

International Niagara Board of Control
One Hundred Fourteenth Semi-Annual Progress Report
to the
International Joint Commission



Covering the Period September 17, 2009 through March 10, 2010

EXECUTIVE SUMMARY

The level of Lake Erie began the reporting period 8 centimetres (3.1 inches) above long-term average for the month of September. The lake level followed its normal seasonal decline during the reporting period and remained above the long-term average until January. In January 2010 the water level matched the long-term average for the month of January of 173.99 metres (570.83 feet). Precipitation throughout the period fluctuated between above- and below-average values but was particularly low in November and January (Section 2).

The level of the Chippawa-Grass Island Pool was regulated under the International Niagara Board of Control's 1993 Directive. The Power Entities were able to comply with the Board's Directive at all times during the reporting period (Section 3).

On January 1, 2010, the new (2009) Ashland rating equation was implemented, without incident, by operators of the International Niagara Control Works. The flow over Niagara Falls was below Treaty requirements for one hour on September 26. This was the result of a mis-judgement of the time required to adjust gate settings to maintain the Treaty minimum. It was also below the required daylight Falls minimum for 2 hours on October 8 and 1 hour on October 11 as the result of police actions (Section 4).

Ontario Power Generation continues with construction of the Niagara Tunnel Project. By March 8, the Tunnel Boring Machine (TBM) had progressed 6167 metres (20,233 feet). This is over half of the entire tunnel length (Section 8).

Installation of the Lake Erie-Niagara River Ice Boom began on December 17 and was completed on December 19 (Section 9).

The Board will hold a meeting with the public in September 2010 in Niagara Falls, New York (Section 10).

COVER: **Activities underway to prepare the new Ice Boom storage site which is located adjacent to the Buffalo River. (U.S. Army Corps of Engineers photograph)**

TABLE OF CONTENTS

<u>SECTION</u>		<u>PAGE</u>
1	GENERAL	1
2	LAKE LEVELS	1
3	OPERATION AND MAINTENANCE OF THE INTERNATIONAL NIAGARA CONTROL WORKS	6
4	FLOWS OVER NIAGARA FALLS	7
5	DIVERSIONS AND FLOW AT QUEENSTON	8
6	GAUGING STATIONS	10
7	FLOW MEASUREMENTS IN THE NIAGARA RIVER AND WELLAND SHIP CANAL	11
8	NIAGARA TUNNEL PROJECT AND PLANT UPGRADES	12
9	ICE CONDITIONS AND ICE BOOM OPERATION	12
10	MEETING WITH THE PUBLIC	14
11	MEMBERSHIP OF THE BOARD	14
12	ATTENDANCE AT BOARD MEETINGS	15

TABLES

PAGE

1	MONTHLY AVERAGE LAKE ERIE WATER LEVELS	3
2	MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN	3
3	MONTHLY NIAGARA RIVER FLOWS AT QUEENSTON	9
4	MONTHLY MAXIMUM AND MINIMUM NIAGARA RIVER FLOWS AT QUEENSTON	10

FIGURES

1	MONTHLY MEAN WATER LEVEL - LAKE ERIE	4
2	MONTHLY PRECIPITATION - LAKE ERIE BASIN	4
3	MONTHLY NET BASIN SUPPLY - LAKE ERIE BASIN	5
4	MONTHLY MEAN FLOW - NIAGARA RIVER AT BUFFALO, NEW YORK	5

ENCLOSURES

1	MAP OF THE UPPER NIAGARA RIVER
2	NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAUGE
3	FLOWS OVER NIAGARA FALLS
4	DIVERSIONS OF NIAGARA RIVER WATER FOR POWER PURPOSES

INTERNET SITES

International Joint Commission

www.ijc.org

International Niagara Board of Control

www.ijc.org/conseil_board/niagara/en/niagara_home_accueil.htm

www.ijc.org/conseil_board/niagara/fr/niagara_home_accueil.htm

Lake Erie-Niagara River Ice Boom

www.iceboom.nypa.gov

INTERNATIONAL NIAGARA BOARD OF CONTROL

Chicago, Illinois
Burlington, Ontario

March 10, 2010

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

Commissioners:

1. **GENERAL**

The International Niagara Board of Control (Board) submits its One Hundred Fourteenth Semi-Annual Progress Report, covering the period September 17, 2009 through March 10, 2010.

2. **LAKE LEVELS**

All elevations in this report are referenced to International Great Lakes Datum 1985 (IGLD 1985). The values are expressed in metric units, with approximate English units (in parentheses) for information purposes only. The monthly lake level data are based on a network of four gauges to better represent the average level of the lake.

The level of Lake Erie began the reporting period 8 centimetres (3.1 inches) above long-term average for the month of September. The lake level followed its normal seasonal decline during the reporting period and remained above the long-term average until January. In January 2010, the water level matched the long-term average for the month of January of 173.99 metres (570.83 feet) and dipped below average for February

at 173.92 metres (570.6 feet). Precipitation throughout the period fluctuated between above- and below-average values but was particularly low in November and January.

Recorded water level data for the period September 2009 through February 2010 and departures from long-term averages are shown in Table 1 and depicted graphically in Figure 1.

The Lake Erie basin received approximately 35 centimetres (14 inches) of precipitation during the September 2009 - February 2010 period. This is about 13% below average for the time of year. Recent precipitation data and departures from long-term averages are shown in Table 2 and depicted graphically in Figure 2.

Lakes Michigan and Huron remained below the long-term average level by about 14 centimetres (5.5 inches) during the reporting period. On average, however, this level was 36 centimetres (14 inches) higher than the same reporting period of last year. The below-average Michigan-Huron level continued to result in below-average inflows to Lake Erie through the Detroit River.

Water supplied to Lake Erie from its local drainage basin started the reporting period below average. The trend in water supplies followed the trend in precipitation, fluctuating between below and above average. The Niagara River monthly mean flows were near average during the reporting period. The higher than average flows in December and January are likely due to lower-than-normal ice retardation in the river. The flows in the Niagara River are graphically depicted in Figure 4 and summarized in Section 5.

The March 2010 six-month water level forecast indicates that the level of Lake Erie is expected to be slightly below its long-term average through mid-summer.

TABLE 1 - MONTHLY AVERAGE LAKE ERIE WATER LEVELS

(Based on a network of 4 water level gauges)

International Great Lakes Datum (1985)

Month	Metres			Feet		
	Recorded* 2009-10	Average 1918-2008**	Departure	Recorded* 2009-10	Average 1918-2008**	Departure
September	174.24	174.16	0.08	571.65	571.39	0.26
October	174.13	174.06	0.07	571.29	571.06	0.23
November	174.07	173.99	0.08	571.10	570.83	0.27
December	174.03	173.99	0.04	570.96	570.83	0.13
January	173.99	173.99	0.00	570.83	570.83	0.00
February	173.92	173.99	-0.07	570.60	570.83	-0.23

*Provisional

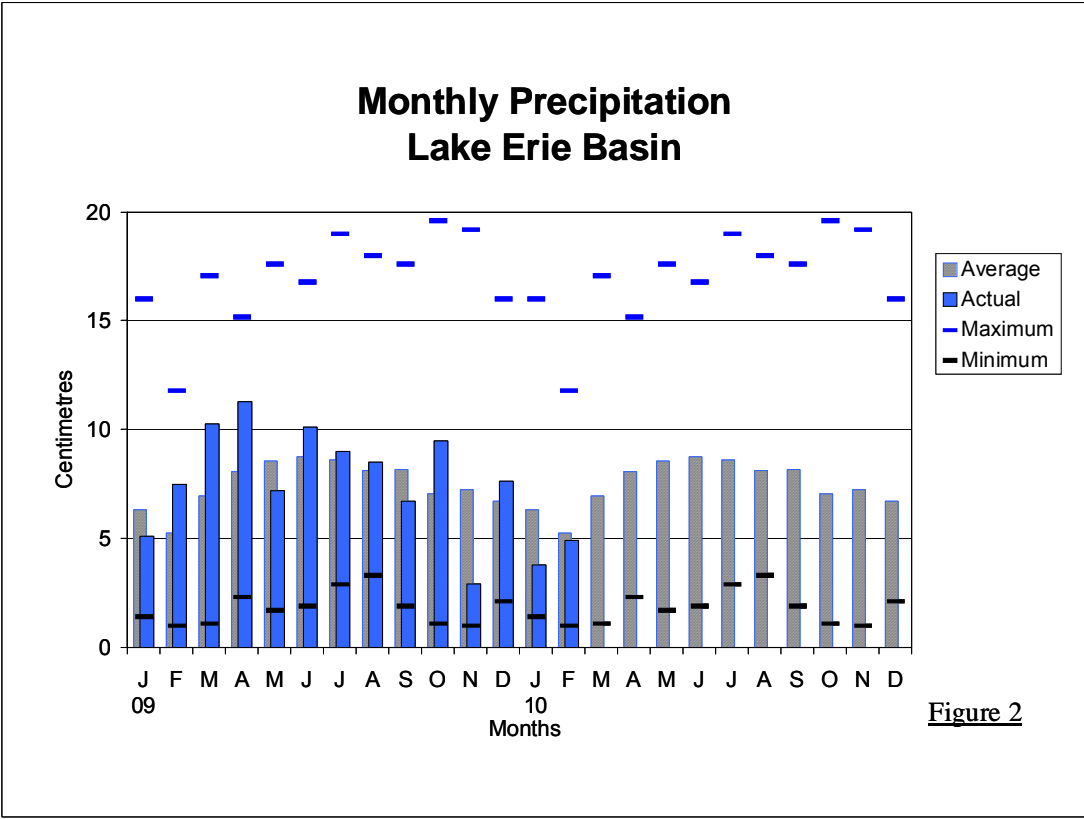
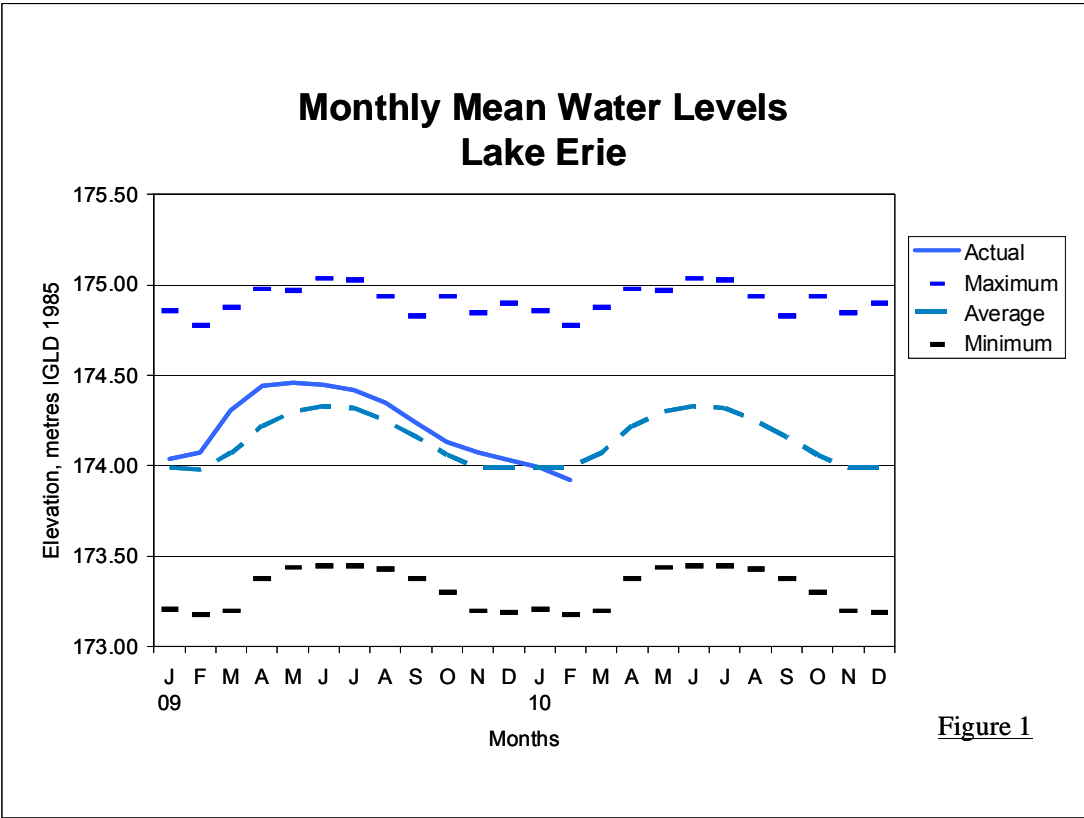
**Period of record is 1918-2008

TABLE 2 - MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN

Month	Centimetres			Inches			
	Recorded* 2009-10	Average 1900-2006 [†]	Departure	Recorded* 2009-10	Average 1900-2006 [†]	Departure	Departure (in percent)
September	6.71	8.13	-1.42	2.64	3.20	-0.56	-18
October	9.45	7.04	2.41	3.72	2.77	0.95	34
November	2.92	7.24	-4.32	1.15	2.85	-1.70	-60
December	7.62	6.69	0.93	3.00	2.63	0.37	14
January	3.78	6.29	-2.51	1.49	2.48	-0.99	-40
February	4.90	5.25	-0.35	1.93	2.07	-0.14	-7

*Provisional

[†]Most recent period of record is 1900-2006



Monthly Net Basin Supplies Lake Erie Basin

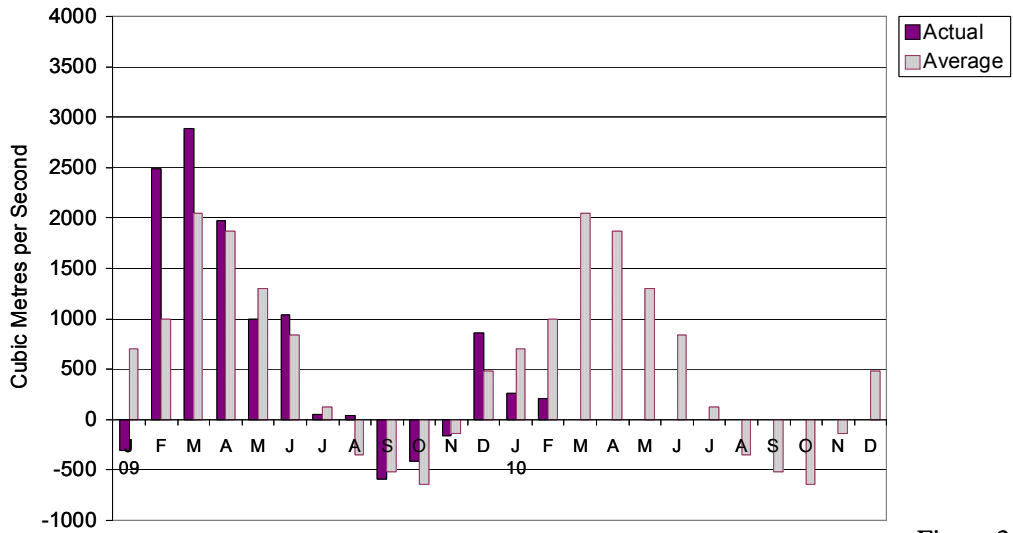


Figure 3

Niagara River Monthly Mean Flows at Buffalo, New York

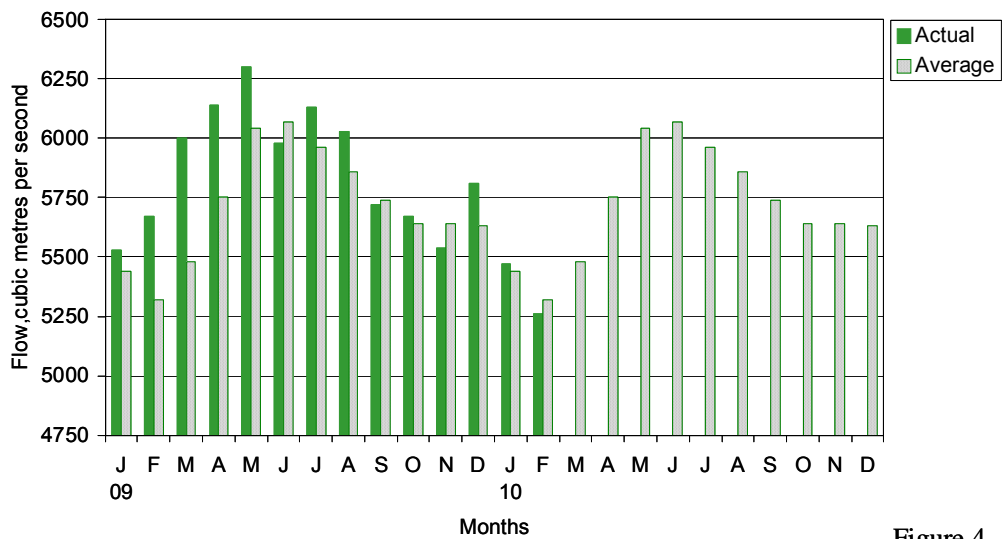


Figure 4

3. OPERATION AND MAINTENANCE OF THE INTERNATIONAL NIAGARA CONTROL WORKS

The water level in the Chippawa-Grass Island Pool (Pool) is regulated in accordance with the Board's 1993 Directive. The Directive requires that the Power Entities, Ontario Power Generation (OPG) and the New York Power Authority (NYPA), operate the International Niagara Control Works to ensure the maintenance of an operational long-term average Pool level of 171.16 metres (561.55 feet) to ameliorate adverse high or low water levels in the Pool. The Directive also establishes tolerances for the Pool's level as measured at the Material Dock gauge.

The Power Entities complied with the Board's Directive at all times during the reporting period.

The accumulated deviation of the Pool's level from March 1, 1973 through February 28, 2010 was 0.24 metre-month (0.79 foot-month) above the long-term average elevation. The maximum permissible accumulated deviation is +/- 0.91 metre-month (3.00 foot-month).

Tolerances for regulation of the Pool level were suspended for October 8 and 11 to assist in a police investigation and for September 28 and 29, October 7 and December 9 through 11 due to abnormally high flows. In addition, tolerances were suspended for January 11 through 15, 23, 27 through 31 and February 1, 2, 7 and 8 to assist in ice management and February 6 due to abnormally low flows.

The locations of the water level gauges on the Niagara River are shown in Enclosure 1. Recorded daily Material Dock water levels covering the period September 2009 through February 2010 are shown in Enclosure 2.

A major overhaul (seals, cylinders, pistons) of Gate 2 began on April 28 and was completed on October 2, 2009. A similar overhaul will be completed on Gate 10 this year. In addition, replacement of Gate 10's roll plate will be made at the same time. As a result of inspections done in 2008, a program to replace all oil lines in Gates 1 to 13 will begin this Spring at the rate of 3 gates per year. The oil lines in the newer gates (14-18) do not need to be replaced.

4. **FLOWS OVER NIAGARA FALLS**

During the tourist season daylight hours, the required minimum Niagara Falls flow is 2832 cubic metres per second (m^3/s) (100,000 cubic feet per second (cfs)). At night and during the winter months, the required minimum Falls flow is 1416 m^3/s (50,000 cfs). The operation of the International Niagara Control Works, in conjunction with power diversion operations, ensures sufficient flow over the Falls to meet the requirements of the Niagara Treaty of 1950.

The flow over Niagara Falls was below Treaty requirements for one hour on September 26. This was the result of a mis-judgement of the time required to adjust gate settings to maintain the Treaty minimum. Steps have been taken by the Control Structure operators to prevent a similar occurrence.

In addition, flows were below Treaty requirements for two hours on October 8 and 1 hour on October 11 as the result of actions taken in response to a request from the Niagara Parks Commission Police. The reduced flows and levels assisted the police as they investigated reports of people in the river.

On January 1, 2010, the new (2009) Ashland rating equation was implemented, without incident, by operators of the International Niagara Control Works. The Board has

directed its staff to be in contact with the Maid-of-the-Mist Steamboat Company and Niagara JetBoat operations, as the tourist season nears, to be assured that the water level impacts to their operations are understood.

Falls flow met or exceeded minimum Treaty requirements at all other times during the reporting period. The recorded daily flow over Niagara Falls, covering the period September 2009 through February 2010, is shown in Enclosure 3.

5. **DIVERSIONS AND FLOW AT QUEENSTON**

Diversion of water from the Niagara River for power purposes is governed by the terms and conditions of the 1950 Niagara Treaty. The Treaty prohibits the diversion of Niagara River water that would reduce the flow over Niagara Falls to below the amounts specified for scenic purposes.

The hydro power plants, OPG's Sir Adam Beck 1 and 2 in Canada and NYPA's Niagara Power Project in the United States, withdraw water from the Chippawa-Grass Island Pool above Niagara Falls and discharge it into the lower Niagara River at Queenston, Ontario and Lewiston, New York, respectively.

During the period September 2009 through February 2010, diversion for the Sir Adam Beck 1 and 2 plants averaged 1659 m³/s (58,590 cfs) and diversion to the Robert Moses Niagara Power Project averaged 1846 m³/s (65,190 cfs).

The average flow from Lake Erie to the Welland Canal for the period September 2009 through February 2010 was 225 m³/s (7,950 cfs) compared to 227 m³/s (8,020 cfs) for the same period one year ago. Diversion from the canal to OPG's DeCew Generating

Stations averaged 176 m³/s (6,220 cfs) for the period September 2009 through February 2010.

Records of diversions for power generation covering the period September 2009 through February 2010 are shown in Enclosure 4.

The monthly average Niagara River flows at Queenston, Ontario for the period September 2009 through February 2010 and departures from long-term averages are shown in Table 3. Maximum and minimum monthly average flows are shown in Table 4.

TABLE 3 - MONTHLY NIAGARA RIVER FLOWS AT QUEENSTON

Month	Cubic Metres per Second			Cubic Feet per Second		
	Recorded 2009-10	Average 1900-2008	Departure	Recorded 2009-10	Average 1900-2008	Departure
September	5715	5725	-10	201820	202180	-360
October	5666	5643	23	200090	199280	810
November	5556	5656	-100	196210	199740	-3530
December	5829	5690	139	205850	200940	4910
January	5578	5537	41	196980	195540	1440
February	5287	5428	-141	186710	191690	-4980
Average	5605	5613	-8	197940	198230	-290

TABLE 4 - MONTHLY MAXIMUM AND MINIMUM NIAGARA RIVER FLOWS AT QUEENSTON

Month	Cubic Metres per Second				Cubic Feet per Second	
	Maximum	Year	Minimum	Year	Maximum	Minimum
September	6880	1986	4340	1934	242960	153260
October	7220	1986	4320	1934	254970	152560
November	7030	1986	4190	1934	248260	147970
December	7410	1985	4270	1964	261680	150790
January	7240	1987	3960	1964	255680	139850
February	6900	1987	3320	1936	243670	117240

During the period September 2009 through February 2010, the flow at Queenston averaged 5605 m³/s (197,940 cfs). One year ago, flows for the same period averaged 5558 m³/s (196,280 cfs) with the monthly averages ranging between 5384 m³/s (190,130) and 5792 m³/s (204,540 cfs).

6. GAUGING STATIONS

The Niagara River gauges used to monitor the Chippawa-Grass Island Pool levels and the flow over Niagara Falls are the Slater's Point, Material Dock, American Falls and Ashland Avenue gauges (see Enclosure 1). All gauges required for the operation of the Chippawa-Grass Island Pool control structure were in operation during the reporting period.

Both the U. S. National Oceanic and Atmospheric Administration (NOAA) and the Power Entities operate water level gauges at the Ashland Avenue location. Subject to continuing comparison checks of the water level data from both instruments by the International Niagara Committee (INC), the Power Entities' gauge is used for officially

recording water levels used in determining the flows over Niagara Falls. Comparison of water level readings from both gauges showed that they were within acceptable INC tolerances throughout the reporting period.

7. **FLOW MEASUREMENTS IN THE NIAGARA RIVER AND WELLAND SHIP CANAL**

Discharge measurements are regularly scheduled in the Niagara River and Welland Canal, for water management purposes, as part of a program to verify the gauge ratings used to determine flows in these channels. All measurements are obtained through joint efforts of the United States Army Corps of Engineers and Environment Canada. Measurement programs require boat, equipment and personnel from both agencies to ensure safety, quality assurance checks between equipment and methods, and bi-national acceptance of the data collected. The Corps and Environment Canada continue efforts to standardize measurement equipment and techniques.

Measurements were conducted at the International Railway Bridge Section in May 2009. Results averaged 3% higher than the 2001 Buffalo rating and differed by a larger amount from the rating than previous measurements in the same water level ranges. Further measurements are recommended for this section in 2010. Measurements are also scheduled for 2010 at the Cableway and Welland Canal Sections and for 2012 at the American Falls Section.

Under the direction of the International Niagara Committee, use of the revised (2009) Ashland Avenue Gauge Rating began January 1, 2010.

8. **NIAGARA TUNNEL PROJECT AND PLANT UPGRADES**

Ontario Power Generation continues with construction of the Niagara Tunnel Project. When completed, the increased diversion capacity will mean that OPG's Sir Adam Beck plants can more fully utilize Canada's diversion entitlement for power production. Increased diversion will not affect the regulation of the Chippawa-Grass Island Pool governed by the International Niagara Board of Control's 1993 Directive.

By March 8, the Tunnel Boring Machine (TBM) had progressed 6167 metres (20,233 feet). This is over half of the entire tunnel length. The advance of the TBM was temporarily interrupted from September 11 through December 8, 2009 complete a planned overhaul of the TBM cutter head, conveyor systems and other tunnel construction equipment, and to repair a short section of the temporary tunnel liner that failed about 1,800 metres (5,900 feet) behind the TBM location.

OPG has also undertaken a unit runner replacement program for its 60 Hz Beck I units. Unit G9 is currently out of service and work is expected to be completed by the end of 2010. Work on the next unit will commence in July 2011, and it is expected to be completed in January 2013.

In addition, work continues on the replacement of the ND1 (DeCew) penstocks and unit overhauls. The first two units are expected to return to service in August and September 2010, with the remaining two units due back in April and May 2011.

9. **ICE CONDITIONS AND ICE BOOM OPERATION**

In accordance with Condition (d) of the Commission's October 5, 1999 supplementary Order of Approval, installation of the Lake Erie-Niagara River Ice Boom's

spans commenced on December 17. The Lake Erie water temperature as measured at the Buffalo Water Intake reached 4° Celsius (39° Fahrenheit) on December 12. Installation may begin when the Lake Erie water temperature at Buffalo reaches 4°C (39°F) or on December 16th, whichever occurs first.

Installation of the ice boom's spans began on December 17 when 6 spans were placed starting from the Canadian side. A further 12 spans, continuing on towards the US shore, were installed on December 18 with the final 4 spans placed on December 19.

The New York Power Authority's Flood Warning Notification Plan in the Event of Ice-Affected Flooding on the Upper Niagara River was tested on December 15. A drill was conducted that simulated a flood event along the U.S. shore triggered by an ice jam upstream of the NYPA intakes in the vicinity of the north Grand Island Bridges. This scenario became reality during the early morning of January 28, 2010 when a warning was issued as the water level rose slightly above the Zero Damage Elevation at the LaSalle Gauge for an hour and a half; however, no flood damage was reported.

Ice first appeared in the Chippawa-Grass Island Pool on January 3. Ice management measures were undertaken in the Pool, at times including ice breaker activity, during much of January. An ice bridge formed in the Maid-of-the-Mist Pool, below the Falls, on January 12. Lake Erie was only about 10% ice covered at the start of January, about half of the average¹ for that time in the season. Ice cover on the lake peaked during the first week of February when it was about 95% compared to the average for that point of around 65%. The extent of cover had reduced to about 60% by the end of the month.

A helicopter flight was conducted on February 12 to measure ice thickness at six sites on the eastern end of Lake Erie. Average thickness was 9 centimetres (3.5 inches).

¹ Average 1973-2002 Source: Canadian Ice Service

Similar measurements taken on February 13 of the previous year, averaged 34 centimetres (13 inches).

At the end of the reporting period, construction of the new ice boom storage site was nearing completion (see cover photo). It is expected to be available when the ice boom is removed this spring. The storage site is located along the Buffalo River, about 3 kilometres (2 miles) from the lake.

10. **MEETING WITH THE PUBLIC**

In accordance with the Commission's requirements, the Board will hold an annual meeting with the public. The meeting will be held in September 2010 on a date to be determined. The meeting will be in Niagara Falls, New York. Information on items including current and projected Great Lakes levels, the operation of the Lake Erie-Niagara River Ice Boom, and OPG's Niagara Tunnel Project will be presented. The previous meeting was held in St. Catharines, Ontario on September 15, 2009.

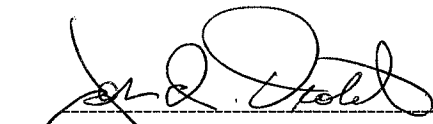
11. **MEMBERSHIP OF THE BOARD**

On February 23, 2010, Colonel John Drolet was appointed Alternate U.S. Chair, vice Colonel Vincent Quarles. The U.S. Chair had requested the change to allow Colonel Quarles to more closely focus on invasive species, particularly in preventing the Asian carp from reaching Lake Michigan through the Illinois Waterway. A position on the Canadian Section of the Board's Working Committee is open with the retirement of Mr. Leo Christl from Ontario's Ministry of Natural Resources in November 2009. Mr. Christl served on the Working Committee since July 1994.


12. **ATTENDANCE AT BOARD MEETINGS**

The Board met once during this reporting period. The meeting was held in Detroit, MI on March 10, 2010. Mr. Mahoney was unable to attend.

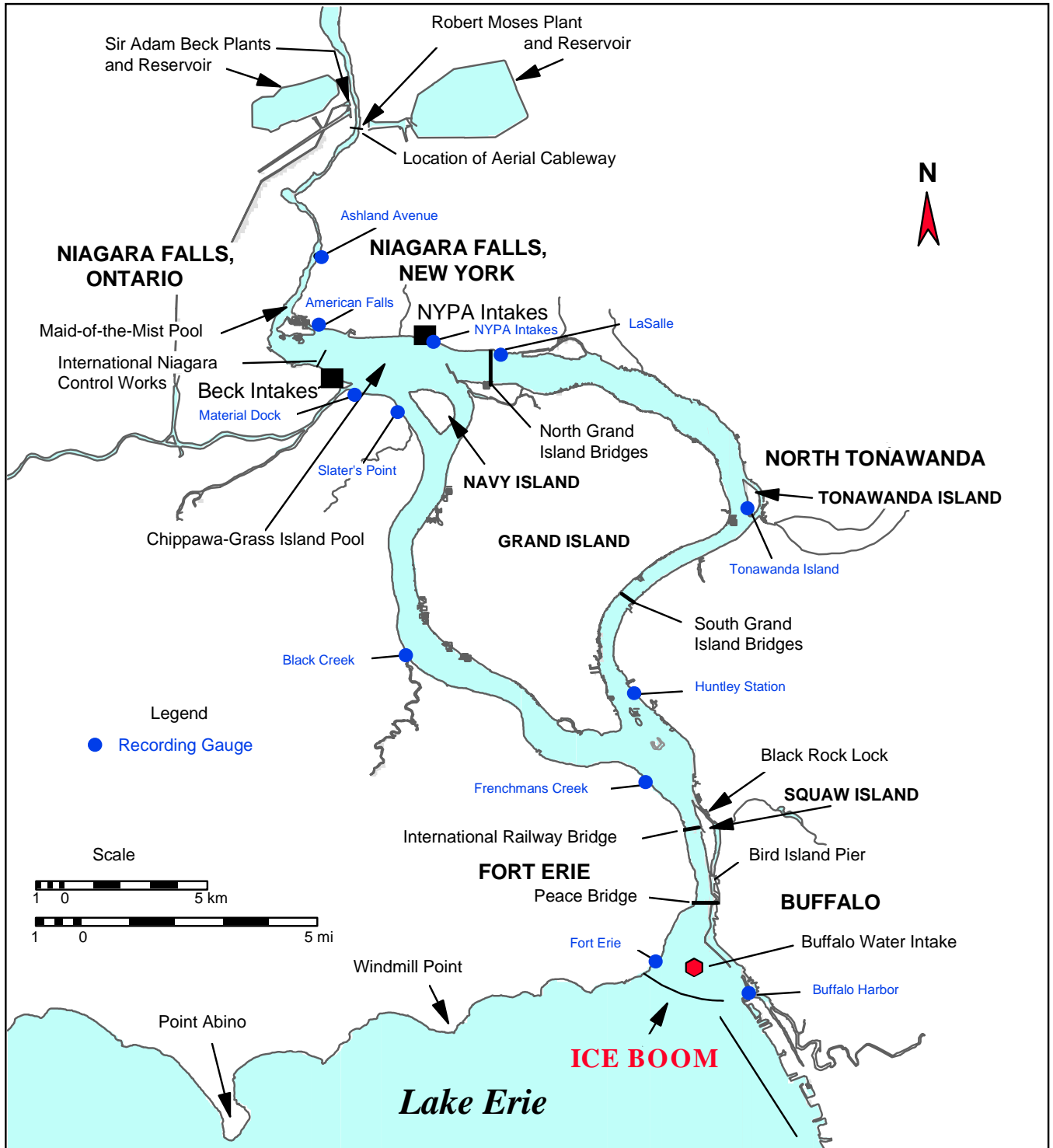
Respectfully Submitted,


MAJOR GENERAL JOHN W. PEABODY
Chair, United States Section


RALPH MOULTON
Chair, Canadian Section


DANIEL J. MAHONEY
Member, United States Section

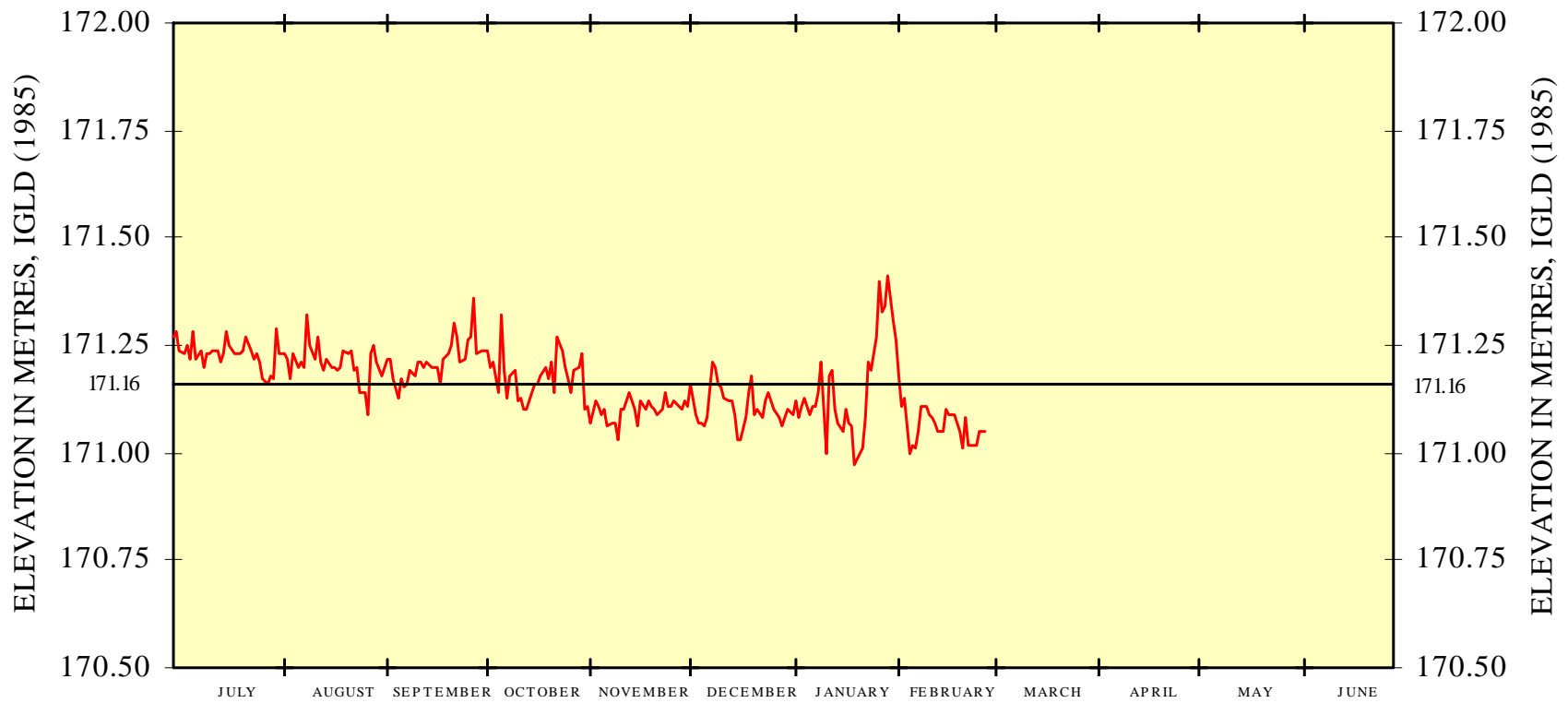
VACANT
Member, Canadian Section



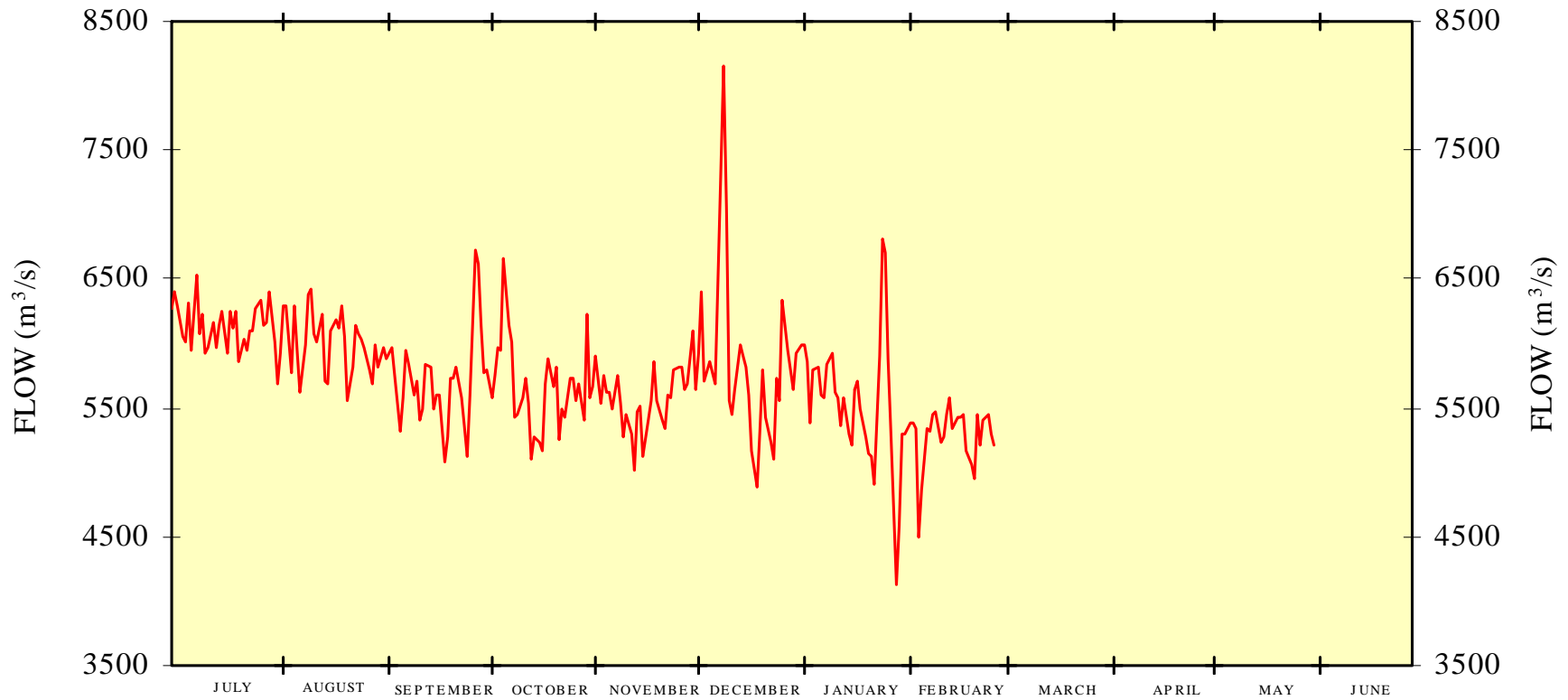
NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAUGE

NOTE: LONG-TERM MEAN STAGE = 171.16 METRES, IGLD (1985)

JULY 2009 THROUGH FEBRUARY 2010



DAILY NIAGARA RIVER FLOW AT QUEENSTON
FLOW AT ASHLAND AVENUE PLUS BECK 1 AND 2 AND NYPA DISCHARGES
IN CUBIC METRES PER SECOND (m³/s)
JULY 2009 THROUGH FEBRUARY 2010



DAILY DIVERSIONS OF NIAGARA RIVER WATER* FOR POWER PURPOSES IN CUBIC METRES PER SECOND (m³/s) JULY 2009 THROUGH FEBRUARY 2010

