliveries to Better Utilize Waters of the St. Mary and Milk Rivers".

In signing this letter, the parties recognize this agreement is within the 1921 Order of the International Joint Commission. Additionally, the parties recognize that this Letter of Intent and Appendix A will form part of the St. Mary - Milk River Procedural Manual.

Termination of this Letter Of Intent will be allowed upon request by either the United States or Canada notifying the other party in writing two months prior to the commencement of the irrigation season (April 1st as specified by the 1921 Order).



Tim Goos
Accredited Officer of Her Majesty
Dated this 8th day of February, 2001



William J. Carswell, Jr. for the
Accredited Officer of the United States
Dated this 8th day of February, 2001

**PROCEDURES FOR THE COMPUTATION OF DEFICIT AND SURPLUS DELIVERIES
TO BETTER UTILIZE WATERS OF THE ST. MARY AND MILK RIVERS**

ST. MARY RIVER

As of January 2001, the accounting procedures for the computation of deficit and surplus deliveries during March 1 through September 15 of each year on the St. Mary River are:

1. During March 1 through May 31 of each year, deficit deliveries from the United States to Canada at the end of each division period will carry over from one division period to another for the year, are cumulative for the year, and are allowed up to a cumulative total of 4,000 cfs-days (9 800 dam³). Deficit deliveries greater than the allowed cumulative total of 4,000 cfs-days (9 800 dam³) are to be refunded in the subsequent division period. Surplus deliveries at the end of a division period are not cumulative, cannot be used to reduce the accumulated deficit from previous division periods to below the allowed total deficit of 4,000 cfs-days (9 800 dam³), and cannot be used as a credit to make up future deficits. Exceptions to these procedures for this period are allowed only if agreed upon in writing by the Field Representative for Canada.
2. During June 1 through July 15 of each year, the United States, at its discretion, may reduce the deficit accumulated in the March 1 through May 31 period to 2,000 cfs-days (4 900 dam³) by making surplus deliveries of St. Mary River water. The remaining deficit is not refundable until after September 15 of that year unless agreed upon in writing by the Field Representative for Canada.
3. During June 1 through September 15 of each year, deficit deliveries from the United States to Canada at the end of each division are not to be incurred. However, if deficits are incurred, they are to be refunded by surplus deliveries in the subsequent division period or at a time agreed upon by both parties. Surplus deliveries do not carry over from one division period to another, are not cumulative, and cannot be used as a credit to make up future deficits.
4. On September 15 of each year, outstanding deficits are to be determined using the best available data, even though those data may be provisional. Any outstanding deficits as of September 15 are to be equalized by October 31 of each year. Deficit deliveries accumulated by Canada on the Milk River can be used to offset deficit deliveries accumulated by the United States on the St. Mary River.
5. The United States Bureau of Reclamation shall contact Canada (Environment Canada), the United States (U.S. Geological Survey), Montana (Montana Department of Natural Resources and Conservation), and Alberta (Alberta Environment) when they plan to begin deficit deliveries during the March 1 through May 31 period and when they plan to make surplus deliveries to reduce the accumulated deficits to 2,000 cfs-days (4 900 dam³) during June 1 through July 15. On or about July 1, and again by September 15 of each year, the parties shall participate in a conference call or meeting to discuss refund of remaining deficit deliveries.

MILK RIVER

As of January 2001, the accounting procedures for the computation of deficit and surplus deliveries during March 1 through September 15 of each year on the Milk River are:

1. During March 1 through May 31 of each year, deficit deliveries from Canada to the United States at the end of each division period are not to be incurred. However, if deficits are incurred, they are to be refunded by surplus deliveries in the subsequent division period or at a time agreed upon by both parties. Surplus deliveries do not carry over from one division period to another, are not cumulative, and cannot be used as a credit to make up future deficits.
2. During June 1 through September 15 of each year, deficit deliveries from Canada to the United States at the end of each division period will carry over from one division period to another for the year, are cumulative for the year, and are allowed up to a cumulative total of 2,000 cfs-days (4 900 dam³). Deficit deliveries greater than the allowed total of 2,000 cfs-days (4 900 dam³) are to be refunded in the subsequent division period. Surplus deliveries at the end of a division period cannot be used to reduce the deficit accumulated during the June 1 through September 15 period to below the lesser of the allowed total deficit of 2,000 cfs-days (4 900 dam³) or the outstanding United States' deficit accumulated on the St. Mary River in the March 1 through May 31 period, and cannot be used as credits to make up future deficits. The remaining deficit is not refundable until after September 15 of that year unless agreed upon in writing by the Field Representative for the United States.
3. On September 15 of each year, outstanding deficits are to be determined using the best available data, even though those data may be provisional. Any outstanding deficits as of September 15 are to be equalized by October 31 of each year. Deficit deliveries accumulated by Canada on the Milk River can be used to offset deficit deliveries accumulated by the United States on the St. Mary River.
4. Canada (Environment Canada), the United States (U.S. Bureau of Reclamation and U.S. Geological Survey), Alberta (Alberta Environment) and Montana (Montana Department of Natural Resources and Conservation) shall participate in a conference call or meeting on or about July 1, and again by September 15 of each year to decide on the approach to be used to reconcile outstanding deficit deliveries.

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ANNEX C

Letter of Intent Respecting the Eastern Tributaries of the Milk River
Streamflow Transfers

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LETTER OF INTENT
TO
BETTER UTILIZE THE WATERS OF THE EASTERN TRIBUTARIES OF THE
MILK RIVER

Whereas, the Boundary Waters Treaty of 1909 and the International Joint Commission Order of 1921 authorize the Accredited Officers of the United States and Canada to make the greatest beneficial use of the waters of the St. Mary and Milk Rivers, and the Eastern Tributaries of the Milk River;

And, whereas the Order of 1921 identifies an equal-sharing arrangement as the basis for apportionment on the Eastern Tributaries;

And, whereas apportionment procedures have been developed and accepted identifying the manner in which the equal-sharing arrangement is to be met;

And whereas, Canada and the United States have identified that beneficial use of the respective shares of the waters of both countries may be improved by providing for increased flexibility in the application of the accepted procedures;

It is therefore ordered and directed by the Accredited Officers that:

1. Acceptable means by which to provide increased flexibility and benefit may include:

For all formally apportioned Eastern Tributaries

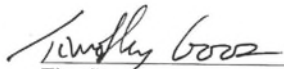
- a. Management of deficit deliveries to allow for prolonged periods of deficit storage in Canadian reservoirs in the Province of Saskatchewan, interim partial deficit discharge, and release rates coordinated with downstream Montana needs and uses where such operations would provide mutually determined and incidental benefits.

For the Frenchman River Tributary

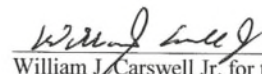
- b. Notwithstanding that reasonable water-management operations will be made by Canada to balance outstanding deficits, residual season-end deficits of less than 300 dam³ (240 acre-feet) shall be allowed and forgiven if live-channel flow at the international boundary is anticipated to continue beyond the apportionment season.

For the Lodge/Middle Creek Tributary

- c. Notwithstanding that reasonable water-management operations will be made by Canada to balance outstanding deficits, small deficits on the order of 200 dam³ (160 acre-feet) which arise in the latter apportionment season shall be concluded by mutual agreement, giving due consideration to factors including, but not limited to, available Canadian storage in Saskatchewan reservoirs, existing channel conditions, and beneficial use of the deficit volume. Where it is concluded that a specified deficit volume cannot reasonably and beneficially be offset by a release from Canadian storage, the deficit volume shall be allowed and forgiven.
2. Mutual agreement for the extent and application of Clause 1 above shall be determined by designates of Montana Department of Natural Resources and Conservation (DNRC) and the Saskatchewan Watershed Authority. The intended actions determined by mutual agreement shall be communicated to the Field Representatives for the United States and Canada for approval.
3. Normally accepted calculations of deficit and surplus flows shall continue to determine the apportionment balance.
4. All apportionment balances within the general limits stated in Clause 1 shall be considered resolved at the end of the apportionment season and resulting deficits shall not be carried forward to the next apportionment season.
5. In the event operations arising from Clause 1 cannot be agreed upon between the Montana DNRC and the Saskatchewan Watershed Authority, the original terms of the procedures shall be the default position. Such default may be initiated by request of the Montana DNRC or the Saskatchewan Watershed Authority to the Field Representatives for the United States and Canada.
6. Environment Canada and the U.S. Geological Survey will provide apportionment information to all parties in a timely manner. A list of the parties is included as Annex A and will be updated annually, or more often as required.
7. Termination of this Letter of Intent will be allowed upon request by either the United States or Canada notifying the other party in writing by February 1 of the year of intended termination.



Tim Goos
Accredited Officer of Her Majesty
Dated this 23 day of August, 2007



William J. Carswell Jr. for the
Accredited Officer of the United States
Dated this 11 day of September 2007

**LETTER OF INTENT –
TO BETTER UTILIZE THE WATERS OF THE EASTERN TRIBUTARIES OF THE MILK RIVER**

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James Heffner	DNRC	Jheffner@mt.gov	(406) 444-9731

AAFC	Agriculture and Agri-Food Canada
AEP	Government of Alberta, Environment and Parks
A.O.	Accredited Officer
DNRC	Montana Department of Natural Resources and Conservation
ECCC	Environment and Climate Change Canada

F.R.	Field Representative
USBR	United State Bureau of Reclamation
USGS	United States Geological Survey
WSA	Water Security Agency

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ANNEX D
Conversion Factors

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FACTORS FOR CONVERSION BETWEEN INCH-POUND UNITS AND INTERNATIONAL SYSTEM (SI) UNITS

Since 1975, the Report to the International Joint Commission on the Division of the Waters of the St. Mary and Milk Rivers has used dual units (SI and inch-pound).

The two inch-pound units that were used in previous reports were cfs-days and acre-feet.

1 cfs-day = 86,400 cubic feet
1 acre-foot = 43,560 cubic feet
1 cfs-day = 1.9835 acre-feet

The SI unit replacing the inch-pound units for volume is the cubic decametre (dam^3).

1 dam^3 = 1 000 cubic metres
1 cubic metre = 35.315 cubic feet
1 dam^3 = 35,315 cubic feet
1 acre-foot = 1.2335 dam^3
1 cfs-day = 2.4466 dam^3
1 dam^3 = 0.8107 acre-feet

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ANNEX E

List of Gauging Stations

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INTERNATIONAL GAUGING STATIONS OPERATED JOINTLY
BY
THE UNITED STATES AND CANADA
ST. MARY AND MILK RIVER BASINS
2016

Stations listed in downstream order

Map Index	Station Name
<u>ST. MARY RIVER BASIN</u>	
5015500	Lake Sherburne at Sherburne, Montana
5018000	St. Mary Canal at St. Mary Crossing near Babb, Montana
05AE027	St. Mary River at International Boundary
<u>MILK RIVER BASIN</u>	
6133500	N. Fork Milk River above St. Mary Canal near Browning, Montana
11AA001	North Milk River near International Boundary
11AA025	Milk River at Western Crossing of International Boundary
11AA005	Milk River at Milk River, Alberta
11AA031	Milk River at Eastern Crossing of International Boundary
<u>LODGE CREEK TRIBUTARY BASIN</u>	
11AB089	Altawan Reservoir near Govenlock
11AB060	Spangler Ditch near Govenlock
11AB009	Middle Creek near Saskatchewan Boundary
11AB001	Middle Creek below Middle Creek Reservoir
11AB108	Middle Creek near Govenlock
11AB008	Middle Creek above Lodge Creek
11AB083	Lodge Creek below McRae Creek at International Boundary
<u>BATTLE CREEK TRIBUTARY BASIN</u>	
11AB102	Gaff Ditch near Merryflat
11AB078	Cypress Lake West Inflow Canal
11AB085	Cypress Lake West Inflow Canal Drain
11AB077	Cypress Lake West Outflow Canal
11AB084	Vidora Ditch near Consul
11AB058	Richardson Ditch near Consul
11AB044	McKinnon Ditch near Consul
11AB018	Nashlyn Canal near Consul
11AB027	Battle Creek at International Boundary
<u>FRENCHMAN RIVER TRIBUTARY BASIN</u>	
11AC064	Belanger Creek Diversion to Cypress Lake
11AC037	Cypress Lake
11AC060	Cypress Lake East Outflow Canal
11AC052	Eastend Canal near Eastend
11AC055	Eastend Reservoir
11AC063	Huff Lake
11AC066	Huff Lake Pumping Canal
11AC065	Huff Lake Gravity Canal
11AC056	Newton Lake
11AC054	Newton Lake Main Canal
11AC041	Frenchman River at International Boundary

GAUGING STATIONS OPERATED INDEPENDENTLY
BY EITHER
THE UNITED STATES OR CANADA
ST. MARY AND MILK RIVER BASINS
2016

*Data for these stations are not included in this report or appendices

**Station not operated in 2016

Map Index	Station Name	Operated by
<u>ST. MARY RIVER BASIN</u>		
5013900**	Grinnell Cr at Grinnell Glacier near Many Glacier, Montana	U.S.A.
5014300*	Swiftcurrent Creek above Swiftcurrent Lake, at Many Glacier, Montana	U.S.A.
5014500*	Swiftcurrent Creek at Many Glacier, Montana	U.S.A.
5017500*	St. Mary River near Babb, Montana	U.S.A.
5018000*	St. Mary Canal at intake, near Babb, Montana	U.S.A.
05AE043*	St. Mary River at Highway 501, near Kimball, Alberta	Canada
05AE005*	Rolph Creek near Kimball, Alberta	Canada
05AE002*	Lee Creek at Cardston, Alberta	Canada
05AE025*	St. Mary Reservoir near Spring Coulee, Alberta	Canada
05AE026*	Canadian St. Mary Canal near Spring Coulee, Alberta	Canada
05AE021*	MacGrath Irrigation District Canal near Spring Coulee, Alberta	Canada
<u>MILK RIVER BASIN</u>		
6132200**	South Fork Milk River near Babb, Montana	U.S.A.
11AA028*	Bear Creek near International Boundary	Canada
11AA029*	Miners Coulee near International Boundary	Canada
11AA038*	Verdigris Coulee near the Mouth	Canada
6137400**	Big Sandy Creek at reservation boundary, near Rocky Boy, Montana	U.S.A.
FRR*	Fresno Reservoir	U.S.A.
6139500*	Big Sandy Creek near Havre, Montana	U.S.A.
6140500*	Milk River at Havre, Montana	U.S.A.
6142400*	Clear Creek near Chinook, Montana	U.S.A.
FTBELKMT*	Fort Belknap Main Diversion Canal	U.S.A.
ALFVALMT*	Alfalfa Valley Diversion Canal	U.S.A.
ZURICHMT*	Zurich Main Diversion Canal	U.S.A.
PARDISMT*	Paradise Main Diversion Canal	U.S.A.
6151500*	Battle Creek near Chinook, Montana	U.S.A.
HARLEMMT*	Harlem Main Pump Diversion	U.S.A.
HSCM*	Harlem Secondary Pump Diversion	U.S.A.
6154100*	Milk River at Harlem, Montana	U.S.A.
FBCM*	BIA – Fort Belknap Main Diversion Canal	U.S.A.
6154400*	Peoples Creek near Hays, Montana	U.S.A.
6154410*	Little Peoples Creek near Hays, Montana	U.S.A.
6154550*	Peoples Creek below Kuhn Coulee, near Dodson, Montana	U.S.A.
DODM*	Dodson North Canal	U.S.A.
DSCM*	Dodson South Canal	U.S.A.
6155030*	Milk River near Dodson, Montana	U.S.A.
DPCM*	Dodson Pump Diversion	U.S.A.
6155900*	Milk River at Cree Crossing, near Saco, Montana	U.S.A.
NELFDRMT*	Nelson Reservoir Feeder Canal	U.S.A.
NELR*	Nelson Reservoir	U.S.A.
NSCM*	Nelson South Canal	U.S.A.
NNCM*	Nelson North Canal	U.S.A.
6164510*	Milk River at Juneburg Bridge, near Saco, Montana	U.S.A.
6166000*	Beaver Creek below Guston Coulee, near Saco, Montana	U.S.A.
BCHM*	Beaver Creek near Hinsdale, Montana	U.S.A.
GLASGOMT*	Glasgow Main Diversion Canal	U.S.A.
6172310*	Milk River at Tampico, Montana	U.S.A.
6174500*	Milk River at Nashua, Montana	U.S.A.

LODGE CREEK TRIBUTARY BASIN

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

BATTLE CREEK TRIBUTARY BASIN

11AB020*	Shepherd Ditch near Consul	Canada
11AB075	Lyons Creek at International Boundary	Canada
11AB090	Reesor Reservoir near Elkwater	Canada
11AB095*	Adams Lake	Canada
11AB096*	Battle Creek near Consul	Canada
11AB101*	Battle Creek below Nashlyn Project	Canada
11AB117*	Battle Creek at Alberta Boundary	Canada
11AB118*	Battle Creek below Wilson's Weir	Canada
6151500*	Battle Creek near Chinook, Montana	U.S.A.

FRENCHMAN RIVER TRIBUTARY BASIN

11AC025*	Denniel Creek near Val Marie	Canada
11AC062*	Frenchman River below Newton Lake	Canada
11AC068*	Val Marie Pump No. 1	Canada

ROCK CREEK TRIBUTARY BASIN

6169500*	Rock Creek below Horse Creek near International Boundary	U.S.A.
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SAGE CREEK TRIBUTARY BASIN

11AA026*	Sage Creek at Q Ranch near Wildhorse	Canada
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