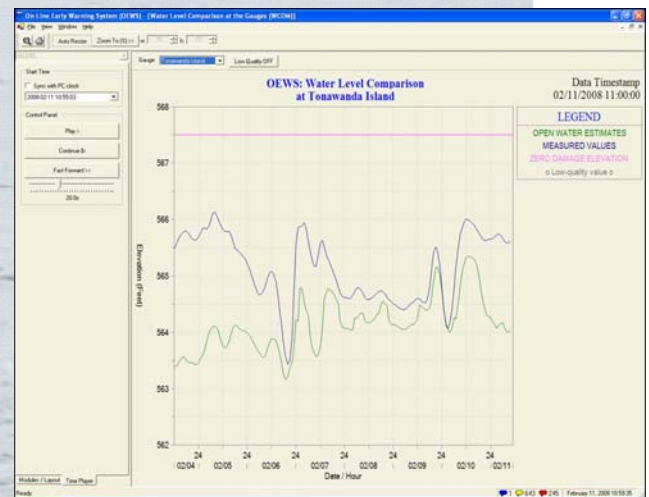


International Niagara Board of Control One Hundred Eleventh Semi-Annual Progress Report to the International Joint Commission



Covering the Period March 21 through September 16, 2008

EXECUTIVE SUMMARY

The level of Lake Erie began the reporting period 19 centimetres (7.5 inches) above long-term average. Dry conditions in April and May contributed to a drop in level but it remained near the long-term average. The six-month water level forecast indicates that the level of Lake Erie is expected to remain below its long-term average (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).

The flow over Niagara Falls met the required Treaty minimums throughout the reporting period (Section 4).

Ontario Power Generation continues with construction of the 10.4 kilometre (6.5 mile) long Niagara Tunnel Project. The Tunnel Boring Machine's progress was slowed due to unstable rock conditions below the buried St. David's Gorge. Now past that point, it is advancing at a rate of around 8 metres (26 feet) per day. Adjustments will be made to the horizontal and vertical alignments to minimize the effect of the delay (Section 8).

Removal of the Lake Erie-Niagara River Ice Boom began on April 15 and was completed on April 19 (Section 9).

The Board held a meeting with the public on September 15, 2008 in Buffalo, New York. Three members of the public were in attendance (Section 10).

Changes in Board/Working Committee membership see BG John W Peabody as the U.S. Chair of the Board with COL Vincent Quarles as his alternate, LTC Daniel B. Sned as the U.S. Chair of the Board's Working Committee and Mr. Peter Valeri as member of the U.S. Section of the Working Committee (Section 11).

COVER: **Examples of electronic graphing and display from the Niagara River Control Centre's digital database.**

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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

Burlington, Ontario
Chicago, Illinois

September 16, 2008

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

Commissioners:

1. **GENERAL**

The International Niagara Board of Control (Board) submits its One Hundred Eleventh Semi-Annual Progress Report, covering the period March 21 through September 16, 2008.

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 19 centimetres (7.5 inches) above the long-term average. The lake peaked in April, with a mean water level of 174.40 metres (572.18 feet), which is 18 centimetres (7.1 inches) above the long-term average for the month. Dry weather conditions in April and May contributed to a drop in level, which by June was at the long-term average for that month. In July, the level rose slightly in response to wet weather, but by August the lake level was again declining. In August, the level was at 174.24 metres (571.65 feet), or 1 centimetre (0.5 inch) below average. Recorded water level data for the period March through August 2008 and departures from long-term averages are shown in Table 1 and depicted graphically on Figure 1.

The Lake Erie basin received 49.0 centimetres (19.3 inches) of precipitation during the period March through August 2008. This is 1% above average for the period. In March, precipitation was well above average but April and May were much drier. Above-average precipitation in June and July slowed and temporarily reversed the decline in water levels, but August saw a return to drier conditions. Precipitation data for the period March through August 2008 and departures from long-term averages are shown in Table 2 and are depicted graphically on Figure 2.

The level of Lakes Michigan and Huron continued to be well below the long-term average during this reporting period. As a result, inflows to Lake Erie from the upstream lakes were 9% below the long-term average for the six-month period March through August 2008.

Water supplied to Lake Erie from its local drainage basin (net basin supply) reflects the amount of precipitation the basin receives during the reporting period, as well as evaporation from the land and lake surfaces and snow accumulation and melt. Supply was above average in March, as was precipitation. Snow melt also contributed to the March supply. In April, low precipitation was supplemented by continued snow melt, which kept the April supply near to average. Supply in June and July was above average, as was

precipitation. Net basin supplies for the period March through August 2008 are depicted in Figure 3.

The water level of Lake Erie naturally affects the outflow into the Niagara River, as does the amount of flow retardation in the river due to ice and weeds. The Niagara River flow was above average each month of the reporting period except for June and August, reflecting relative water level conditions throughout the reporting period. Monthly flows in the Niagara River are graphically depicted in Figure 4 and summarized in Section 6.

The September 2008 water level forecast indicates that the level of Lake Erie is expected to be below the long-term average during the next six months.

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	Average 1918-2007**	Departure	Recorded* 2008	Average 1918-2007**	Departure
March	174.26	174.07	0.19	571.72	571.10	0.62
April	174.40	174.22	0.18	572.18	571.59	0.59
May	174.36	174.30	0.06	572.05	571.85	0.20
June	174.33	174.33	0.00	571.95	571.95	0.00
July	174.36	174.31	0.05	572.05	571.88	0.17
August	174.24	174.25	-0.01	571.65	571.69	-0.04

*Provisional

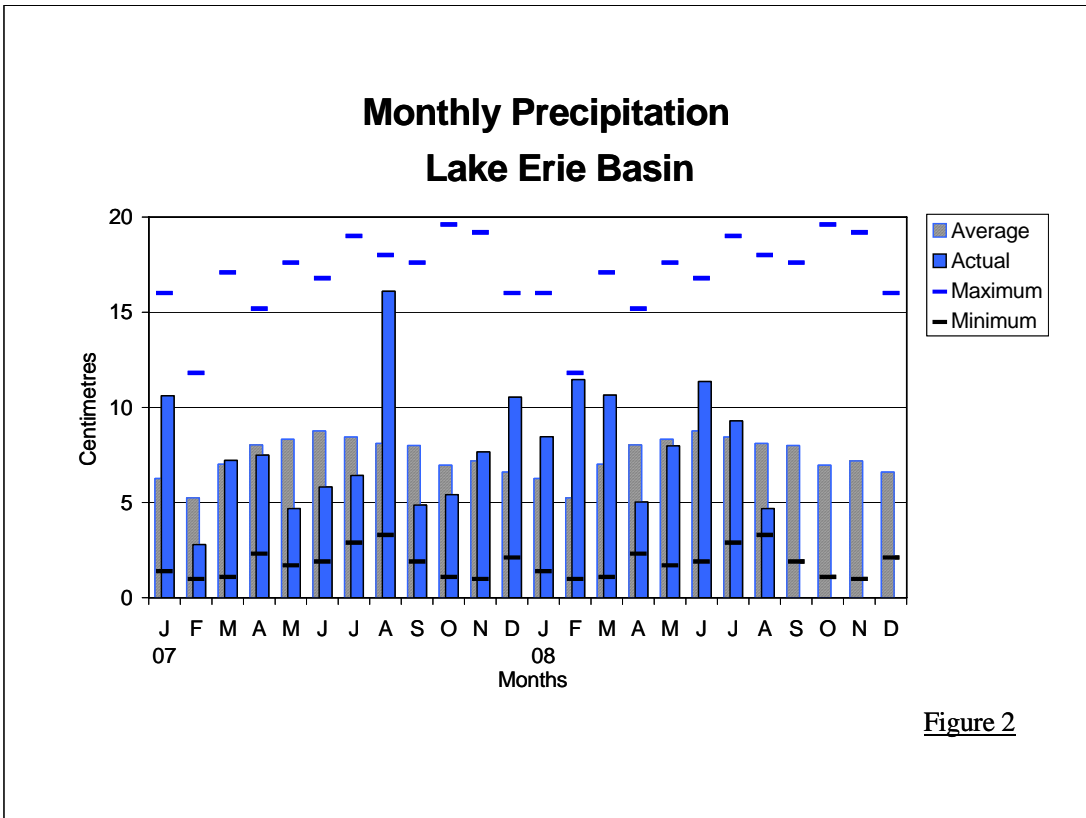
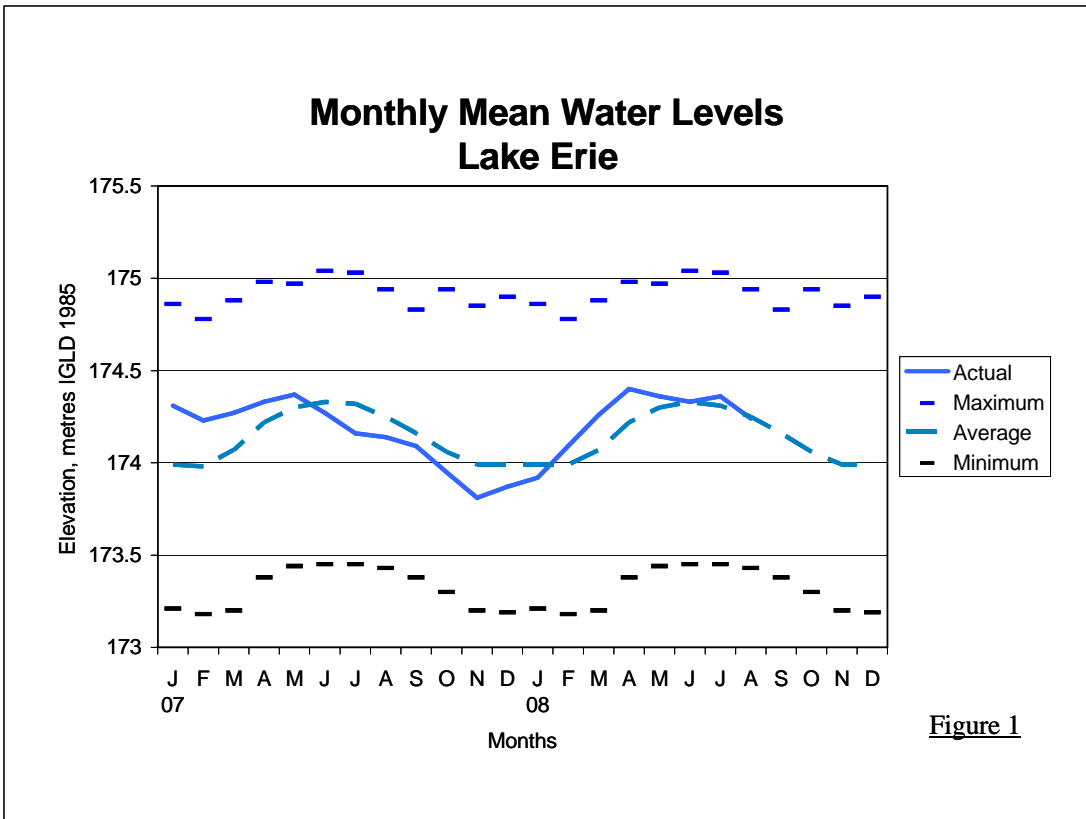
**Period of record is 1918-2007

TABLE 2 - MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN

Month	Centimetres			Inches			
	Recorded* 2008	Average 1900-99 ⁺	Departure	Recorded* 2008	Average 1900-99 ⁺	Departure	Departure (in percent)
March	10.64	7.01	3.63	4.19	2.76	1.43	52
April	5.03	8.03	-3.00	1.98	3.16	-1.18	- 37
May	7.98	8.33	-0.35	3.14	3.28	-0.14	- 4
June	11.35	8.76	2.59	4.47	3.45	1.02	30
July	9.30	8.43	0.87	3.66	3.32	0.34	10
August	4.67	8.10	-3.43	1.84	3.19	-1.35	-42

*Provisional

⁺Most recent period of record is 1900-99



Monthly Net Basin Supplies Lake Erie Basin

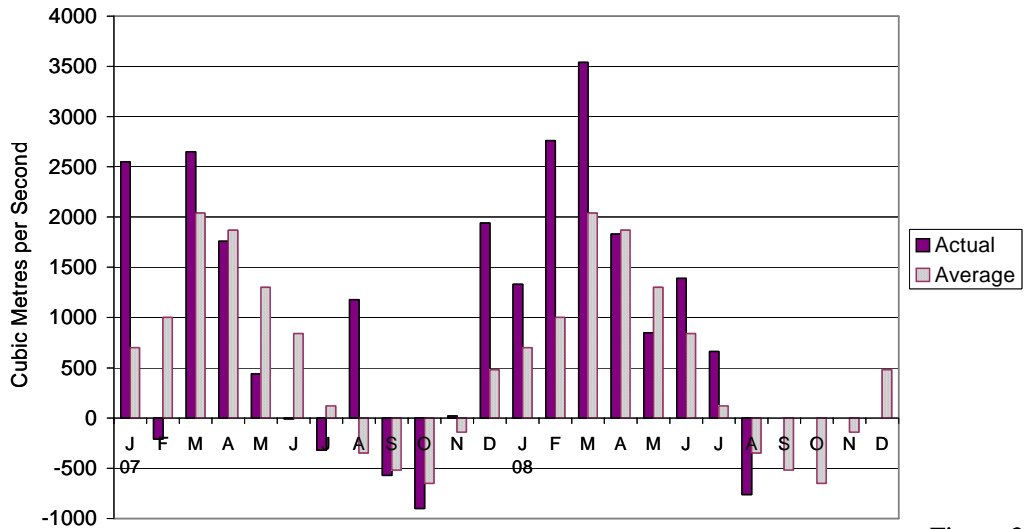


Figure 3

Niagara River Monthly Mean Flows at Buffalo, New York

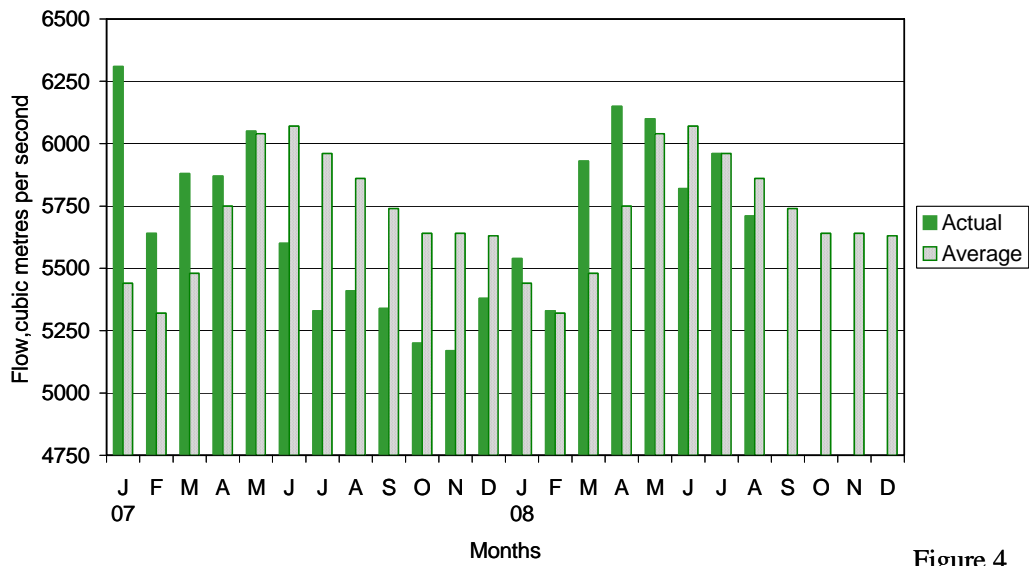


Figure 4

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 August 31, 2008 was 0.44 metre-month (1.44 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 March 23 and April 2 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 March through August 2008 are shown in Enclosure 2.

The Power Entities' are responsible for regulatory compliance, flow forecasting, ice management and the dispatch of water shares to their Niagara River hydropower facilities. This is accomplished through the Niagara River Control Centre (NRCC) which,

in exercising these duties, relies on a network of water level gauges located at various points along the river and around Lake Erie. The gauge elevations are transmitted to the NRCC and recorded in a computer database, as well as displayed on the Supervisory Control and Data Acquisition (SCADA) system and water level recorders in the control room.

In an effort to be environmentally conscious and reduce paper consumption, the NRCC will retire 16 of the 20 graphic recorders that are currently in use in favour of electronic graphing of water level data from the existing digital database. Electronic graphing has long been a part of the NRCC operation and will now be considered as the primary form of graphing. To support regulatory requirements, the NRCC will retain paper charts for gauges at Fort Erie, Material Dock, OP Tailwater and Ashland Avenue.

Along similar lines, the NRCC has been continuing with development of custom computer software specifically for applications related to regulatory compliance, water control/utilization, ice management and flow forecasting. With the use of this technology, reliance on paper media is quickly being replaced.

To further improve the reliability of data flow between the remote gauge sites and the NRCC, OPG and NYPA are entering into a series of phased projects that involve developing new wired and wireless communications pathways, redundant digital storage and systems to prevent interruption or loss of data.

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.

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 March through August 2008, 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 March through August 2008, diversion for the Sir Adam Beck 1 and 2 plants averaged 1669 m³/s (58,940 cfs) and diversion to the Robert Moses Niagara Power Project averaged 1980 m³/s (59,920 cfs).

The average flow from Lake Erie to the Welland Canal for the period March through August 2008 was 250 m³/s (8,830 cfs) compared to 212 m³/s (7,490 cfs) for the same period one year ago. Diversion from the canal to OPG's DeCew Generating Stations averaged 203 m³/s (7,170 cfs) for the period March through August 2008.

Records of diversions for power generation covering the period March through August 2008 are shown in Enclosure 4.

The monthly average Niagara River flows at Queenston, Ontario for the period March through August 2008 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	Average 1900-2007	Departure	Recorded 2008	Average 1900-2007	Departure
March	6031	5636	395	212980	199030	13950
April	6261	5888	373	221100	207930	13170
May	6146	6090	56	217040	215070	1970
June	5819	6070	-251	205490	214360	-8870
July	5967	5966	1	210720	210690	30
August	5677	5852	-175	200480	206660	-6180

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
March	6880	1986	4340	1934	242960	153260
April	7220	1986	4320	1934	254970	152560
May	7030	1986	4190	1934	248260	147970
June	7410	1985	4270	1964	261680	150790
July	7240	1987	3960	1964	255680	139850
August	6900	1987	3320	1936	243670	117240

During the period March through August 2008, the flow at Queenston averaged 5984 m³/s (211,320 cfs). One year ago, flows for the same period averaged 5731 m³/s (202,390 cfs) with the monthly averages ranging between 5320 m³/s (187,870 cfs) and 6091 m³/s (215,100 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 its development is being prepared for submission to the Board in early 2009.

8. **NIAGARA TUNNEL PROJECT**

Ontario Power Generation continues with construction of the 10.4 kilometre (6.5 mile) long 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 September 16, the Tunnel Boring Machine (TBM) had progressed 3026 metres (9,928 feet). That is a little over one quarter of the entire tunnel length. Progress was hindered 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 but is currently averaging 8 metres (26 feet) per day. Adjustment to both the horizontal and vertical alignments will be made in a bid to reduce costs and make up for some of the lost construction time.

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**

The most extensive ice cover on Lake Erie this past winter was experienced around March 10. The lake was almost completely ice covered at that time. A fixed-wing observation flight was conducted over the eastern basin of Lake Erie on March 25 and showed there was 3370 square kilometres (1,300 square miles) of ice present. The result was a delay in ice boom opening beyond April 1.

Board representatives continued to monitor ice conditions and noted that the extent of the ice field continued to diminish in the first two weeks of April. A flight made on April 14 showed that 310 square kilometres (120 square miles) of ice remained on eastern Lake

Erie. By then, the ice bridge below Niagara Falls had dissipated and conditions were favourable for ice boom opening to commence.

The Board issued a Media Advisory on April 14 regarding ice boom opening. Those operations began on April 15. Substantial tension on span and anchor cables from pressure exerted by the ice field raised safety concerns and slowed span opening and removal. However, with improved ice and wind conditions, ice boom opening was completed on April 19.

10. **MEETING WITH THE PUBLIC**

In accordance with the Commission's requirements, the Board held an annual meeting with the public. The meeting was in Buffalo, New York on the evening of September 15. 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 and OPG's Niagara Tunnel Project was presented. Three members of the public were in attendance.

11. **MEMBERSHIP OF THE BOARD**

Brigadier General John W. Peabody, who assumed command of the U.S. Army Corps of Engineers' Great Lakes and Ohio River Division on August 4, is the new U. S. Chair of the Board. Colonel Vincent B. Quarles, appointed on July 28, will act as BG Peabody's alternate with the Board. BG Peabody succeeds Colonel Jeffrey C. Smith who was in that position for three months following the retirement of former U. S. Chair BG Bruce A. Berwick.

Lieutenant Colonel Daniel B. Snead assumed command of the U.S. Army Corps of Engineers Buffalo District, effective July 18. He succeeds LTC John S. Hurley as the U. S. Chair of the Board's Working Committee.

Mr. Peter Valeri of the U.S. Federal Energy Regulatory Commission joined the U.S. Section of the Board's Working Committee. He replaces Mr. Charles Goggins.

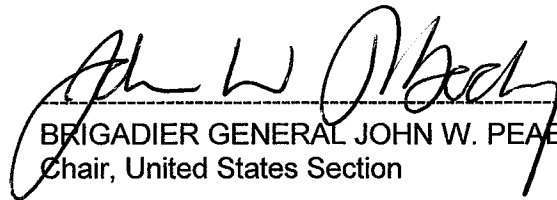
12. **ATTENDANCE AT BOARD MEETINGS**

The Board met once during this reporting period. The meeting was held in Fort Erie, Ontario on September 16. Colonel Quarles acted on behalf of BG Peabody who was unable to attend. All other Board Members were in attendance.

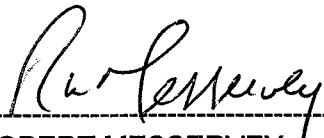
Respectfully Submitted,



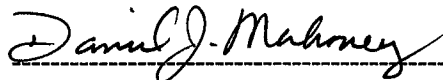
RALPH MOULTON
Chair, Canadian Section



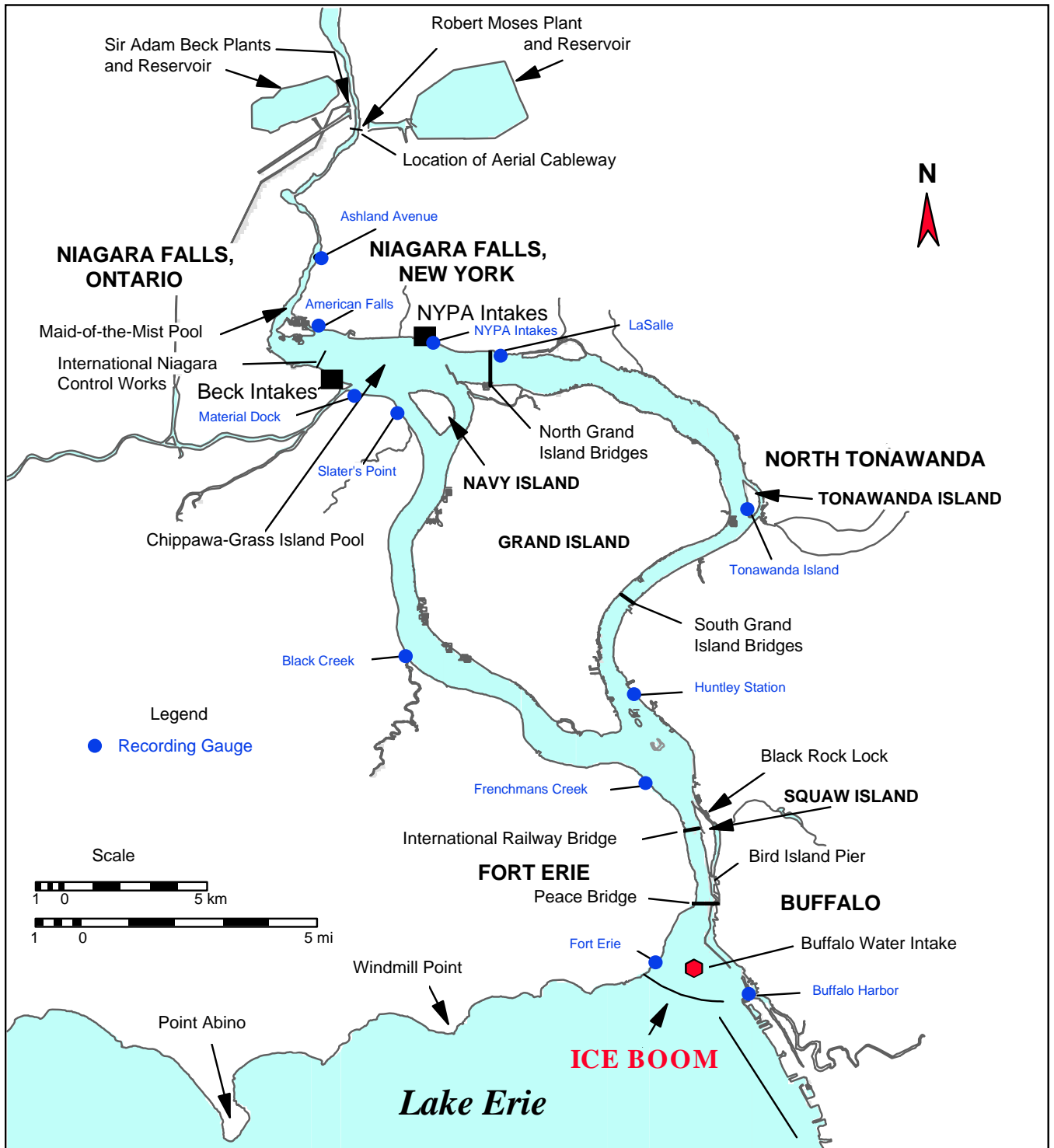
BRIGADIER GENERAL JOHN W. PEABODY
Chair, United States Section



ROBERT MESSERVEY
Member, Canadian Section



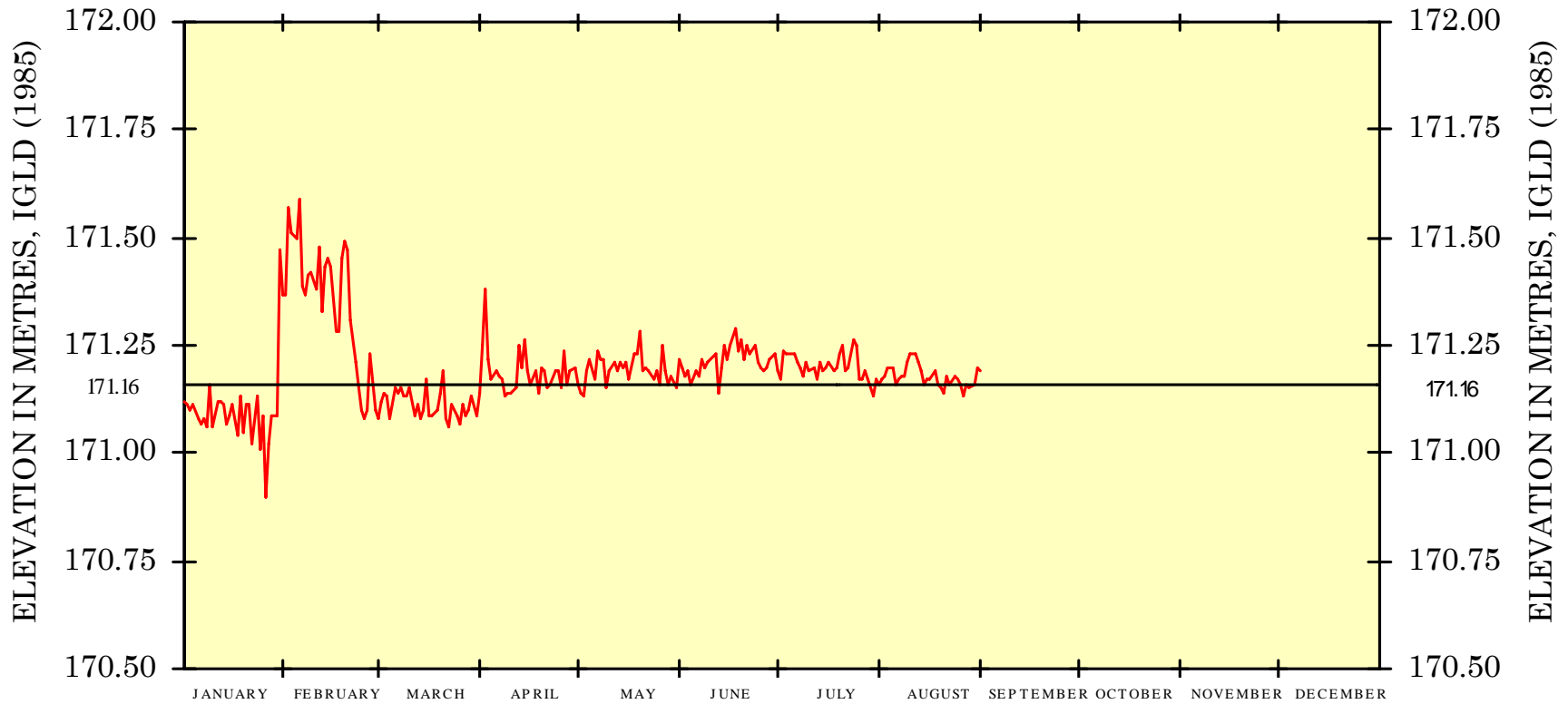
DANIEL J. MAHONEY
Member, United States Section



NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAUGE

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

2008

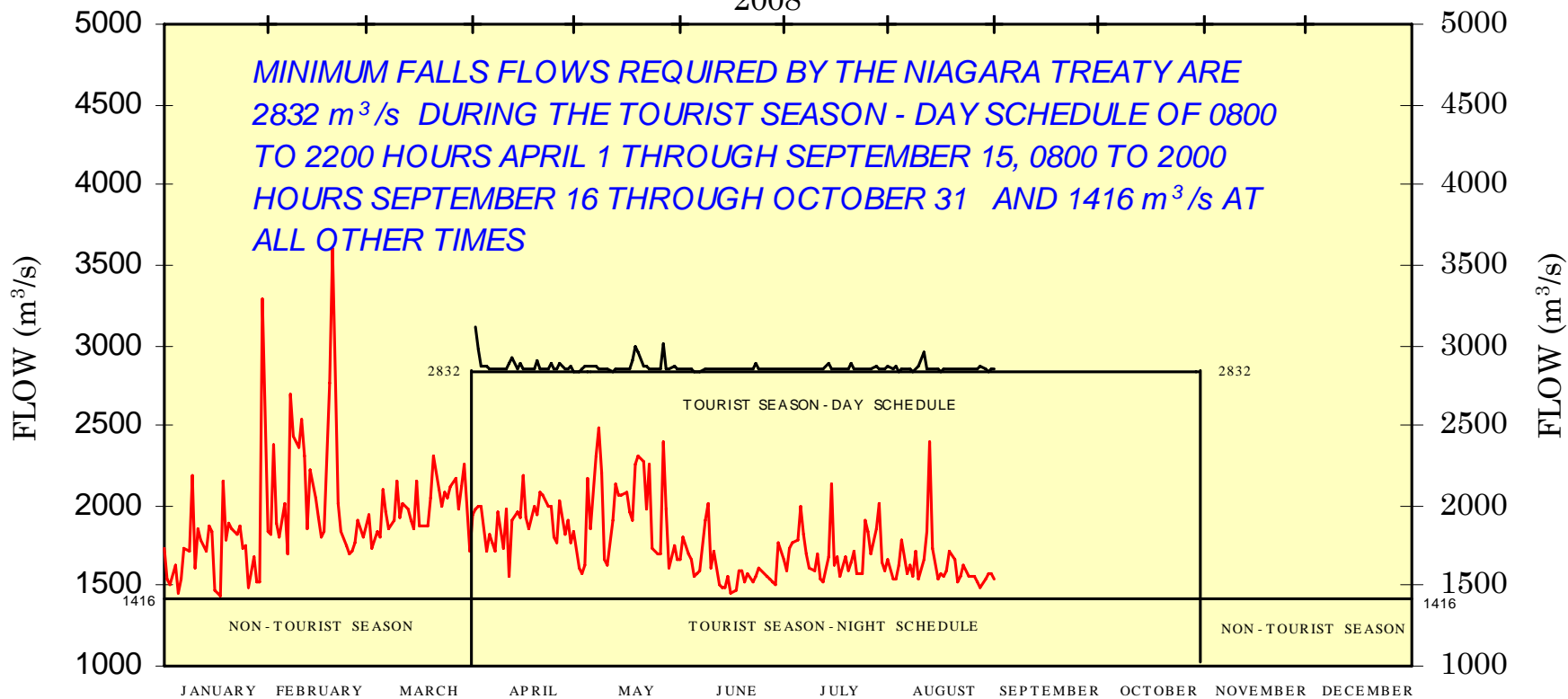


DAILY FLOW OVER NIAGARA FALLS

FLOW AT ASHLAND AVENUE GAUGE MINUS CN AND OP DIVERSIONS

IN CUBIC METRES PER SECOND (m³/s)

2008



DAILY DIVERSIONS OF NIAGARA RIVER WATER* FOR POWER PURPOSES

IN CUBIC METRES PER SECOND (m³/s)

2008

