International Niagara Board of Control

One Hundred Eighteenth Semi-Annual Progress Report

to the

International Joint Commission

Covering the Period September 15, 2011 through March 22, 2012

EXECUTIVE SUMMARY

The level of Lake Erie began the reporting period 14 centimetres (5.5 inches) above the long-term average for the month of September, and remained above average during the reporting period. Heavy rain during the second half of November resulted in a sharp rise in the lake's level that was sustained through to the end of the reporting period, at which time the lake was 38 centimetres (15 inches) above the long-term average. Inflow to Lake Erie from upstream, via the Detroit River, remained below the long-term average throughout the reporting period and was virtually unaffected by ice retardation during January and February (Section 2).

The level of the Chippawa-Grass Island Pool is regulated under the International Niagara Board of Control's 1993 Directive. The Power Entities (Ontario Power Generation (OPG) and the New York Power Authority (NYPA)) were able to comply with the Board's Directive at all times during the reporting period (Section 3).

Use of the cableway, located just upstream of the OPG and NYPA plants, for the Board's flow measurement program has become redundant. NYPA, on behalf of the Power Entities, has undertaken to have the cableway removed (Section 7).

OPG continues with construction of the Niagara Tunnel Project. The new tunnel will provide increased water diversion capability for OPG's Sir Adam Beck complex, and is expected to be in service by December 2013 (Section 8).

Installation of the Lake Erie-Niagara River Ice Boom began on December 17 and was completed on December 18. Lake Erie remained virtually ice free throughout the reporting period. The boom was opened on February 28, 2012, which is its earliest opening since it was first installed during the winter of 1964-65 (Section 9).

Colonel Margaret W. Burcham replaced Major General John W. Peabody as the U.S. Co-Chair of the Board on October 3, 2011. Colonel Burcham was promoted to Brigadier General, US Army, on January 27, 2012. Mr. Dan Mahoney retired from the U.S. Section of the Board at the end of September 2011. The U.S. Member position remains vacant (Section 11).

COVER: **Satellite photo for February 6, 2012, from NASA's MODIS observations via http://coastwatch.glerl.noaa.gov/modis/modis.html. Most of the white in this photo is clouds. A small amount of shore ice is seen near Point Pelee at the western end of Lake Erie and on the east shore of Lake St. Clair. The St. Clair and Detroit rivers appear to be ice free. The lack of a snow cover is also readily apparent.**

TABLE OF CONTENTS

SECTION		PAGE
1	GENERAL	1
2	BASIN CONDITIONS	1
3	OPERATION AND MAINTENANCE OF THE INTERNATIONAL NIAGARA CONTROL WORKS	7
4	GAUGING STATIONS	8
5	FLOWS OVER NIAGARA FALLS	10
6	DIVERSIONS AND FLOW AT QUEENSTON	10
7	FLOW MEASUREMENTS IN THE NIAGARA RIVER AND WELLAND SHIP CANAL	12
8	NIAGARA TUNNEL PROJECT AND PLANT UPGRADES	15
9	ICE CONDITIONS AND ICE BOOM OPERATION	16
10	MEETING WITH THE PUBLIC	19
11	MEMBERSHIP OF THE BOARD	20
12	ATTENDANCE AT BOARD MEETINGS	20

TABLES **PAGE**

1	MONTHLY AVERAGE LAKE ERIE WATER LEVEL	4
2	MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN	4
3	MONTHLY NIAGARA RIVER FLOWS AT QUEENSTON	12
4	MONTHLY MAXIMUM AND MINIMUM NIAGARA RIVER FLOWS AT QUEENSTON	12

FIGURES

1	MONTHLY MEAN WATER LEVEL - LAKE ERIE	5
2	MONTHLY PRECIPITATION - LAKE ERIE BASIN	5
3	MONTHLY NET BASIN SUPPLY - LAKE ERIE BASIN	6
4	MONTHLY MEAN FLOW - NIAGARA RIVER AT BUFFALO, NEW YORK	6

ENCLOSURES

1	MAP OF THE UPPER NIAGARA RIVER
2	NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAUGE
3	DAILY FLOW OVER NIAGARA FALLS
4	DAILY 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

Cincinnati, Ohio
Burlington, Ontario

March 22, 2012

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

Commissioners:

1. GENERAL

The International Niagara Board of Control (Board) submits its One Hundred Eighteenth Semi-Annual Progress Report, covering the reporting period September 15, 2011 through March 22, 2012.

2. BASIN CONDITIONS

All elevations in this report are referenced to International Great Lakes Datum 1985 (IGLD 1985). The values are expressed in metric units, with approximate customary units (in parentheses) for information purposes only. The monthly Lake Erie water levels 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 14 centimetres (5.5 inches) above the long-term average for the month of September, and remained above average during the

reporting period. The lake's level fell by a few centimetres less than average on a monthly basis from September though November. As a result, the lake's November monthly average was 22 centimetres (8.7 inches) above the long-term average level for that month. Heavy rain during the second half of November resulted in a sharp rise in the lake's level during late November and early December, and in turn, a December monthly level 19 centimetres (7.5 inches) higher than that of November and 42 centimetres (16.5 inches) above average. The lake's level remained fairly stable during December and January. It declined by a few centimetres during February and the first half of March before beginning its annual seasonal rise about two weeks later than average. At the end of the reporting period, the lake's level was about 28 centimetres (11 inches) above average. Recorded monthly water level data for the period September 2011 through February 2012 and departures from long-term averages are shown in Table 1 and depicted graphically in Figure 1.

Precipitation on the Lake Erie basin was above average for each month of the reporting period except February, and well above average in September and November. During the period September 2011 through February 2012, the basin received approximately 62 centimetres (24 inches) of precipitation. This is approximately 51% above average for the September though February portion of the year. Recent precipitation data and departures from the long-term averages are shown in Table 2 and depicted graphically in Figure 2.

The water supplied to a lake from its local drainage basin is referred to as its net basin supply. A lake's net basin supply reflects the amount of water the lake receives from precipitation falling directly on its surface and runoff (including snow melt) from its surrounding area minus the amount of water that evaporates from its surface. The recent net basin supplies to Lake Erie are depicted in Figure 3. The net basin supply to Lake Erie was above average for all months from September 2011 through February 2012. However, as of early February, little or no snow was stored on the land portion of the lake basin as shown in the MODIS true colour image of Lake Erie provided on the front cover of this

report. The lack of snow cover will limit spring runoff from snow melt and affect the water supply to Lake Erie for the coming months.

Inflows to Lake Erie from upstream, via the Detroit River, were below the long-term average from September through December largely due to the level of Lakes Michigan-Huron continuing to be below its long-term average. On the other hand, inflows to Lake Erie from upstream were above-average during January and February, despite the below-average levels on Lakes Michigan-Huron, because there was little to no ice retardation of flow on the St. Clair and Detroit Rivers as is typically the case during these months of the year.

The water level of Lake Erie naturally affects the outflow from the lake into the Niagara River, as does the amount of flow retardation in the river due to ice and weeds. Consistent with the high level of Lake Erie, the Niagara River flow was above average every month of the reporting period, particularly in December and January. Higher levels on Lake Erie, combined with little or no ice retardation of the flow in the Niagara River, resulted in unseasonably high flow (i.e. higher than expected given the lake's level) for those months. The monthly flows in the Niagara River at Buffalo are graphically depicted in Figure 4. The flows over Niagara Falls and at Queenston are summarized in Sections 5 and 6, respectively.

The six-month water level forecast published at the beginning of March indicates that the level of Lake Erie is likely to remain above its long-term average at least through the summer. However, if low water supply conditions are experienced, the level of Lake Erie could fall below average before summer begins.

TABLE 1 – MONTHLY AVERAGE LAKE ERIE WATER LEVELS

(Based on a network of 4 water level gauges)
International Great Lakes Datum (1985)

	Metres			Feet		
Month	Recorded* 2011-2012	Average+ 1918-2010	Departure	Recorded* 2011-2012	Average+ 1918-2010	Departure
September	174.30	174.16	0.14	571.85	571.39	0.46
October	174.27	174.06	0.21	571.75	571.06	0.69
November	174.21	173.99	0.22	571.56	570.83	0.73
December	174.40	173.98	0.42	572.18	570.80	1.38
January	174.38	173.99	0.39	572.11	570.83	1.28
February	174.37	173.99	0.38	572.08	570.83	1.25

* Provisional + Period of record is 1918-2010

TABLE 2 – MONTHLY AVERAGE PRECEPITATION ON THE LAKE ERIE BASIN

	Centimetres			Inches			
Month	Recorded* 2011-2012	Average 1900-2008	Departure	Recorded* 2011-2012	Average 1900-2008	Departure	Departure (in percent)
September	15.37	8.13	7.24	6.05	3.20	2.85	89
October	10.67	7.04	3.63	4.20	2.77	1.43	52
November	13.49	7.28	6.21	5.31	2.87	2.44	85
December	9.83	6.78	3.05	3.87	2.67	1.20	45
January	8.08	6.35	1.73	3.18	2.50	0.68	27
February	4.32	5.31	-0.99	1.70	2.09	-0.39	-19

* Provisional + Most recent period of record is 1900-2008

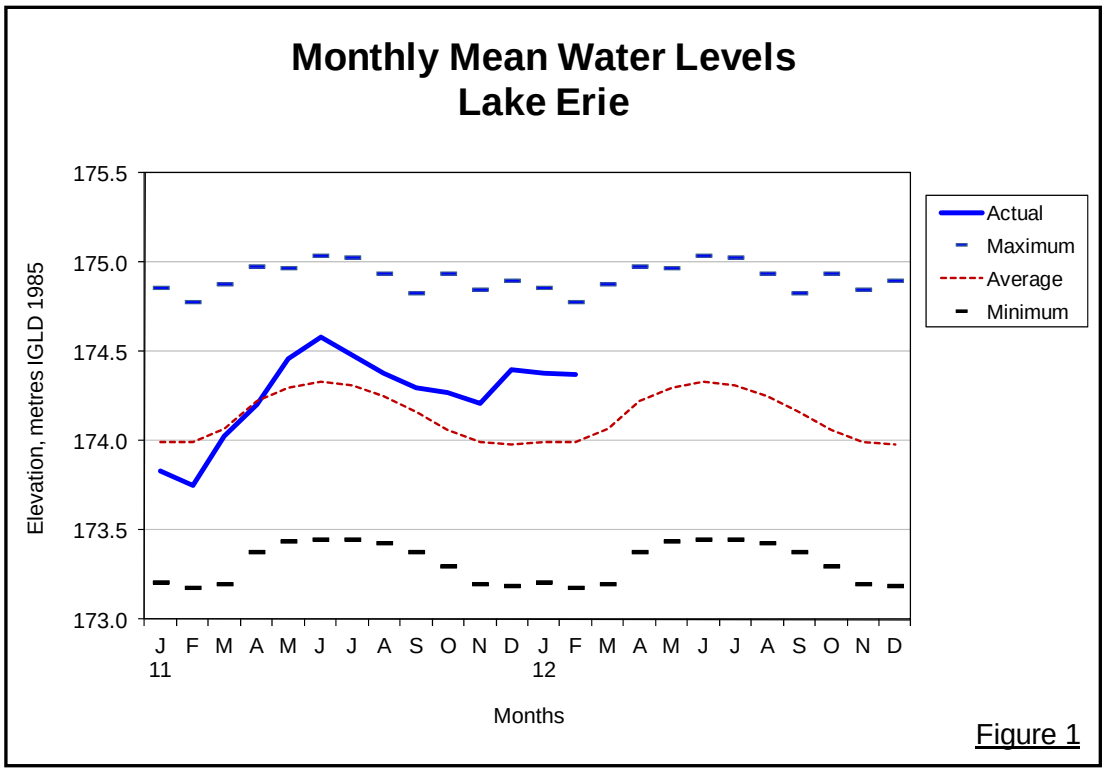


Figure 1

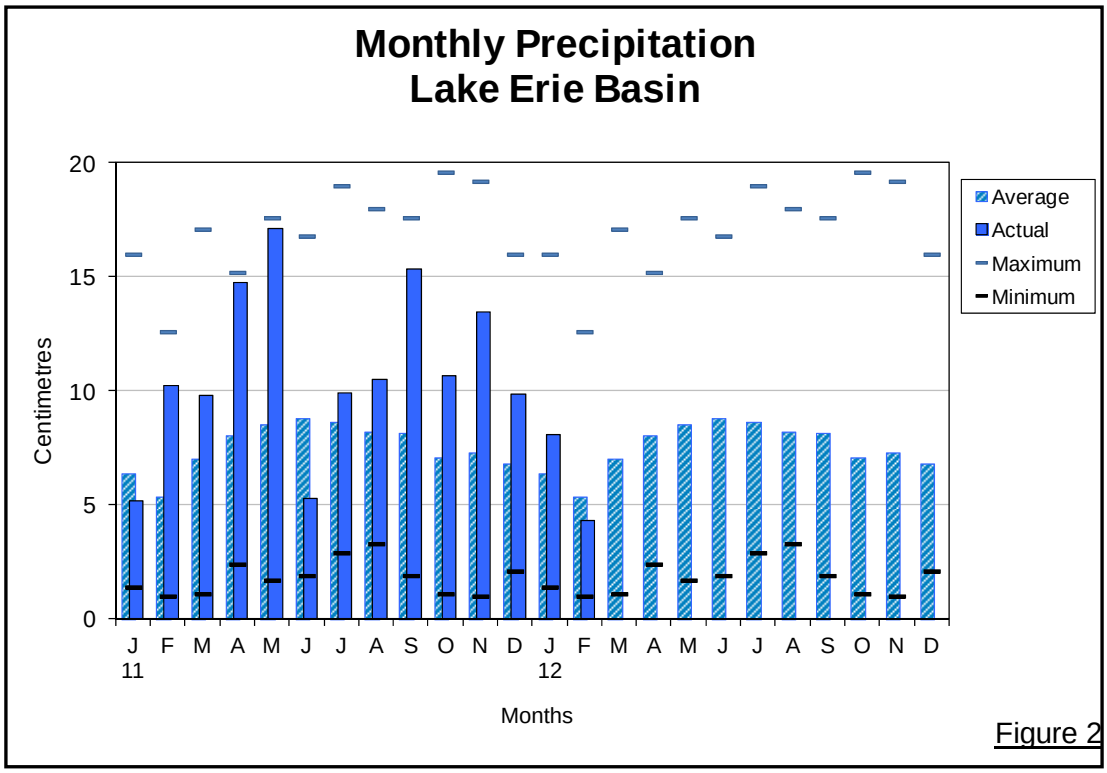


Figure 2

Monthly Net Basin Supplies
Lake Erie Basin

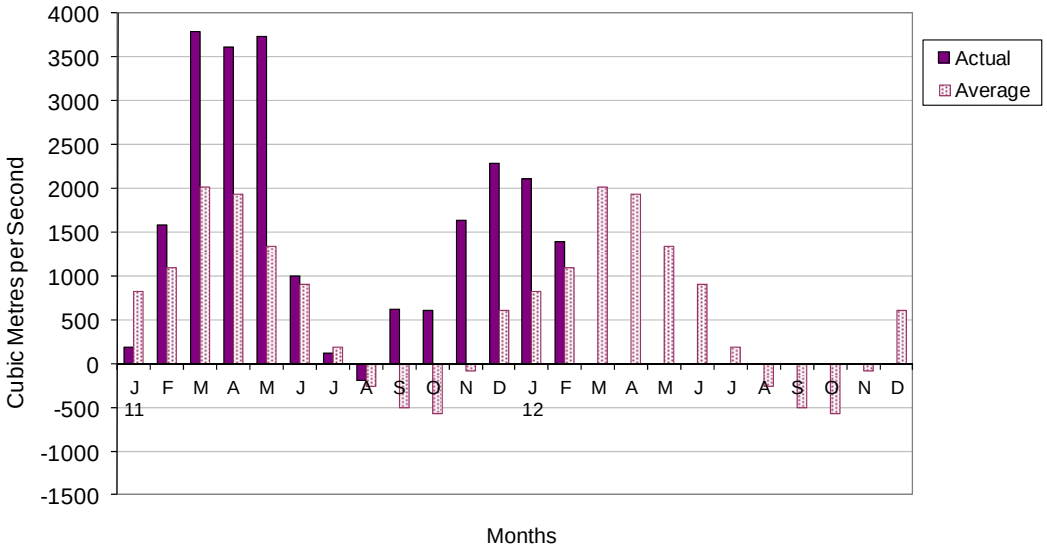


Figure 3

Niagara River Monthly Mean Flows
at Buffalo, New York

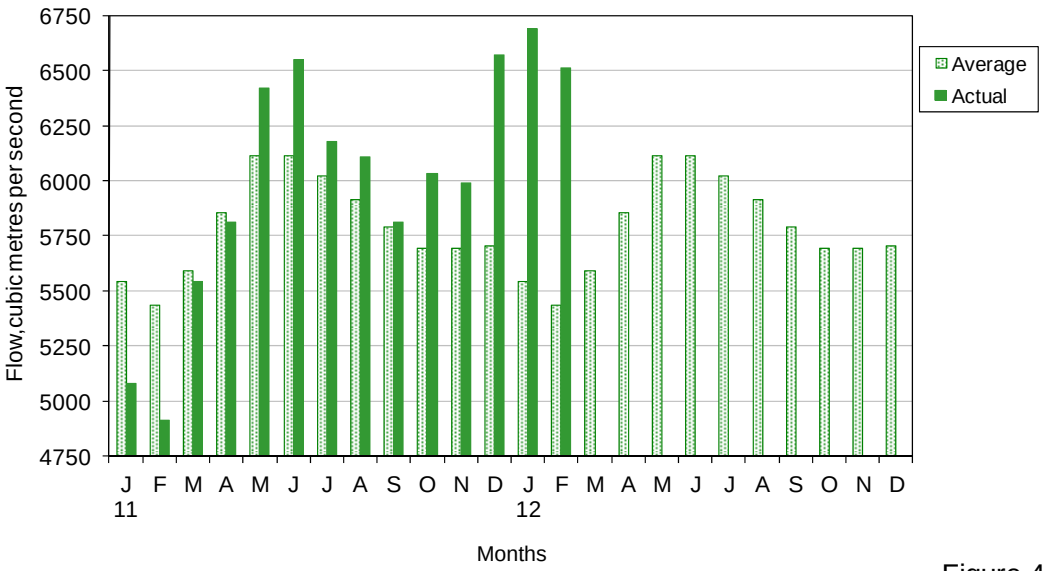


Figure 4

3. OPERATION AND MAINTENANCE OF THE INTERNATIONAL NIAGARA CONTROL WORKS

The water level in the Chippawa-Grass Island Pool (CGIP) 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 (INCW) to ensure the maintenance of an operational long-term average CGIP level of 171.16 metres (561.55 feet) to ameliorate adverse high or low water levels in the CGIP. The Directive also establishes tolerances for the CGIP'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 CGIP's level from March 1, 1973 through February 29, 2012 was 0.36 metre-months (1.18 foot-months) above the long-term average elevation. The maximum permissible accumulated deviation is $\pm$ 0.91 metre-months ($\pm$ 3.00 foot-months).

Tolerances for regulation of the CGIP level were suspended for September 28 and 29, February 12 and 13, and March 9 and 10 due to actions taken in response to life-saving and/or emergency operations. Tolerances were also suspended for 2 days in December, 8 days in January, 2 days in February and 1 day in March (up to the end of the reporting period on March 22) due to abnormally high 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 2011 through February 2012 are shown in Enclosure 2.

As a result of inspections performed by OPG in 2008, replacement of oil lines on Gates 1-13 of the INCW commenced in 2010 when work was initially completed on Gate 2.

Overhaul of Gate 10 (seals, cylinders, pistons and replacement of the roll plate) was also completed in 2010. However, the gate remained out of service until replacement of the oil line was completed in July 2011. Replacement of the oil lines on Gates 1, 3, 6, 7 and 11 was also completed in 2011, and work on Gates 4, 5, 8, 9, 12 and 13 is scheduled for 2012. Oil lines of the newer gates (Gates 14-18) do not need to be replaced.

4. GAUGING STATIONS

The Niagara River gauges used to monitor the CGIP levels and the flow over Niagara Falls are the Slater's Point, Material Dock, American Falls and Ashland Avenue gauges (see Enclosure 1).

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 ongoing 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 to determine the flows over Niagara Falls.

The Power Entities' gauge at Ashland Avenue was not reporting level data from 12:21 pm on December 3 to December 6 at 8:55 am due to the failure of NYPA's modem and the gauge's power supply, and for a few hours on both January 23 and 31 due to a modem lockout and a communications failure, respectively. During these times, data from the NOAA gauge was used to calculate flows over Niagara Falls.

A comparison carried out by representatives of the INC early in January between the daily average water level readings from the Power Entities' gauge and NOAA's verified water level data showed that the two gauges were not within acceptable INC tolerances of $\pm$ 2 centimetres ($\pm$ 0.8 inches) on a daily basis from November 10 through to the time the

Power Entities' gauge lost its power supply on December 3. During this period, the differences between the daily water levels recorded and/or reported by the Power Entity and NOAA gauges were between 5 and 7 cm (2 and 2.8 inches). An inspection of the Power Entities' gauge by a NYPA technician following the repair to its power supply on December 6 indicated that the gauge was recording and reporting the correct water level to the Niagara River Control Centre at the INCW. However, the results of an investigation into the issue based on water level differences between the Power Entities' and NOAA's gauges in the Ashland Avenue station and the OP Tailrace gauge located on the Canadian side of the river indicate that, for reasons not fully understood at this time, the Power Entities' gauge was reading and/or reporting 5 to 7 centimetres (2 to 2.8 inches) lower than the actual level of the Maid-of-the-Mist Pool at the Ashland Avenue location during the period in question. The INC is in the process of revising the Falls flow and Niagara River flows at Queenston for the period in question using the verified levels recorded by the NOAA gauge. As a result, the revised values are not available to be included in this report. It is important to note that there were no 1950 Niagara Treaty minimum Falls flow violations resulting from this gauging issue. Falls flows met or exceeded the Treaty minimum throughout the portions of November and early December in question, and the revised Falls flows will be higher than those originally reported. Measures have been taken by representatives and associates of the INC and the Board to help ensure that similar divergence between the Power Entity and NOAA gauges are identified sooner.

Water levels from the Slater's Point gauge were unavailable for just over three hours during the morning of September 21, 2011 due to a communications failure. The Slater's Point gauge was also out of service for just under one hour on January 17, 2012 and about three and one-half hours on February 16, 2012 due to local power outages. These two outages did not negatively affect operations of INCW as water levels from the Material Dock gauge were available.

All gauges required for the operation of the INCW were in operation during the remainder of the reporting period.

5. 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 INCW, in conjunction with power diversion operations, ensures sufficient flow over the Falls to meet the requirements of the Niagara Treaty of 1950. Falls flow met or exceeded minimum Treaty requirements at all times during the reporting period. The recorded daily flow over Niagara Falls, covering the period September 2011 through February 2012, is shown in Enclosure 3. However, it must be noted that, as a result of the revision of Falls flow values by the INC due to the issue with the water levels recorded and/or reported by the Power Entities' gauge at Ashland Avenue as reported in Section 4, the values shown in the plot for November 10 through December 3 will be adjusted upward.

6. 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 for scenic purposes to below the amounts specified above.

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 CGIP above Niagara

Falls and discharge it into the lower Niagara River at Queenston, Ontario and Lewiston, New York, respectively.

During the period September 2011 through February 2012, diversion for the Sir Adam Beck 1 and 2 plants averaged 1657 m^3/s (58,520 cfs) and diversion to the Robert Moses Niagara Power Project averaged 2326 m^3/s (82,140 cfs).

The average flow from Lake Erie to the Welland Canal for the period September 2011 through February 2012 was 235 m^3/s (8,300 cfs) compared to 208 m^3/s (7,350 cfs) for the same period during 2010-11. Diversion from the canal to OPG's DeCew Generating Stations averaged 190 m^3/s (6,710 cfs) for the period September 2011 through February 2012.

Records of diversions for power generation covering the period September 2011 through February 2012 are shown in Enclosure 4.

The monthly average Niagara River flows at Queenston, Ontario, for the period September 2011 through February 2012, and departures from the 1900-2010 long-term average are shown in Table 3. Maximum and minimum monthly average flows, for the period 1900-2010, are shown in Table 4. During the period September 2011 through February 2012, the flow at Queenston averaged 6291 m^3/s (222,160 cfs), with the monthly average ranging between 5805 m^3/s (205,000 cfs) and 6736 m^3/s (237,880 cfs). The flow at Queenston for the same period in 2010-11 averaged 5264 m^3/s (185,900 cfs) with the monthly averages ranging between 4948 m^3/s (174,740 cfs) and 5444 m^3/s (192,250 cfs). The flow values reported in Table 3 for the November and December 2011 Niagara River flow at Queenston, as well as the average for the September 2011 to February 2012 period will increase once the INC has revised the November and December Falls flow values as required.

TABLE 3 - MONTHLY NIAGARA RIVER FLOWS AT QUEENSTON

Month	Cubic Metres per Second			Cubic Feet per Second		
	Recorded 2011-12	Average 1900-2010	Departure	Recorded 2011-12	Average 1900-2010	Departure
September	5805	5723	82	205,000	202,110	2,890
October	6032	5640	392	213,020	199,170	13,850
November	6014	5652	362	212,380	199,600	12,780
December	6622	5690	932	233,850	200,940	32,910
January	6736	5538	1198	237,880	195,570	42,310
February	6535	5430	1105	230,780	191,760	39,020
Average	6291	5612	679	222,160	198,190	23,970

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	242,960	153,270
October	7220	1986	4320	1934	254,970	152,560
November	7030	1986	4190	1934	248,260	147,970
December	7410	1985	4270	1964	261,680	150,790
January	7240	1987	3960	1964	255,680	139,850
February	6900	1987	3320	1936	243,670	117,240

7. Flow Measurements in the Niagara River and Welland Ship Canal

Discharge measurements are regularly scheduled in the Niagara River and Welland Canal as part of a program to verify the gauge ratings used to determine flow in these channels for water management purposes. 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 their efforts to standardize measurement equipment and techniques.

Measurements are taken near the International Railway Bridge to provide information for evaluating stage-discharge relationships for flow entering the Niagara River from Lake Erie. Measurements are scheduled in accordance with a 3-year cycle, and were last made here in 2009-2010. The 2010 measurements were off-schedule measurements made to gather additional data to address questions about the 2009 measurements. The rating equations presently being evaluated include the 2001 Buffalo equation and the 1998 Buffalo-Material Dock equation. As a result of reviewing previous discharge measurements made near the International Railway Bridge, a revision of the 2001 Buffalo rating equation is being proposed and is under review by the Board's working committee. The Buffalo rating equation is used by the Power Entities to determine preliminary estimates of Niagara River flows and ice and weed retardation. It is also used in Great Lakes water supply routing models to estimate the flow in the Niagara River and to verify other Niagara River flow estimates. Discharge measurements near the International Railway Bridge are scheduled for 2012 as part of the regular measurement cycle at this location.

Discharge measurements in the American Falls Channel are used to verify the rating equation for the flow in this channel. The 1978 American Falls equation is used to ensure that a dependable and adequate flow of water is maintained over the American Falls and in the vicinity of Three Sisters Islands. Since American Falls flow is directly related to the operation of the CGIP, the Board monitors this relationship. Measurements were traditionally made from the pedestrian bridges between Goat Island, Green Island and the U.S. mainland, using conventional measurement methods. In 2005, when measurements were scheduled at this section, per the usual 5-year cycle, a temporary superstructure had been placed over the main bridge by the New York State park service which made the prospect of taking conventional measurements there difficult. The measurements were

delayed and plans were formulated to utilize new technology in the form of an ADCP mounted on a remote controlled or tethered boat, at a location upstream of the bridge, closer to the American Falls gauge. In May 2007, ADCP measurements were successfully made at this new location. The measurements matched the rating equation very well, with a maximum difference of 2%. Discharge measurements in the American Falls Channel are scheduled for 2012 as part of the regular measurement cycle at this location.

No Board required discharge measurements are planned near the Cableway section in 2012. Discharge measurements were last conducted near the Cableway Section in October 2010 and, following the regular measurement schedule for this site, are planned again for 2013. This series is made to verify the 2009 Ashland Avenue gauge rating of the outflow from the Maid-of-the-Mist Pool below the Falls. The 2010 measurements fit the 2009 Ashland rating well, with all measurements falling within 5% of the rating.

In the spring of 2007, Acoustic Doppler Current Profiler (ADCP) technology replaced conventional current meter measurements to verify the Ashland rating. This made the continued use of the cableway, located just upstream of the OPG and NYPA plants, redundant. The New York Power Authority, on behalf of the Power Entities, has undertaken to have the cableway removed. A contractor was selected and removal was scheduled for May 2011. Just prior to the removal date, a rock slide resulting from significant rainfall obstructed portions of the access road to Ontario Power Generation's Sir Adam Beck complex. This prevented safe access to the cable anchor point on the Canadian side of the gorge. As a result, cable removal is now re-scheduled for April 2012.

Discharge measurements were last made in the Welland Canal in May 2010. These regularly scheduled measurements are made to verify the rating used to determine flow through the Supply Weir. Due to the St. Lawrence Seaway Management Corporation's inability to provide water level data for the time of the 2010 measurements, these measurements could not be used to verify the rating. Off-schedule measurements are

planned for the Welland Canal in early 2012 to address the problems created by lack of results from the 2010 measurements. The need to repeat measurements in 2013 as part of the regular 3-year measurement cycle will be determined based on the results of the 2012 measurements.

8. NIAGARA TUNNEL PROJECT AND PLANT UPGRADES

OPG continues with construction of the Niagara Tunnel Project. As of March 19, the invert (bottom) concrete lining had been completed to 8288 metres (27,192 feet), while the arch (top) concrete lining had progressed to 5588 metres (18,333 feet). The new tunnel will provide increased water diversion capability for OPG's Sir Adam Beck complex, and is expected to be in service by December 2013. 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 CGIP which is governed by the Board's 1993 Directive.

OPG has also undertaken a unit runner replacement program for its 60 Hz Beck I units. Work to replace the G3 runner and for a generator re-wind is expected to begin in April 2012.

The Beck I units were originally built with Johnson Valves at the bottom of the penstocks that could be activated to stop water from entering the units. These valves are being removed and their function replaced with headgates that can prevent water from entering the penstocks. As the units are upgraded, sleeves will be installed where the Johnson Valves were removed to improve flow through that portion of the penstock. A sleeve was not installed when G7 was initially upgraded. The unit was taken out of service again, from early March 2011 until late-February 2012, to complete this work. An Index Test for G7 is currently scheduled to be carried out in May 2012. As G7 is similar to G9, the

results of this test will be used to decide if the unit's performance is similar to that of G9, so that the same rating table can be used for both units. A full Gibson Performance Test was done on G9 in July 2011, following its upgrade, to establish the rating table.

The Sir Adam Beck Pump Generating Station (PGS) Comprehensive Geotechnical Investigation (CGI) is part of a technical assessment to determine refurbishment options and design specifications to ensure that the facility continues to operate safely for the next several decades. This investigation consisted of borehole drilling, geo-probing, cone penetration testing, test-pitting, sediment sampling and geophysical surveys, and will increase OPG's knowledge of the subsurface conditions both outside and inside of the reservoir. The reservoir was fully dewatered (first time since 1958) to carry out the CGI. Dewatering of the PGS reservoir started on October 17, and it remained dewatered until December 1. The reservoir returned to service on December 2.

Work has been completed on the replacement of ND1's (DeCew) penstocks and overhaul of its four units. After the replacement of ND1's penstocks (removed from service in December 2008), the station's G7 and G8 units were returned to service in May 2011, G5 was returned to service on October 17, and G6 returned to service on November 15.

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. Installation may begin when the Lake Erie water temperature as measured at the Buffalo Water Intake reaches 4^{o}C (39^{o}F) or on December 16, whichever occurs first. Installation of the ice boom's spans was planned to begin on December 16; however, strong winds and high wave conditions delayed the start of installation until December 17.

Preparations for installing the ice boom began in late November. Beginning on November 22, the junction plates were raised from the bottom of the lake and floatation barrels attached. This first phase of installation was completed on November 29. The strings of boom pontoons were pulled from their summer storage area and placed inside the Buffalo Harbor breakwall during the period December 1 through 7, completing the second phase. Nine spans of the boom were placed starting from the Canadian side on December 17. The final 13 spans were installed on December 18, completing the final phase of installation in two days. The water temperature at Buffalo remained above 4^{o}C (39^{o}F) throughout the boom installation period.

Unseasonably warm weather continued into January, delaying the start of ice formation on Lake Erie until the second week in January. Ice continued to form in the western basin of the lake and inside Long Point Bay, peaking at 12.5% coverage by the third week in January, before beginning to dissipate and falling to about 1.5% coverage by February 5, one day before the MODIS images provided on the cover of this report was taken. The helicopter flight scheduled for February 9 to measure ice thickness on the eastern part of Lake Erie was cancelled due to the absence of ice on the lake. A brief period of cold weather caused the ice coverage to increase to a little over 8% on February 12. With the return of milder temperatures, the ice cover fell to just under 2% on February 19. Only a trace amount of ice remained on February 26, and the lake was completely ice free on the Canadian Ice Service's next weekly coverage reporting on March 3. The eastern basin remained virtually ice free throughout the 2011-12 ice season, with only a small amount of ice showing in Long Point Bay on the ice coverage chart for February 20.

Open water conditions over most of Lake Erie combined with strong winds, predominately from the west and southwest resulted in several large positive surges in water levels at the eastern end of Lake Erie during January and February, causing damage

to the ice boom on four occasions. Span “D” of the ice boom was reported broken on January 24. This span was replaced with a spare on January 25. A trailing pontoon was also noted on Span “F”. Due to suspicions of possible cable fatigue as a result of wave action, Span “F” was also replaced using a second spare span cable. On January 30, another trailing span, Span “E”, was observed following strong west winds experienced a few days earlier. NYPA’s Ice Boom Crew completed a splice repair to Span “E” of the boom during the afternoon of February 2. On February 19, Span “I”, was observed broken. The broken span was repaired on February 21.

Ice did not form on Lake Erie in the vicinity of the ice boom at any time during the 2011-12 ice season. In contrast, during the 2010-11 ice season, the ice coverage on Lake Erie peaked at the end of January with the lake being about 98% covered. At mid-March 2011, Lake Erie was still about 40% ice covered, much of which was in the eastern portion of the lake and in the vicinity of the ice boom.

Considering the lack of ice on the lake, the absence of an ice build up in the Maid-of-the-Mist Pool below Niagara Falls, and the risk of continuing damage to the ice boom due to open water conditions, the Board issued a media advisory on February 27 that preparations for boom opening were underway.

Boom opening operations began on February 28, which represents the earliest opening date since the boom was first used in the winter of 1964-65. The previous earliest date was March 5, 1998. Seven spans were opened on February 28. Eight spans were opened on February 29, and the last seven spans of the boom were removed on March 2. Last year, boom opening began on April 12 and was completed on April 22.

Floatation barrels were removed from the lake on March 5 and 12. Both the Canadian and U.S. Coast Guards were then notified that this year’s ice boom removal from the lake had been completed. On March 14, the NYPA crew began towing the individual

spans up the Buffalo River to the boom's storage site, where the ground crew pulled them on shore. This operation was completed on March 20.

Given the lack of ice and the early opening of the boom, the helicopter flight scheduled for March 8 to measure ice thickness on the eastern part of Lake Erie and the fixed-wing flights typically carried out in early March to determine the extent and condition of the ice cover in order to decide when the ice boom can be removed were not needed this year.

10. MEETING WITH THE PUBLIC

In accordance with the Commission's requirements, the Board will hold an annual meeting with the public in September 2012. The meeting will be in the Niagara Falls or Buffalo, NY area, with the meeting location and date to be determined. The Board's 2011 meeting with the public was held on August 17 in Niagara Falls, ON.

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 at the meeting. The Board is exploring ways to increase attendance at the meeting by both local residents and visitors to the Niagara area.

11. MEMBERSHIP OF THE BOARD

Major General John W. Peabody of the U.S. Army Corps of Engineers was the Chair of the United States Section of the Board until September 19, 2011. Colonel Margaret W. Burcham, whose promotion to brigadier general was pending in the Senate, assumed command of the U.S. Army Corps of Engineers' Great Lakes and Ohio River Division at that time. On October 3, 2011, the Commission appointed Colonel Burcham as the U.S. Co-Chair of the Board. Colonel Burcham was promoted to Brigadier General, US Army, on January 27, 2012.

Mr. Dan Mahoney retired from the U.S. Section of the Board at the end of September 2011. The U.S. Member position remains vacant.

12. ATTENDANCE AT BOARD MEETINGS

The Board met once during this reporting period. The meeting was held in Watertown, New York on March 22, 2012. Colonel Drolet, alternate U.S. Board Chair, and Mr. Thompson, Canadian Board Chair, were in attendance.

Respectfully Submitted,

Original Signed by:

BG MARGARET W. BURCHAM
Chair, United States Section

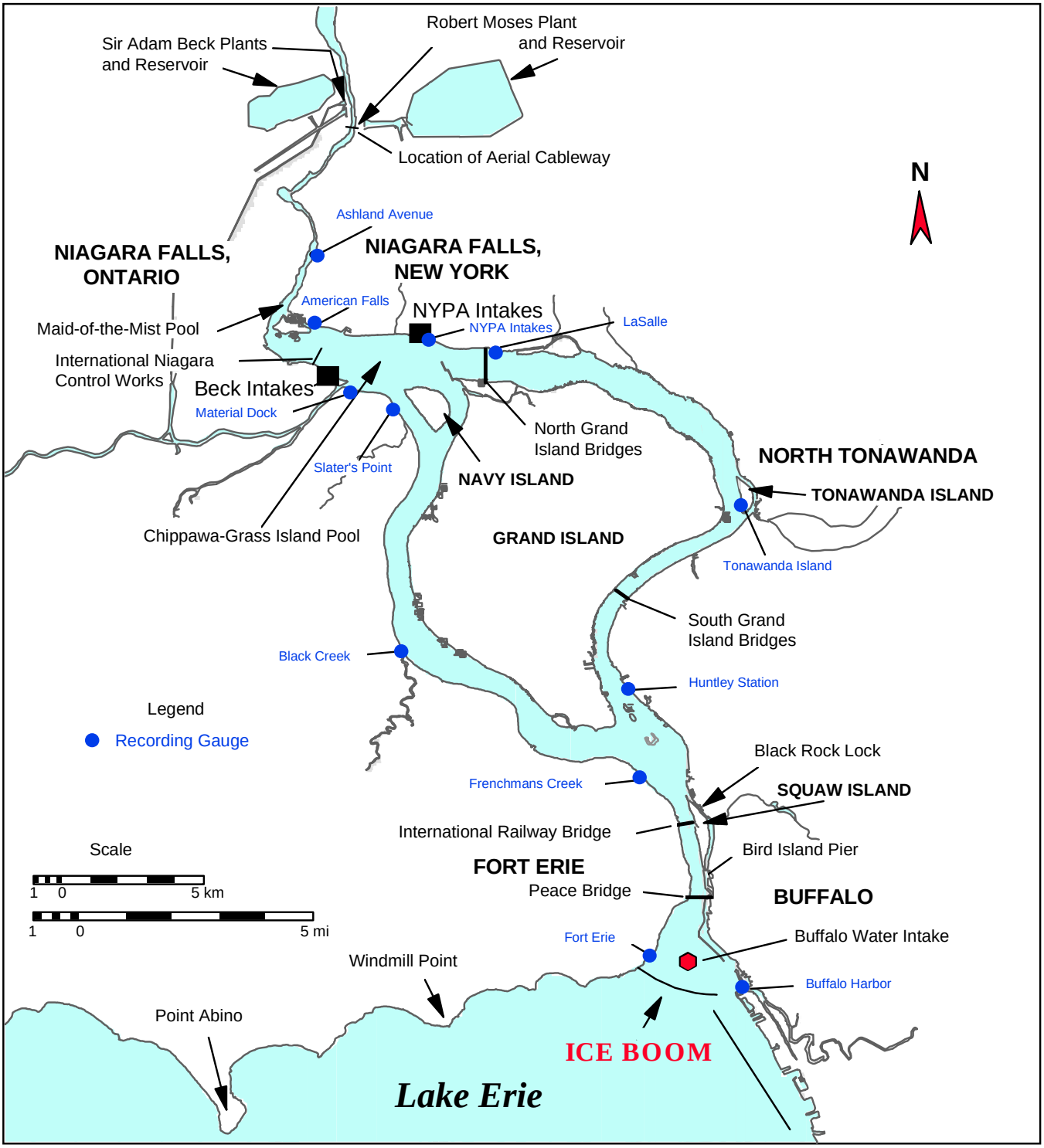
Original Signed by:

Mr. AARON F. THOMPSON
Chair, Canadian Section

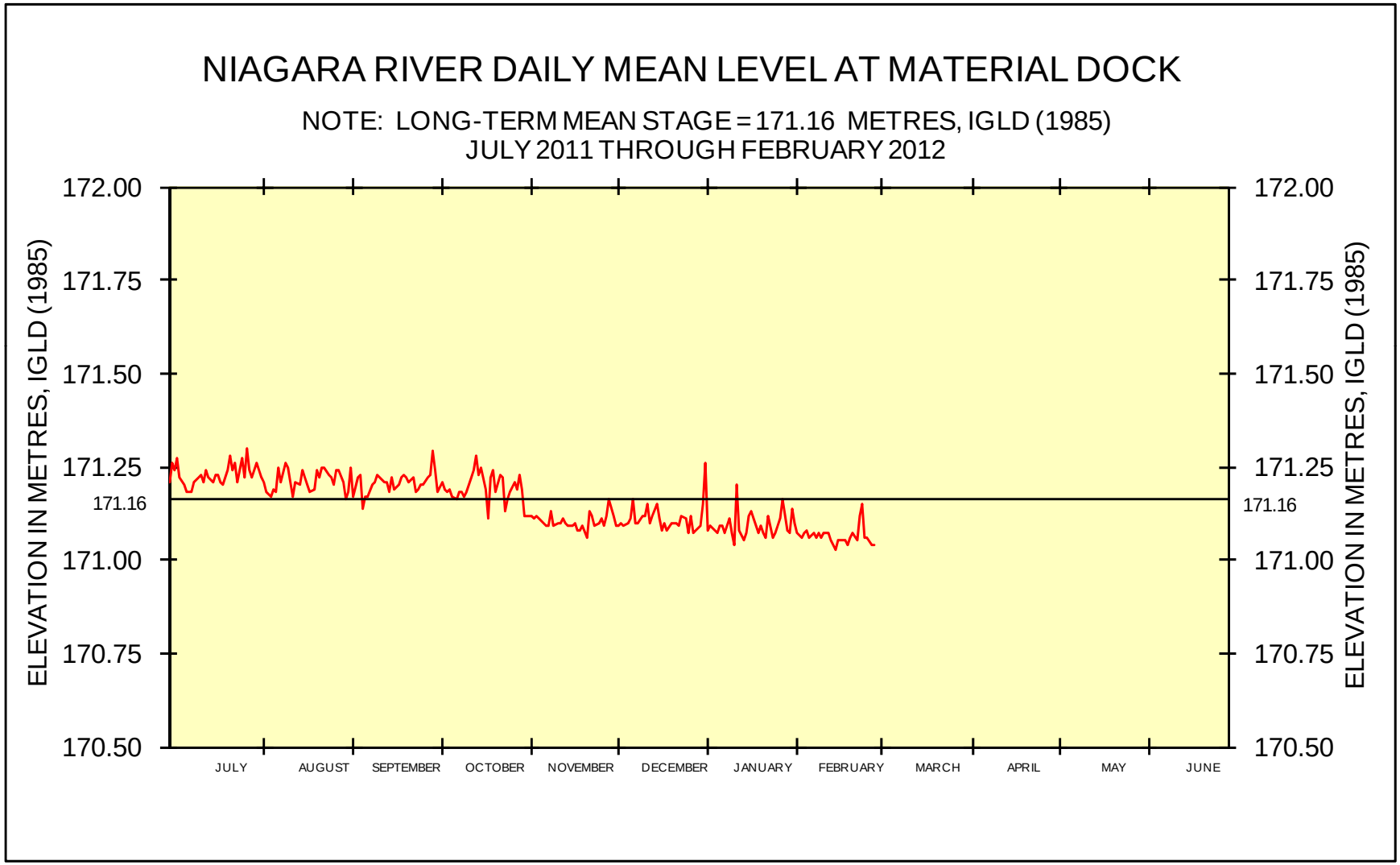
VACANT
Member, United States Section

Original Signed by:

Ms. JENNIFER L. KEYES
Member, Canadian Section


Sir Adam Beck Plants
and Reservoir
Robert Moses Plant
and Reservoir
Location of Aerial Cableway
N
Ashland Avenue
NIAGARA FALLS,
ONTARIO
NIAGARA FALLS,
NEW YORK
American Falls
NYPA Intakes
NYPA Intakes
LaSalle
Maid-of-the-Mist Pool
International Niagara
Control Works
Beck Intakes
Material Dock
North Grand
Island Bridges
NORTH TONAWANDA
TONAWANDA ISLAND
Slater's Point
NAVY ISLAND
Chippawa-Grass Island Pool
GRAND ISLAND
Tonawanda Island
South Grand
Island Bridges
Black Creek
Huntley Station
Legend
Recording Gauge
Black Rock Lock
Frenchmans Creek
SQUAW ISLAND
International Railway Bridge
Bird Island Pier
Scale
FORT ERIE
Peace Bridge
BUFFALO
1 0 5 km
1 0 5 mi
Fort Erie
Buffalo Water Intake
Windmill Point
Buffalo Harbor
Point Abino
ICE BOOM
Lake Erie

ENCLOSURE 1

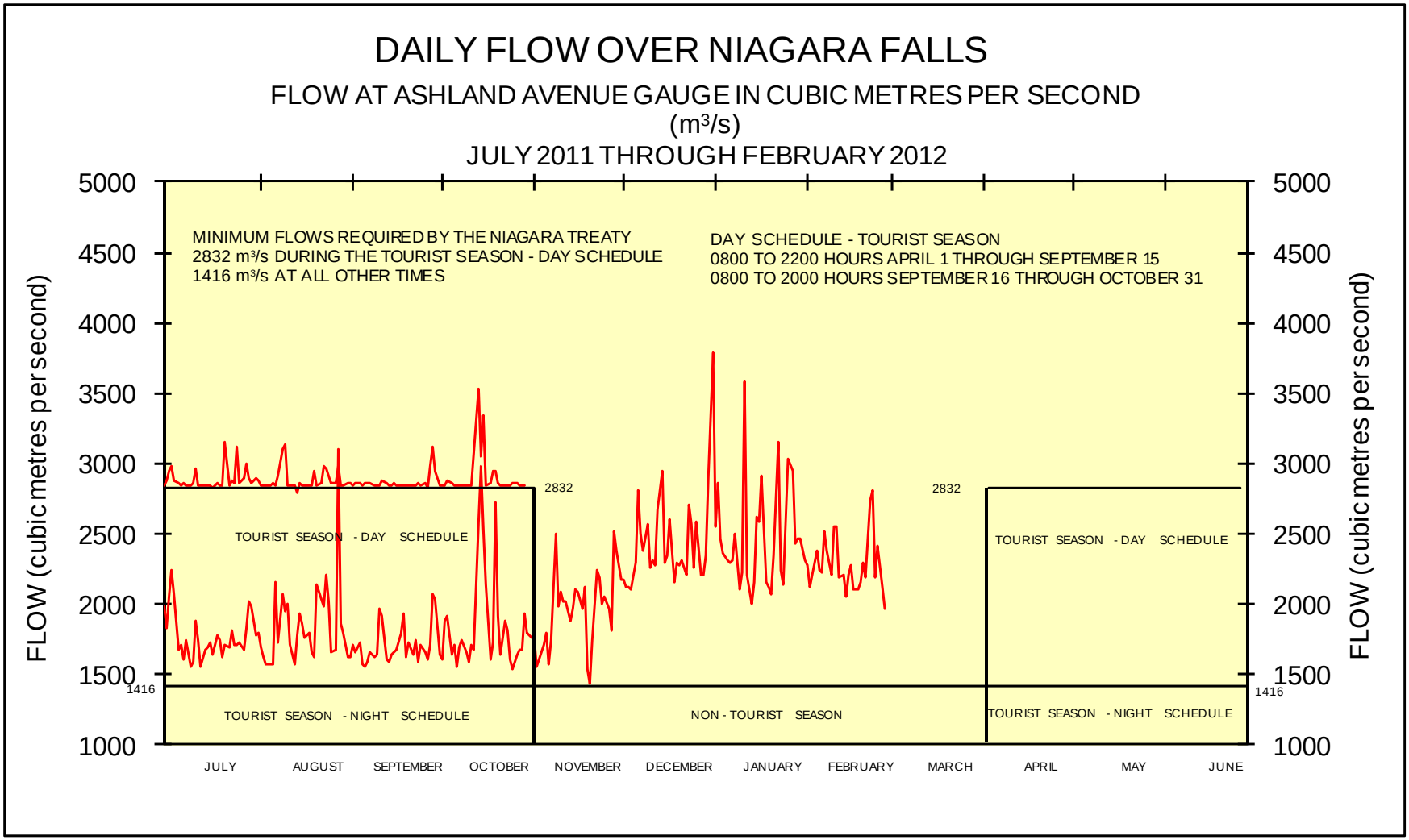

NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK
NOTE: LONG-TERM MEAN STAGE = 171.16 METRES, IGLD (1985)
JULY 2011 THROUGH FEBRUARY 2012
ELEVATION IN METRES, IGLD (1985)
172.00
171.75
171.50
171.25
171.16
171.00
170.75
170.50
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE

ENCLOSURE 2

DAILY FLOW OVER NIAGARA FALLS

FLOW AT ASHLAND AVENUE GAUGE IN CUBIC METRES PER SECOND (m^3/s)

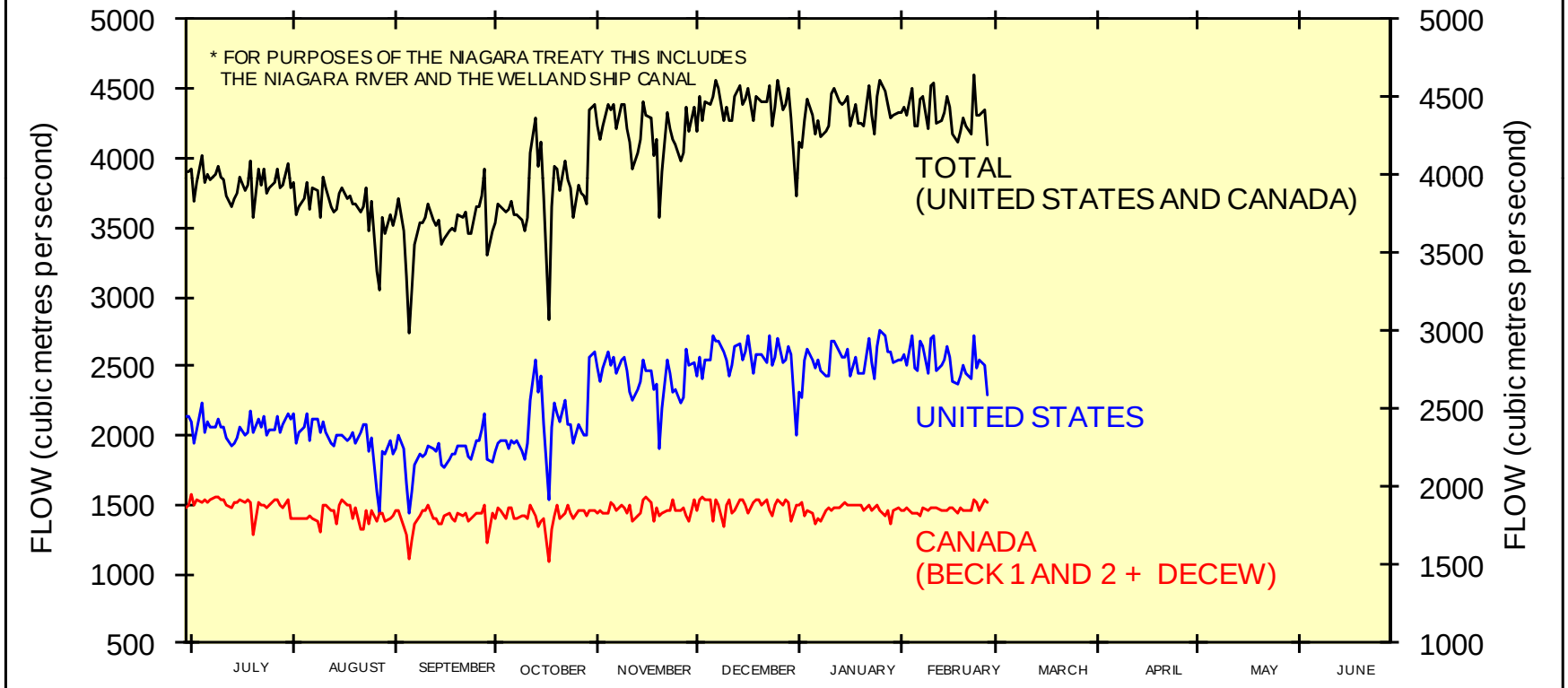
JULY 2011 THROUGH FEBRUARY 2012



ENCLOSURE 3

DAILY DIVERSIONS OF NIAGARA RIVER WATER* FOR POWER PURPOSES

IN CUBIC METRES PER SECOND (m^3/s)
JULY 2011 THROUGH FEBRUARY 2012



ENCLOSURE 4