

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



Covering the Period March 4 through September 16, 2009

EXECUTIVE SUMMARY

The level of Lake Erie began the reporting period 24 centimetres (9.4 inches) above the long-term average. The lake slowly declined through the summer and in August, the level was at 174.35 metres (572.01 feet), or 10 centimetres (3.9 inches) above average. The September 2009 water level forecast indicates that the level of Lake Erie is expected to be above the long-term average during the next six months (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 was 135 cubic metres per second (4,700 cubic feet per second) below the required daylight Falls minimum for 0:800 on August 5 as the result of a police action (Section 4).

Ontario Power Generation continues with construction of the Niagara Tunnel Project. The Tunnel Boring Machine's progress was slowed due to unstable rock conditions below the buried St. David's Gorge. By September 11, 2009, the Tunnel Boring Machine (TBM) had progressed 5418 metres (17,776 feet) (Section 8).

Removal of the Lake Erie-Niagara River Ice Boom began on April 6 and was completed on April 13 (Section 9).

The Board held a meeting with the public on September 16, 2009 in St. Catharines, Ontario. Nine members of the public were in attendance (Section 10).

Mr. Rob Messervey resigned as a Canadian member of the Board (Section 11).

COVER: Niagara Falls Ontario Fire Department personnel practice river rescue procedures at the International Niagara Control Works. (Photo courtesy of Ontario Power Generation's Peter Kowalski)

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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, 2009

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

Commissioners:

1. **GENERAL**

The International Niagara Board of Control (Board) submits its One Hundred Thirteenth Semi-Annual Progress Report, covering the period March 4 through September 16, 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 24 centimetres (9.4 inches) above the long-term average. Above average precipitation in the early spring fuelled a rapid rise in levels in March and April. Below average precipitation in May stalled this rise and the lake peaked in May, with a mean water level of 174.46 metres (572.38 feet). That level is 16 centimetres (6.3 inches) above the long-term average for the month. The lake slowly declined through the summer and in August, the level was at 174.35 metres (572.01 feet), or 10 centimetres (3.9 inches) above average. Recorded water level data for the period March through August 2009 and departures from long-term averages are shown in Table 1 and depicted graphically on Figure 1.

The Lake Erie basin received approximately 56.25 centimetres (22.1 inches) of precipitation during the period March through August 2009. This is about 15% above average for the period. In March and April, precipitation was well above average. May was the only month in the reporting period when precipitation was below average. Precipitation data for the period March through August 2009 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 below the long-term average during this reporting period, but was the closest to average it has been since 1999. As a result, inflows to Lake Erie from the upstream lakes were below, but very near, the long-term average for the six-month period March through August 2009.

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. Supplies were above average every month of the reporting period except May, which was also the only month with below average precipitation, and July. Net basin supplies for the period March through August 2009 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 every month of the reporting period except June. The flows in the Niagara River are graphically depicted in Figure 4 and summarized in Section 6.

The September 2009 water level forecast indicates that the level of Lake Erie is expected to be above 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* 2009	Average 1918-2008**	Departure	Recorded* 2009	Average 1918-2008**	Departure
March	174.31	174.07	0.24	571.88	571.10	0.78
April	174.44	174.22	0.22	572.31	571.59	0.72
May	174.46	174.30	0.16	572.38	571.85	0.53
June	174.45	174.33	0.12	572.34	571.95	0.39
July	174.42	174.32	0.10	572.24	571.92	0.32
August	174.35	174.25	0.10	572.01	571.69	0.32

*Provisional

**Period of record is 1918-2008

TABLE 2 - MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN

Month	Centimetres			Inches			
	Recorded* 2009	Average 1900-2006 ⁺	Departure	Recorded* 2009	Average 1900-2006 ⁺	Departure	Departure (in percent)
March	10.26	6.94	3.32	4.04	2.73	1.31	48
April	11.25	8.04	3.21	4.43	3.17	1.26	40
May	7.16	8.54	-1.38	2.82	3.36	-0.54	-16
June	10.11	8.75	1.36	3.98	3.44	0.54	16
July	8.99	8.59	0.40	3.54	3.38	0.16	5
August	8.48	8.10	0.38	3.34	3.19	0.15	5

*Provisional

⁺Most recent period of record is 1900-2006

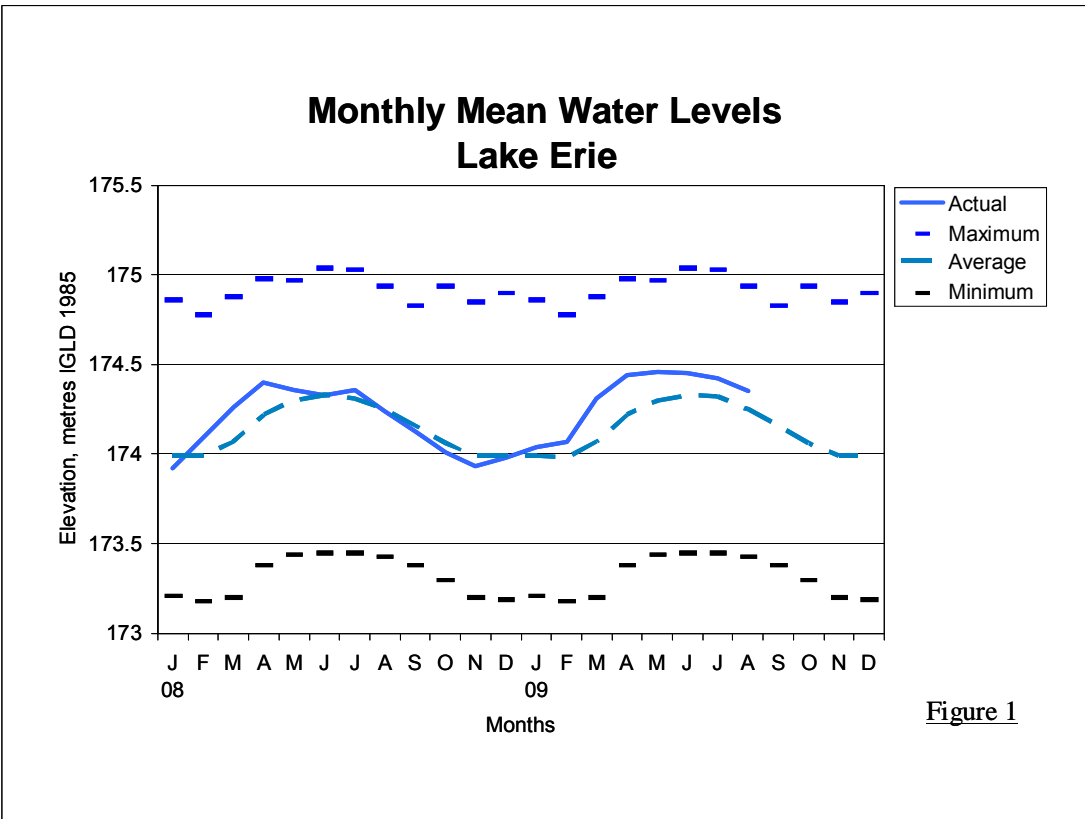


Figure 1

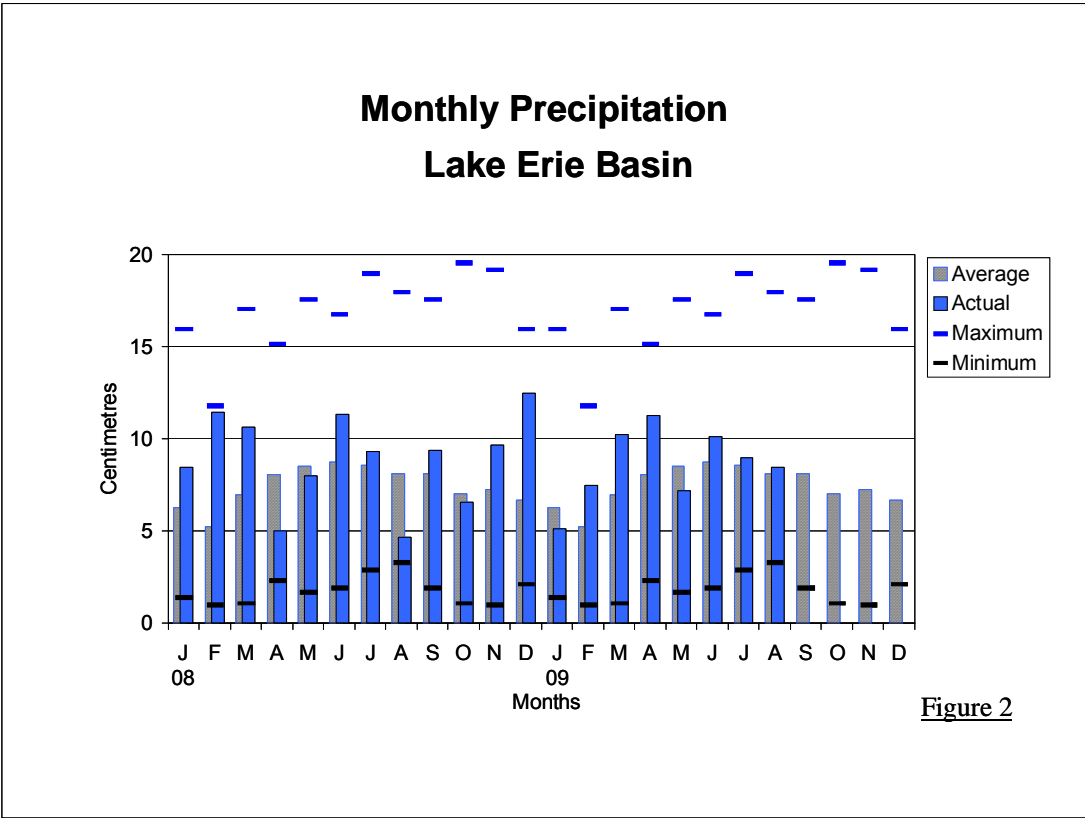


Figure 2

Monthly Net Basin Supplies Lake Erie Basin

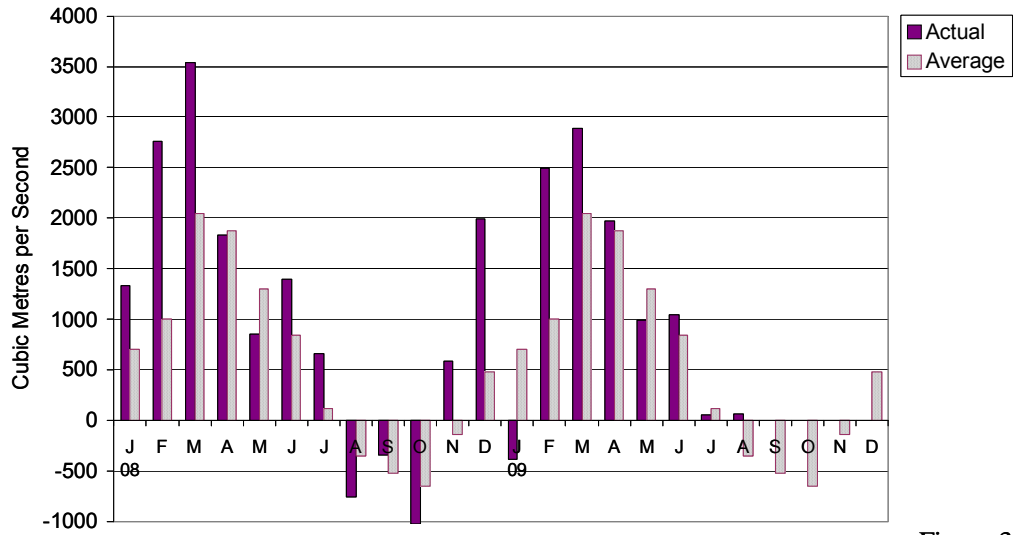


Figure 3

Niagara River Monthly Mean Flows at Buffalo, New York

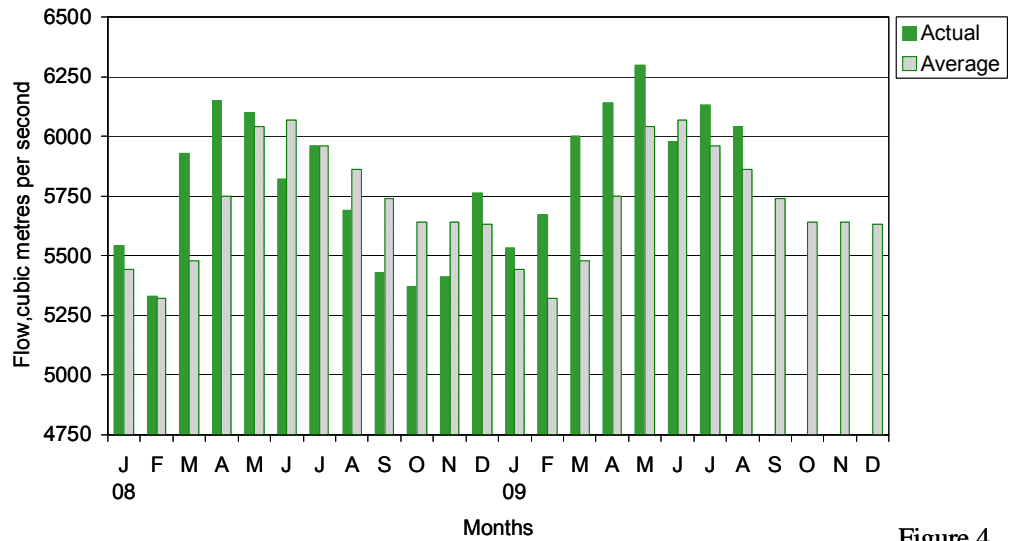


Figure 4

3. OPERATION AND MAINTENANCE OF THE INTERNATIONAL NIAGARA CONTROL WORKS

The water level in the Chippawa-Grass Island Pool (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, 2009 was 0.45 metre-month (1.48 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 were suspended for March 11 and 12 and April 4 as the result of actions to assist in ice management. Tolerances were also suspended on August 5, 7 and 12 through 16 as the result of police operations.

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 2009 are shown in Enclosure 2.

Three maintenance items to the control works are of particular interest. Gate 2 has been out of service since April 28 as it undergoes a major overhaul (seals, cylinders,

pistons). The Uninterruptable Power Supply, for such things as water level graphing, was recently replaced and now provides a 2 hour battery backup capability. As a result of inspections done in 2008, a plan and schedule has been developed to replace all oil lines in Gates 1 to 13. The 4 year program will start this Fall. Two will be done in 2009 and will continue at the rate of 2-3 per year until all 13 are completed. Gates 14-18 oil lines do not need replacing.

4. **FLOWS OVER NIAGARA FALLS**

During the tourist season daylight hours, the required minimum 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.

At the request of the Niagara Parks Police, transition to meet the daytime Falls flow minimum was impacted on August 5 while a search for a body was conducted. The minimum amount of flow over the Falls was reported for 0800 as being 135 m^3/s (4,700 cfs) below the required daylight minimum.

Falls flow met or exceeded minimum Treaty requirements at all other times during the reporting period. The recorded daily flows over Niagara Falls, covering the period March through August 2009, are 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 2009, diversion for the Sir Adam Beck 1 and 2 plants averaged 1636 m³/s (57,780 cfs) and diversion to the Robert Moses Niagara Power Project averaged 2068 m³/s (73,030 cfs).

The average flow from Lake Erie to the Welland Canal for the period March through August 2009 was 242 m³/s (8,550 cfs) compared to 250 m³/s (8,830 cfs) for the same period one year ago. Diversion from the canal to OPG's DeCew Generating Stations averaged 177 m³/s (6,250 cfs) for the period March through August 2009.

Records of diversions for power generation covering the period March through August 2009 are shown in Enclosure 4.

The monthly average Niagara River flows at Queenston, Ontario for the period March through August 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 2009	Average 1900-2008	Departure	Recorded 2009	Average 1900-2008	Departure
March	6092	5639	453	215140	199140	16000
April	6257	5888	369	220960	207930	13030
May	6312	6091	221	222900	215100	7800
June	5989	6068	-79	211500	214290	-2790
July	6144	5966	178	216970	210690	6280
August	5999	5850	149	211850	206590	5260
Average	6132	5917	215	216550	208960	7590

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 2009, the flow at Queenston averaged 6132 m³/s (216,550 cfs). One year ago, flows for the same period averaged 5984 m³/s (211,320 cfs) with the monthly averages ranging between 5677 m³/s (200,480 cfs) and 6261 m³/s (221,100 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). For the last two hours of August 9 and the first two hours of August 10, the Slater's Point Gauge (the approved alternate for the Material Dock Gauge) was used to determine the elevation of the Pool as difficulties were experienced with the Material Dock Gauge.

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 and are scheduled in 2010 at the Cableway and Welland Canal Sections and in 2012 at the American Falls Section.

The International Niagara Committee, by letter dated May 7, 2009, forwarded the approved revised Ashland Avenue Gauge Rating to the Governments. Operational use of the revised rating will begin on January 1, 2010.

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 September 11, 2009, the Tunnel Boring Machine (TBM) had progressed 5418 metres (17,776 feet). That is more than half 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.

When this tunnel becomes operational, the 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**

Ice cover on Lake Erie increased during late February and peaked at about 97% in the first week of March. It then began to steadily decline throughout the remainder of the month.

March started out very cold but then quickly transitioned to above normal temperatures. Average temperature for the month was 1.9°C (35.4°F) or 0.6°C (1.1°F) above normal.

On March 12, a helicopter flight was conducted to measure ice thickness on the eastern part of Lake Erie. Average thickness was 27 centimetres (11 inches). Similar measurements taken in mid-March 2008 resulted in an average of 23 centimetres (9 inches).

Representatives of the International Niagara Board of Control conducted a fixed-wing flight on March 25 to determine the extent of ice remaining on the eastern basin. Although continuing to dissipate, there was still 2250 square kilometres (870 square miles) or 44% of ice cover present. The Board advised the Commission that, due to that amount of ice, a delay in ice boom opening beyond April 1 was expected.

The amount of ice cover diminished rapidly over the last few days of March and, based on satellite imagery, the amount of ice remaining in the eastern basin by April 2 was determined to be about 520 square kilometres (200 square miles). Considering the amount of ice remaining and the absence of an ice build-up in the Maid-of-the-Mist Pool below Niagara Falls, the Board issued a media advisory that preparations were underway for boom opening. The last aerial observation was made on April 6 when it was shown that only about 100 square kilometres (40 square miles) of ice remained.

Boom opening operations began on April 6 with three spans opened. Three more spans were opened on April 7 and another two on April 8. Substantial tension on span and anchor cables from pressure exerted by the ice field during this time raised safety concerns and slowed span opening and removal. Conditions changed dramatically over the Easter weekend with winds pushing most of the remaining ice westwards to disperse and melt in the lake. By April 13, only a small amount of ice remained and was located along the

southern shore at Sturgeon Point. The remaining 14 boom spans were removed that day. All spans, which had been secured to the inside of the breakwall during the 1st phase of removal, were placed onshore, at the summer storage area, by the end of the day on April 15, completing the 2nd phase of boom removal.

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 St. Catharines, Ontario, on the evening of September 16. Information on items including current and projected Great Lakes levels, the operation of the Lake Erie-Niagara River Ice Boom, the revised Ashland Avenue rating and OPG's Niagara Tunnel Project was presented. Nine members of the public were in attendance.

11. **MEMBERSHIP OF THE BOARD**

Mr. Rob Messervey retired from Ontario's Ministry of Natural Resources and resigned from the Board in July. All other Board and Working Committee membership remains unchanged. Ralph Moulton retired from Environment Canada in June, but has been retained on casual status and is continuing as Canadian Chair of the Board.

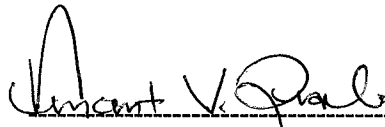
12. **ATTENDANCE AT BOARD MEETINGS**

The Board met once during this reporting period. The meeting was held in Burlington, Ontario on September 16. Colonel Jack Drolet acted on behalf of U. S. Chair Major General Peabody who was unable to attend. All other Board Members were in attendance.

Respectfully Submitted,

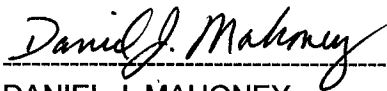


RALPH MOULTON
Chair, Canadian Section

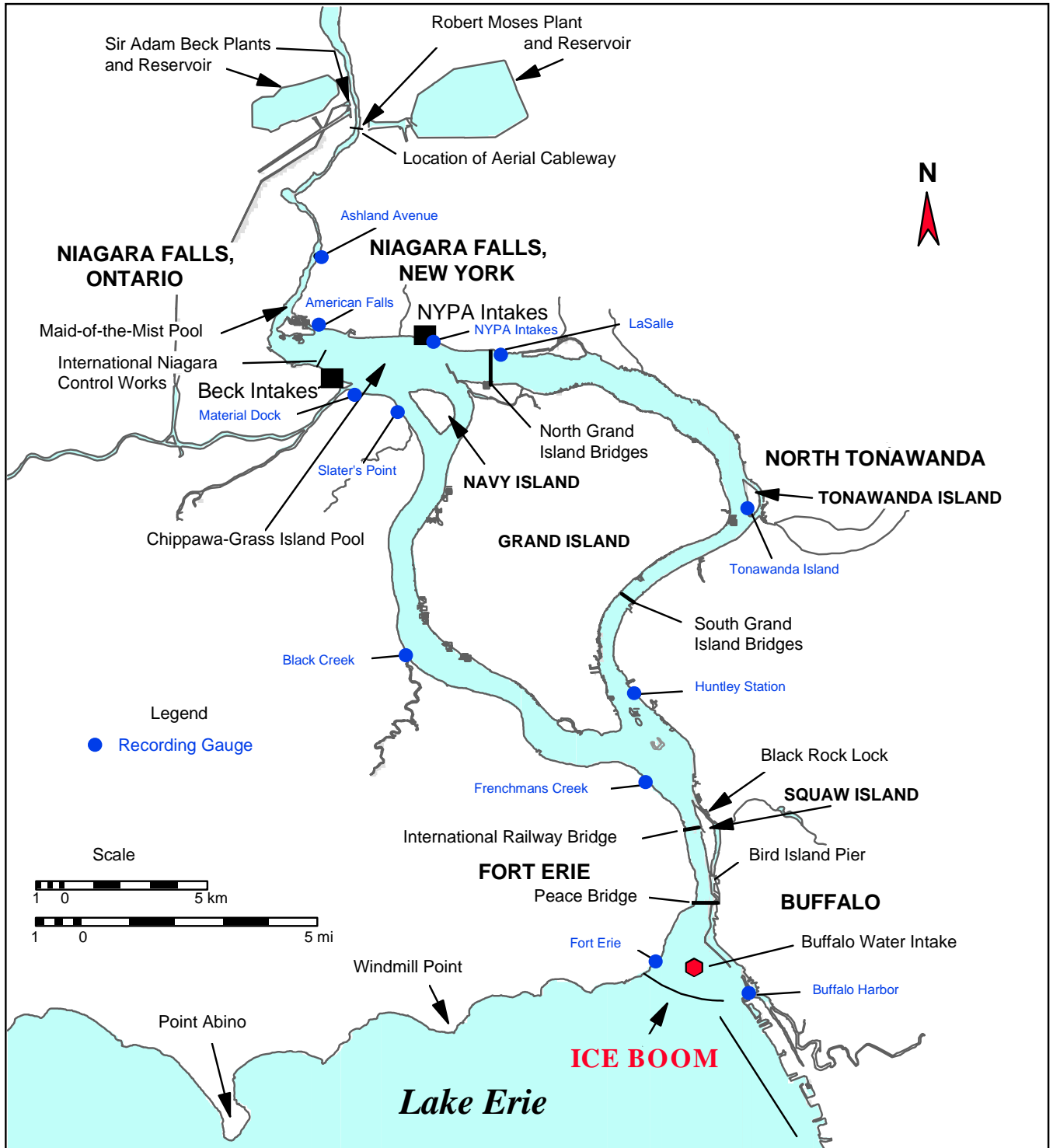


~~FOR~~ MAJOR GENERAL JOHN W. PEABODY
Chair, United States Section

VACANT
Member, Canadian Section



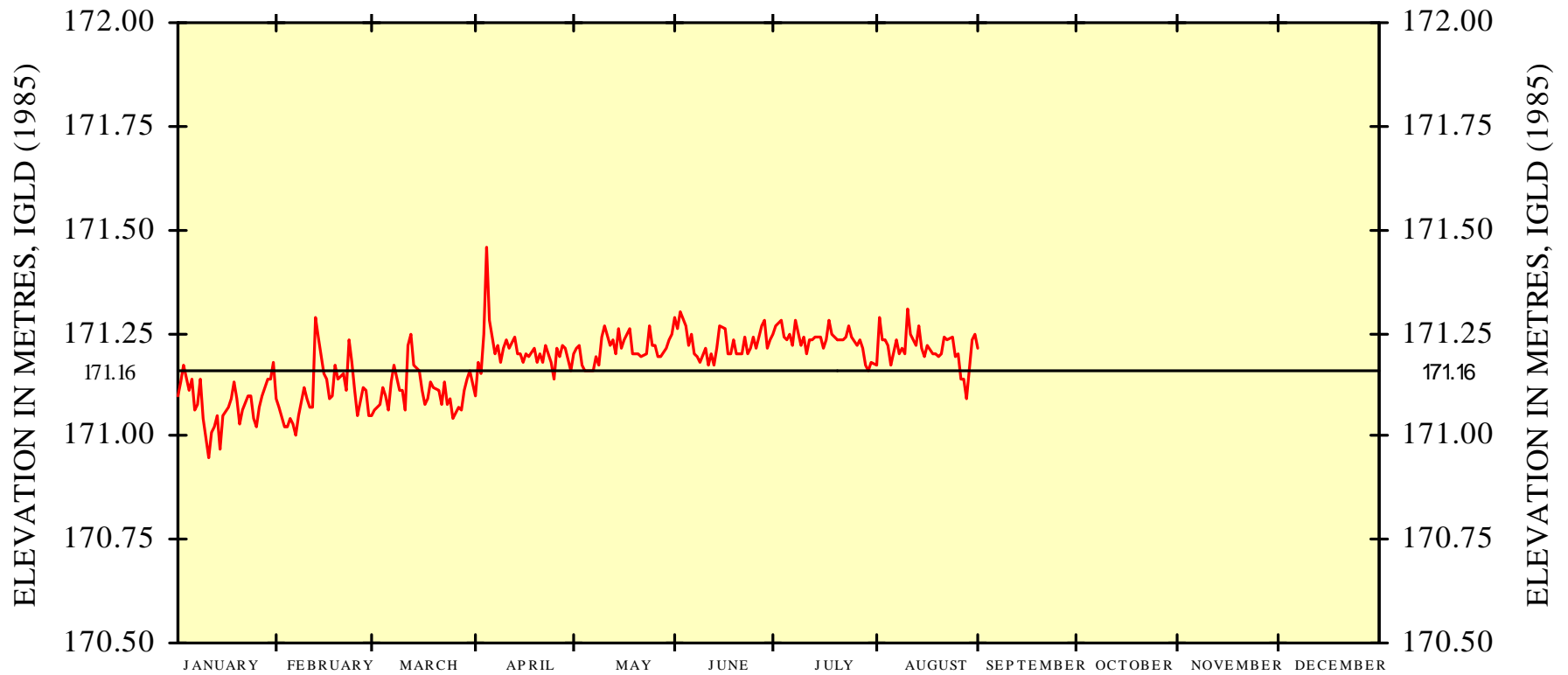
DANIEL J. MAHONEY
Member, United States Section



NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAUGE

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

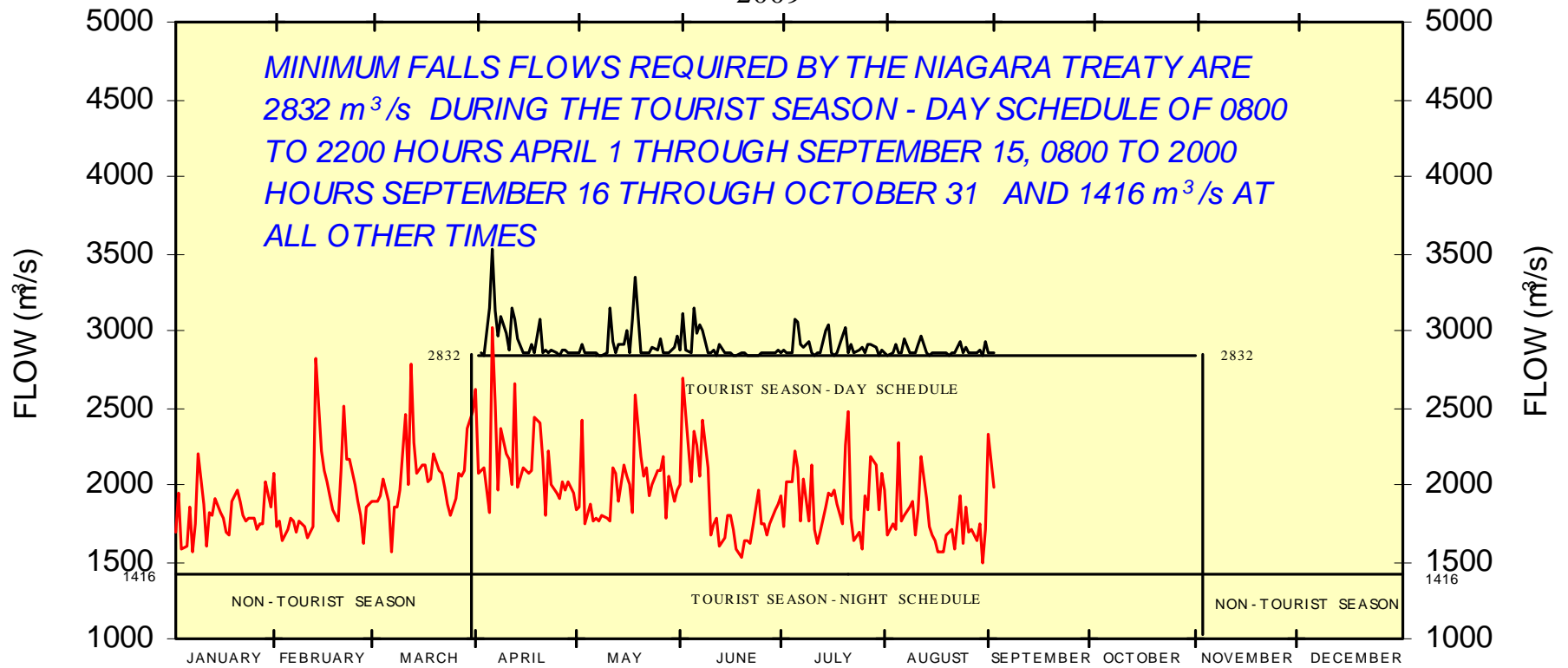
2009



DAILY FLOW OVER NIAGARA FALLS

FLOW AT ASHLAND AVENUE GAUGE MINUS CN AND OP DIVERSIONS IN CUBIC METRES PER SECOND (m³/s)

2009



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

2009

