

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



Covering the Period September 17, 2008 through March 3, 2009

EXECUTIVE SUMMARY

The level of Lake Erie began the reporting period 3 centimetres (1.2 inches) below long-term average. Levels remained below average to the end of 2008, but January and February 2009 saw slightly above average levels, most likely due to the above-average precipitation in December and February. The March six-month water level forecast indicates that the level of Lake Erie is expected to be above its long-term average until mid-summer (Section 2).

The level of the Chippawa-Grass Island Pool was regulated under the International Niagara Board of Control's 1993 Directive. Tolerances for regulation of the Pool were suspended for 19 days in January and 14 days in February to assist in ice management. The Power Entities were able to comply with the Board's Directive at all times during the reporting period (Section 3).

The flow over Niagara Falls was below Treaty requirements for four hours on September 20 due to police requirements but met Treaty minimums throughout the remainder of the reporting period (Section 4).

Ontario Power Generation continues with construction of the Niagara Tunnel Project. The Tunnel Boring Machine has progressed 3619 metres (11,873 feet), a little over 1/3 of the total length (Section 8).

The Lake Erie-Niagara River Ice Boom was installed on December 10 and 11th. Ice began to form behind it in early January. The most extensive ice cover on Lake Erie was present at the beginning of March (Section 9).

The Board will hold a meeting with the public on September 16, 2009 at a location in the Niagara area as yet to be determined (Section 10).

COVER: **The eastern end of the Lake Erie-Niagara River Ice Boom with the entrance to the Buffalo River and a portion of downtown Buffalo in the background.**

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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 3, 2009

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

Commissioners:

1. **GENERAL**

The International Niagara Board of Control (Board) submits its One Hundred Twelfth Semi-Annual Progress Report, covering the period September 17, 2008 through March 3, 2009.

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 3 centimetres (1.2 inches) below the long-term average for the month of September. The largest decline from average for the period occurred in November, when the lake reached its seasonal low with a monthly mean level of 173.93 metres (570.64 feet), which was 6 centimetres (2.3 inches) below average. Levels remained below average through 2008 but January and February

saw slightly above-average levels, most likely due to the above-average precipitation in December and February.

In February, the level was at 174.07 metres (571.10 feet), or 9 centimetres (3.6 inches) above average. Recorded water level data for the period September 2008 through February 2009 and departures from long-term averages are shown in Table 1 and depicted graphically in Figure 1.

The Lake Erie basin received approximately 50.5 centimetres (19.9 inches) of precipitation during the September 2008 - January 2009 period. This is about 24% above average for this 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 well below their long-term average levels during the reporting period. On average, these levels were 26 centimetres (10 inches) higher than the reporting period a year prior.

Water supplied to Lake Erie from its local drainage basin (shown in Figure 3) started the reporting period below average. The rest of 2008 saw above-average supplies, especially in December. This is the result of the above-average precipitation received in December. The Niagara River monthly mean flow at Buffalo was above average beginning in December of the reporting period. These flows are graphically depicted in Figure 4 (at Buffalo) and summarized in Section 5.

The March 2009 six-month water level forecast indicates that the level of Lake Erie is expected to be above its long-term average until 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* 2008-09	Average 1918-2007**	Departure	Recorded* 2008-09	Average 1918-2007**	Departure
September	174.13	174.16	-0.03	571.29	571.39	-0.10
October	174.01	174.06	-0.05	570.90	571.06	-0.16
November	173.93	173.99	-0.06	570.64	570.83	-0.19
December	173.98	173.99	-0.01	570.80	570.83	-0.03
January	174.04	173.99	0.05	571.00	570.83	0.17
February	174.07	173.98	0.09	571.10	570.80	0.30

*Provisional

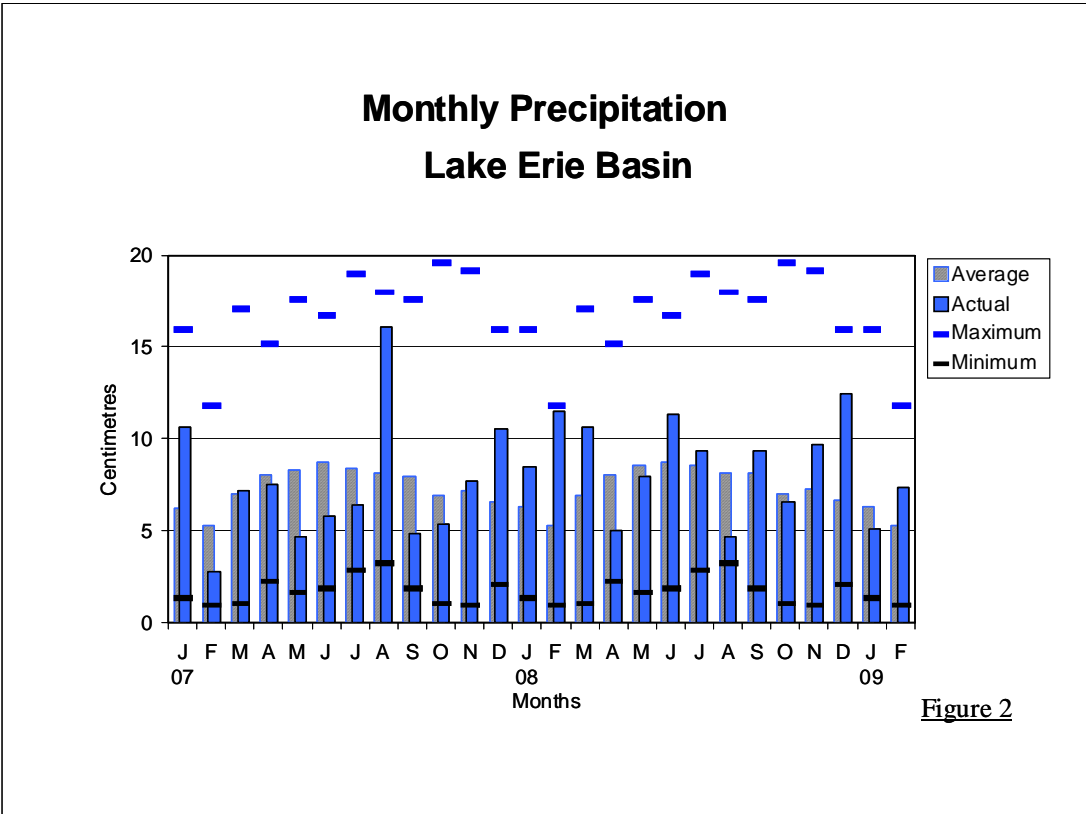
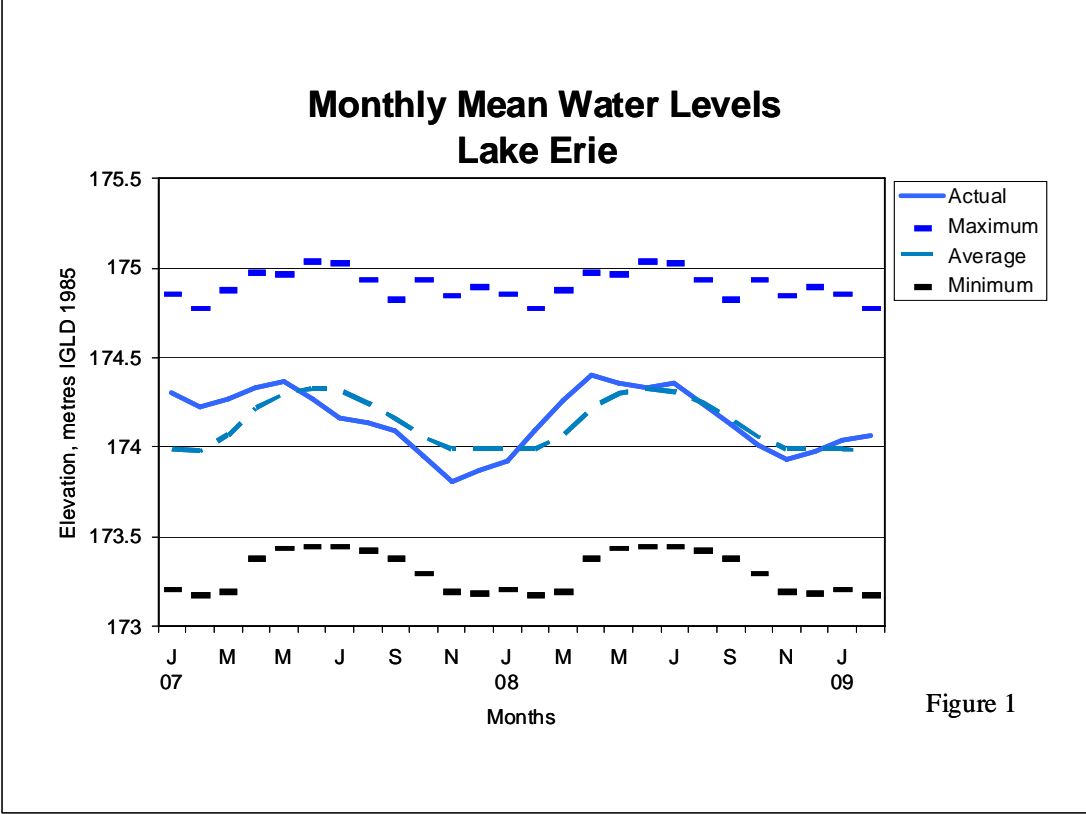
**Period of record is 1918-2007

TABLE 2 - MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN

Month	Centimetres			Inches			
	Recorded* 2008-09	Average 1900-99 ⁺	Departure	Recorded* 2008-09	Average 1900-99 ⁺	Departure	Departure (in percent)
September	9.37	8.00	1.37	3.69	3.15	0.54	17
October	6.55	7.04	-0.49	2.58	2.77	-0.19	-7
November	9.65	7.24	2.41	3.80	2.85	0.95	33
December	12.47	6.69	5.78	4.91	2.63	2.28	87
January	5.11	6.29	-1.18	2.01	2.48	-0.47	-19
February	7.34	5.26	2.08	2.89	2.07	0.82	40

*Provisional

⁺Most recent period of record is 1900-99



Monthly Net Basin Supplies Lake Erie Basin

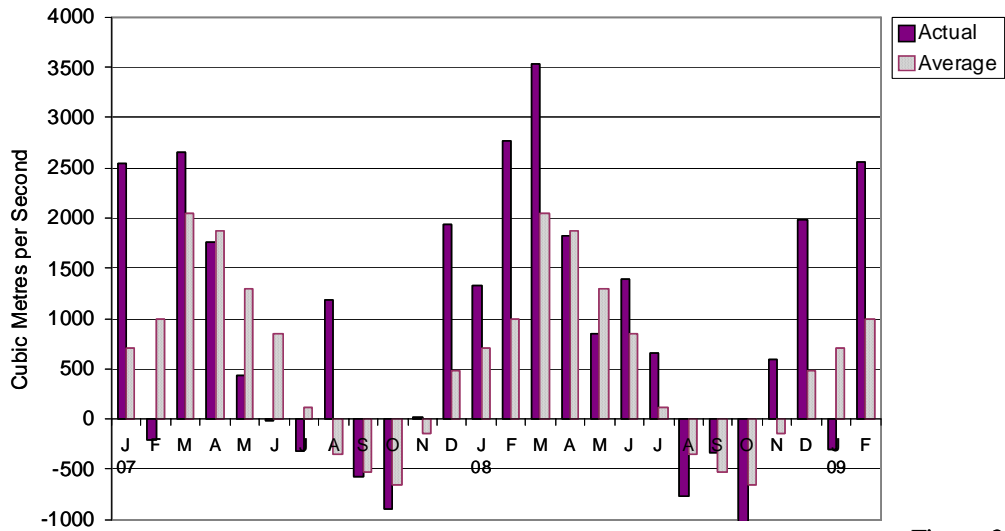


Figure 3

Niagara River Monthly Mean Flows at Buffalo, New York

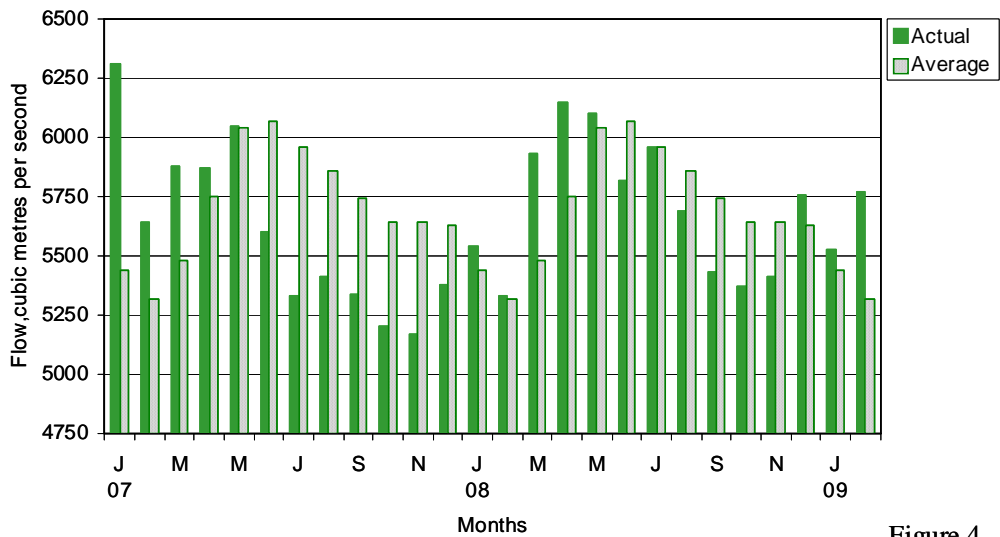


Figure 4

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, 2009 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 September 20 and 21 to assist in a police investigation, for December 19 and 20 due to abnormally low flows, and for December 21, 22, 28 and 29 due to abnormally high flows. In addition, tolerances were suspended for 19 days in January and 14 days in February to assist in ice management.

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 2008 through February 2009 are shown in Enclosure 2.

An inspection of the underside of the control structure's bridge spans was conducted in 2008. Although designed to assess concrete and sill conditions, it also revealed that the pier to pier oil lines, which run under the spans, are deteriorated and will require replacement. The number of spans that can have lines replaced in a calendar year and the actual work methods are in the planning stages. Corrective action will most likely involve installing new lines in the cable tray area and removal of the deteriorated lines.

As the result of a risk assessment of the power supply, following the 2003 power blackout, it was identified that the International Niagara Control Works is supplied with AC power from two independent sources. However, these two sources shared a common pole structure near a major roadway that raised the possibility of a complete AC supply failure should damage to the pole interrupt power transmission through both lines simultaneously.

Measures to correct this problem were taken once an upgrade to the control structure's station service (reported to the Commission in the Board's 106th Report) was completed. One of the feeders was reconfigured, in October 2008, so that it transitions to underground cable on the opposite side of the roadway and several hundred feet closer to the town of Chippawa.

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 four hours on September 20 as the result of actions taken by operators of the structure 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 above the Falls. When it was determined that no one was in peril, normal operations were resumed and minimum Falls flows requirements were met.

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 2008 through February 2009, 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 2008 through February 2009, diversion for the Sir Adam Beck 1 and 2 plants averaged 1650 m³/s (58,270 cfs) and diversion to the Robert Moses Niagara Power Project averaged 1964 m³/s (69,360 cfs).

The average flow from Lake Erie to the Welland Canal for the period September 2008 through February 2009 was 227 m³/s (8,020 cfs) compared to 217 m³/s (7,660 cfs) for the same period one year ago. Diversion from the canal to OPG's DeCew Generating Stations averaged 187 m³/s (6,600 cfs) for the period September 2008 through February 2009.

Records of diversions for power generation covering the period September 2008 through February 2009 are shown in Enclosure 4.

The monthly average Niagara River flows at Queenston, Ontario for the period September 2008 through February 2009 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 2008-09	Average 1900-2007	Departure	Recorded 2008-09	Average 1900-2007	Departure
September	5413	5728	-315	191160	202280	-11120
October	5384	5645	-261	190130	199350	-9220
November	5438	5658	-220	192040	199810	-7770
December	5792	5690	102	204540	200940	3600
January	5595	5536	59	197580	195500	2080
February	5725	5428	297	202180	191690	10490
Average	5558	5614	-56	196270	198260	-1990

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 2008 through February 2009, the flow at Queenston averaged 5558 m³/s (196,280 cfs). One year ago, flows for the same period averaged 5349 m³/s (188,900 cfs) with the monthly averages ranging between 5190 m³/s (183,280 cfs) and 5609 m³/s (198,080 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 are scheduled for 2009 at the International Railway Bridge Section, for 2010 at the Cableway and Welland Canal Sections and for 2012 at the American Falls Section.

The Board approved a revised Ashland Avenue Gauge Rating at its meeting of September 16, 2008. Technical review of the revision was undertaken by members of the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data. A summary report on the development of the new rating was approved by the Board at its March 3 meeting. The Board will implement the new rating, planned for January 1, 2010, under the direction of the International Niagara Committee.

8. **NIAGARA TUNNEL PROJECT**

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 entitlement for power production. By March 3, the Tunnel Boring Machine (TBM) had progressed 3619 metres (11,873 feet). This is a little over one third of the entire tunnel length. Adjustment to both the horizontal and vertical alignments will be made in a bid to reduce costs and make up for some of the construction delay that was caused by the need to stabilize the rock face and remove rock that had fallen into the excavation as the TBM passed under the buried St. David's Gorge.

Increased diversion will not affect the regulation of the Chippawa-Grass Island Pool governed by the International Niagara Board of Control's 1993 Directive.

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 10. The Lake Erie water temperature as measured at the Buffalo Water Intake reached 4° Celsius (39° Fahrenheit) on December 5. 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 10 when 12 spans were placed starting from the Canadian side. The remaining 10 spans went in on December 11.

Buffalo's December weather included two major rainfalls, three record snowfalls, major flooding and a substantial windstorm. Most of the first three weeks were generally cold but the final week turned mild and included a Buffalo record for December 27th of 17°C (63°F) and of 18°C (64°F) for the 28th. The average monthly temperature of -1.4°C (29.4°F) was just 0.2°C (0.4°F) degrees below the normal of -1.2°C (29.8°F). Lake Erie water temperature was at 2°C (35°F) at the end of December.....exactly normal for the 125 year period of record.

Ice first appeared in the Pool on December 22. A mixture of sheet and slush ice required ice breaker activity at the Beck intakes on December 23 and 24 but the return of warmer temperatures stopped ice production during the last week of the year.

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 29th. A drill was conducted that simulated a flood event along the U.S. shore triggered by an ice jam upstream of the NYPA intakes.

Small amounts of ice passed through the Pool early in January. Ice first began forming behind the boom on January 9. A storm at the end of the first week of the month, with significant winds from the southwest, resulted in a broken ice boom span. The opened span, span "E", was repaired on January 12.

Ice management measures were undertaken in the Pool, at times including ice breaker activity, from January 10 through 25. An ice bridge formed in the Maid-of-the-Mist Pool, below the Falls, on January 17. Lake Erie was over 90% ice covered by January 22.

A helicopter flight was conducted on February 13 to measure ice thickness on the eastern part of Lake Erie. Average thickness was 34 centimetres (13 inches). There was insufficient ice cover to take similar measurements in mid-February 2008.

10. **MEETING WITH THE PUBLIC**

In accordance with the Commission's requirements, the Board will hold an annual meeting with the public. The meeting is scheduled for the evening of September 16 at a location in the Niagara Peninsula as yet to be determined. Information on items including current and projected Great Lakes levels, the operation of the Lake Erie-Niagara River Ice Boom, the Board's measurement program, the revised Ashland Avenue rating and OPG's Niagara Tunnel Project will be presented.

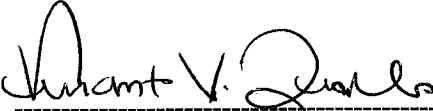
11. **MEMBERSHIP OF THE BOARD**


The membership of the Board and its Working Committee is unchanged from the last report.


12. **ATTENDANCE AT BOARD MEETINGS**

The Board met once during this reporting period. The meeting was held in Chicago, Illinois on March 3. As Brigadier General Peabody was unable to attend, Colonel Quarles chaired the meeting. Also unable to attend were United States Member Mr. Daniel Mahoney and Canadian Member Mr. Rob Messervey.

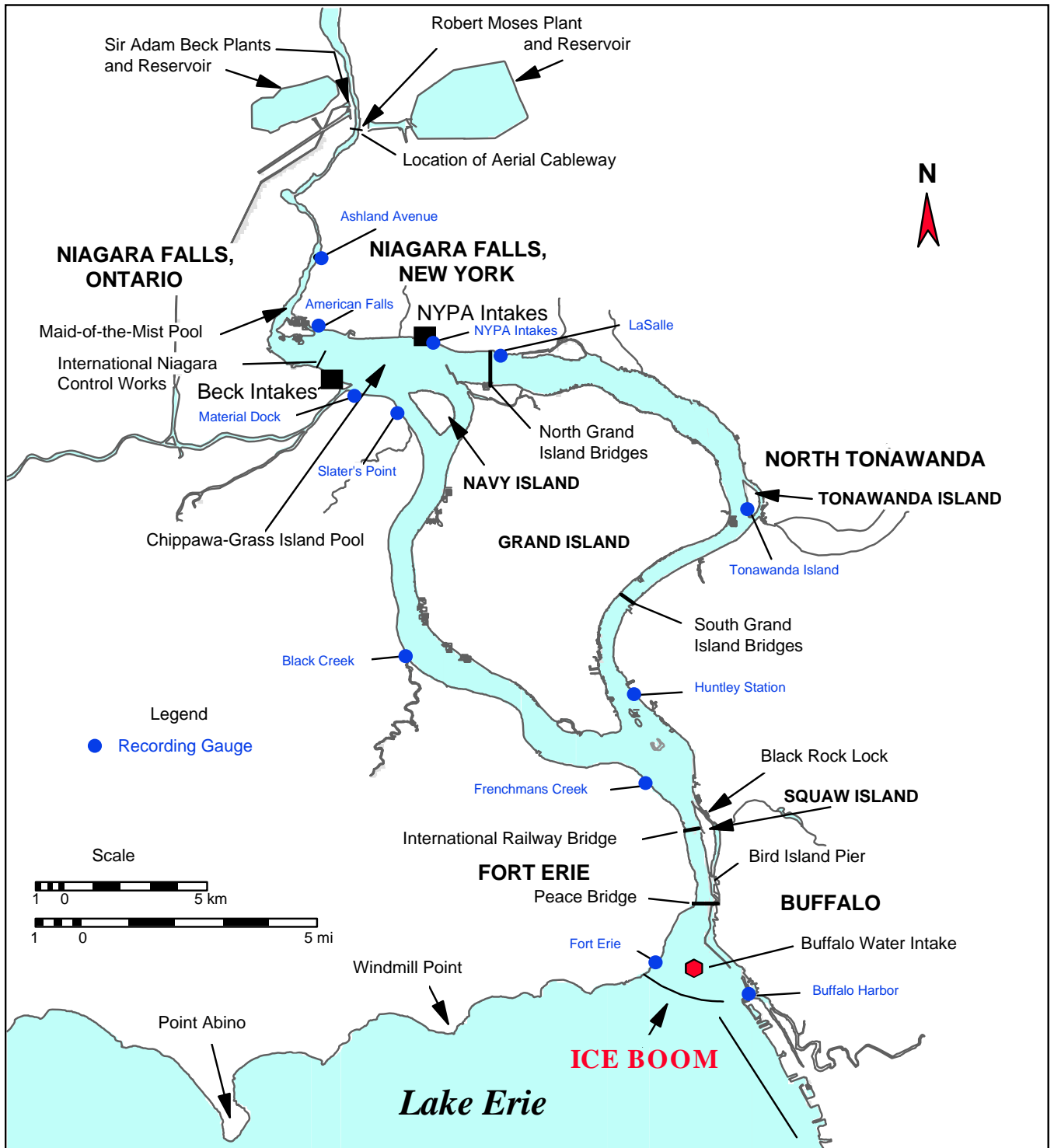
Respectfully Submitted,

For 
BRIGADIER GENERAL JOHN W. PEABODY
Chair, United States Section


RALPH MOULTON
Chair, Canadian Section


DANIEL J. MAHONEY
Member, United States Section

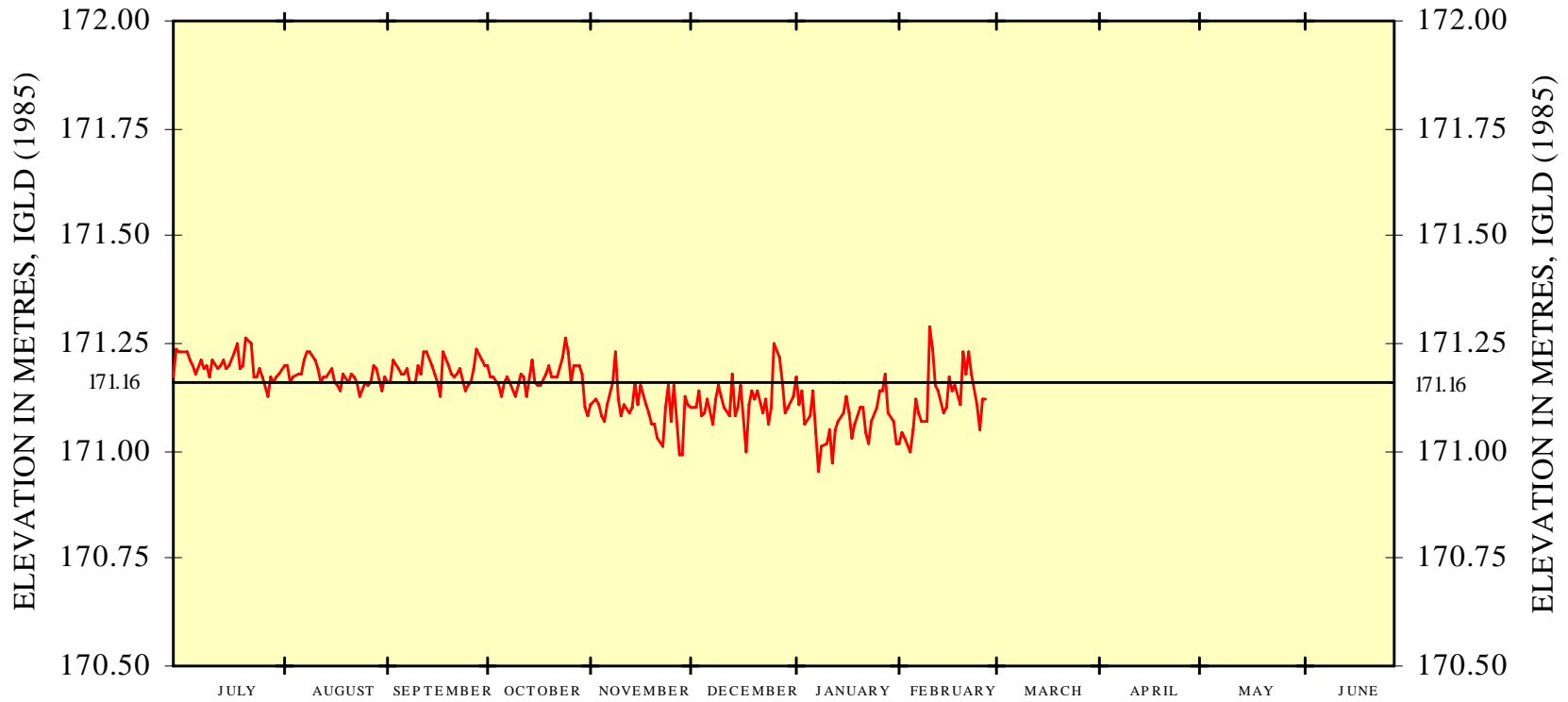

ROBERT MESSERVEY
Member, Canadian Section



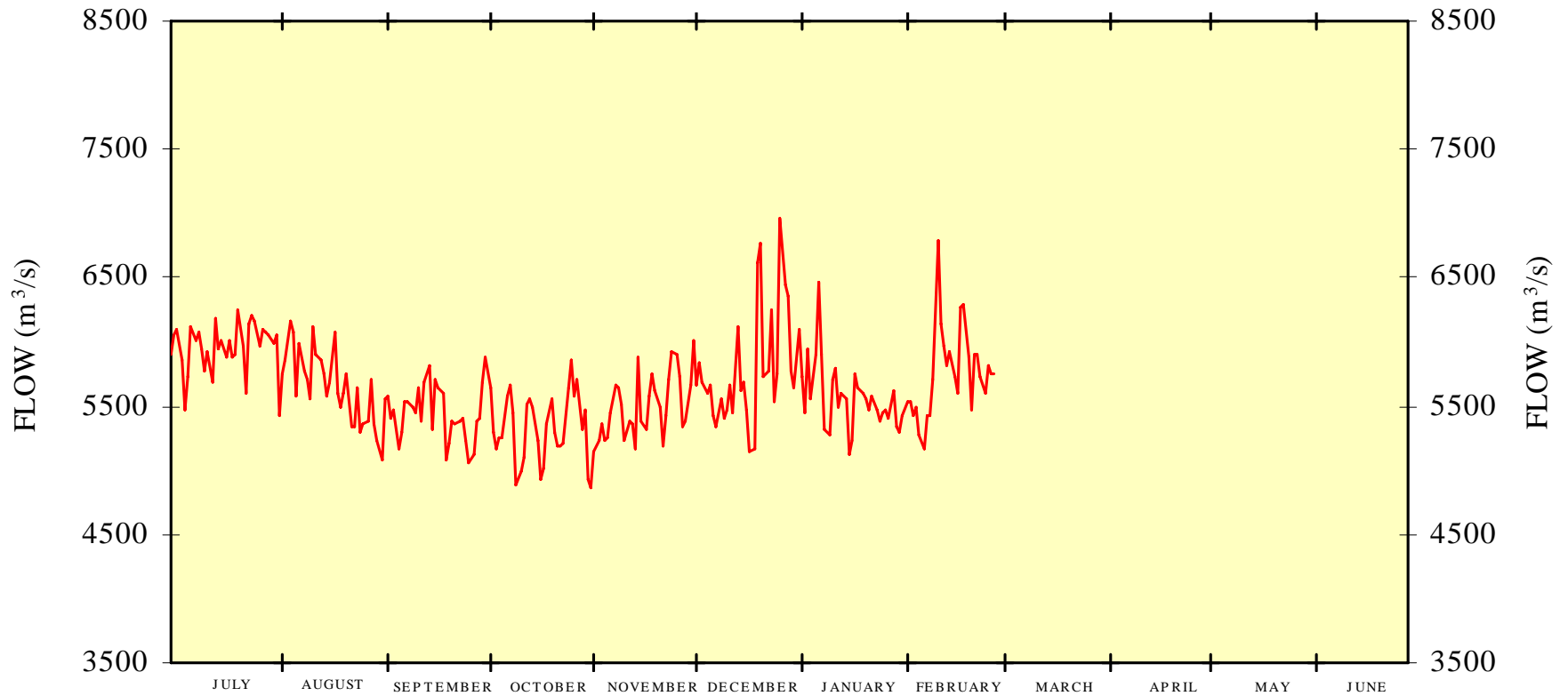
NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAUGE

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

JULY 2008 THROUGH FEBRUARY 2009



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 2008 THROUGH FEBRUARY 2009



DAILY DIVERSIONS OF NIAGARA RIVER WATER* FOR POWER PURPOSES IN CUBIC METRES PER SECOND (m³/s) JULY 2008 THROUGH FEBRUARY 2009

