

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



Covering the Period September 18, 2002 through March 5, 2003

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COVER: **View of the Lake Erie-Niagara River Ice Boom showing open spans and the reformed ice arch following a storm event on February 4, 2003. (NYPA Photograph)**

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INTERNET SITES

International Niagara Board of Control	http://huron.lre.usace.army.mil/ijc/niagara.html
International Joint Commission	http://www.ijc.org/
Lake Erie-Niagara River Ice Boom	http://www.iceboom.nypa.gov

INTERNATIONAL NIAGARA BOARD OF CONTROL

Chicago, Illinois
Burlington, Ontario

March 5, 2003

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

Commissioners:

1. GENERAL

The International Niagara Board of Control (Board) submits its One Hundredth Semi-Annual Progress Report, covering the period September 18, 2002 through March 5, 2003.

2. ITEMS OF INTEREST

For the months of September 2002 through February 2003, the level of Lake Erie continued below its long-term average. Very low levels on Lakes Michigan and Huron were a major contributing factor, limiting the inflow to Lake Erie from upstream.

The Power Entities (Ontario Power Generation Inc. (OPG) and the New York Power Authority (NYPA)) complied with the Board's 1993 Directive for regulation of Chippawa-Grass Island Pool water levels throughout the reporting period.

The Province of Ontario, sole shareholder of Ontario Power Generation, has directed the company to proceed with the Beck tunnel project, the first phase of its expansion at the Sir Adam Beck complex. In addition, the province will issue a request for proposals for a feasibility study to expand generation capacity.

The Lake-Erie Niagara River Ice Boom had 12 of its 22 spans forced open as the result of a storm event over the Buffalo/Fort Erie area on February 4. Although lake ice entered the Niagara River for a few hours, there was no ice jamming and no instances of flooding or reports of shoreline property damage. As the storm subsided, the intact spans restrained ice as a stable ice arch reformed upstream of the boom. The NYPA crew began re-attaching the opened spans on February 7 and completed boom closure on February 26.

As part of the routine summer ice boom maintenance program, NYPA will replace hardware where necessary. In addition, cables spliced to facilitate repairs this winter will be replaced with new cables.

3. **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.

During the months of September 2002 through February 2003, the level of Lake Erie remained below its long-term average. The level of the lake started the period 12 centimetres (4.7 inches) below average. It reached its seasonal low in February, with a mean of 173.74 metres (570.01 feet) which was 25 centimetres (9.8 inches) below

average. Recorded water level data for the period September 2002 through February 2003 and departures from long-term averages are shown in Table 1 and depicted graphically on Figure 1.

The Lake Erie basin received about 39.3 centimetres (15.5 inches) of precipitation during the period September 2002 through February 2003. The period of record (1900–1996) average over this six-month period is 40.3 centimetres (15.9 inches). The departure from average over the six-month period was –2 %. Though precipitation was near normal averaged over the six-months, during this period it ranged from 23% above average in November to 37% below average in January. Precipitation data for the period September 2002 through February 2003 and departures from long-term averages are shown in Table 2 and depicted graphically on Figure 2.

Lakes Michigan and Huron remained well below their long-term average levels during this period. As a result, inflows to Lake Erie from the upstream lakes continued to be lower than average. Inflows from the upper lakes for the six-month period September 2002 through February 2003 were about 4 % below the long-term average.

Water supplied to Lake Erie from its local drainage basin was generally below average for the period September 2002 through February 2003, as can be seen in Figure 3. The above average supplies in December were the result of a relatively warm and wet November and December.

The water level on Lake Erie naturally affects the outflow into the Niagara River. The continuing below average levels on the lake has caused Niagara River flows to remain below average. The flows in the Niagara River are graphically depicted in Figure 4 and summarized in Section 6.

The March 2003 water level forecast indicates that the level of Lake Erie is expected to remain below its long-term average during the next six months. Lake Erie is expected to peak in the summer about 0.3 metre (1 foot) lower than last year. This is about 0.4 metre (1.3 foot) below the long-term average, but nearly 0.6 metre (2 feet) above the record summer lows. Lakes Michigan and Huron, which provide inflow to Lake Erie, are also expected to peak for the summer about 0.3 metre (1 foot) lower than last year. This is nearly 0.6 metre (2 feet) below average.

TABLE 1 - MONTHLY AVERAGE LAKE ERIE WATER LEVELS

(Based on a network of 4 water level gauges)

International Great Lakes Datum (1985)

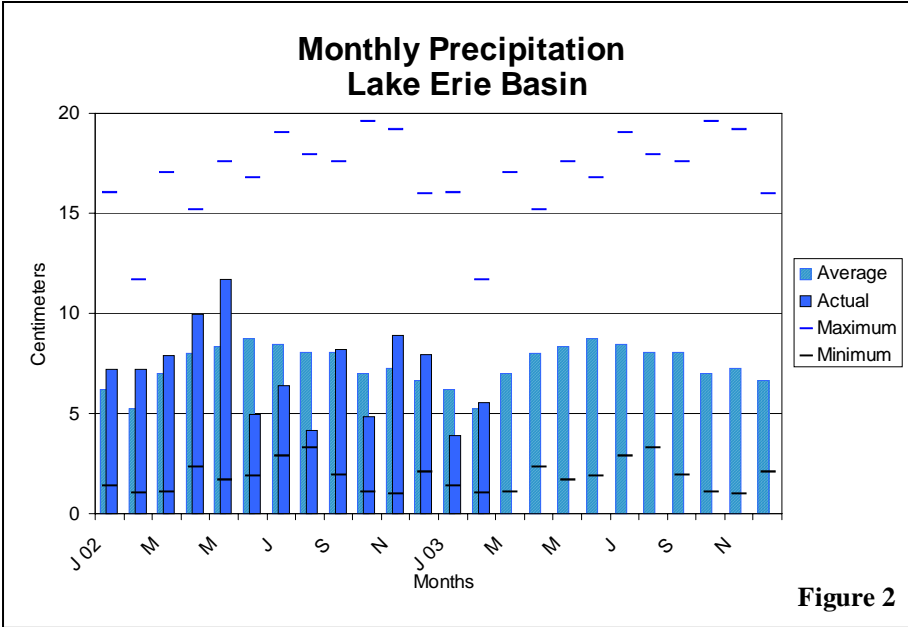
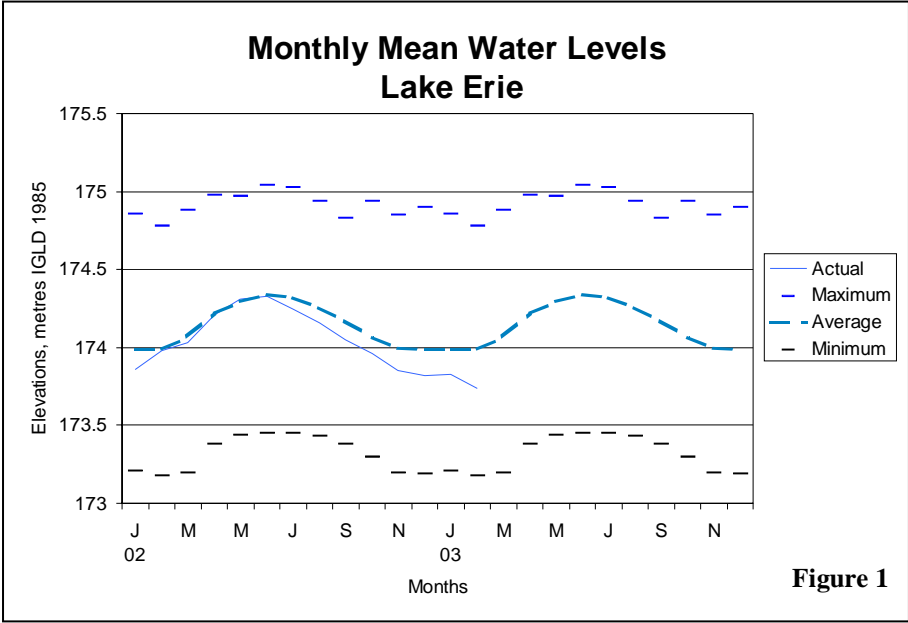
Month	Metres			Feet		
	Recorded*	Average		Recorded*	Average	
	2002-2003	1918-01	Departure	2002	1918-01	Departure
September	174.05	174.17	-0.12	571.03	571.42	-0.39
October	173.96	174.07	-0.11	570.73	571.10	-0.37
November	173.85	174.00	-0.15	570.37	570.87	-0.50
December	173.82	173.99	-0.17	570.28	570.83	-0.55
January	173.83	173.99	-0.16	570.31	570.83	-0.52
February	173.74	173.99	-0.25	570.01	570.83	-0.82

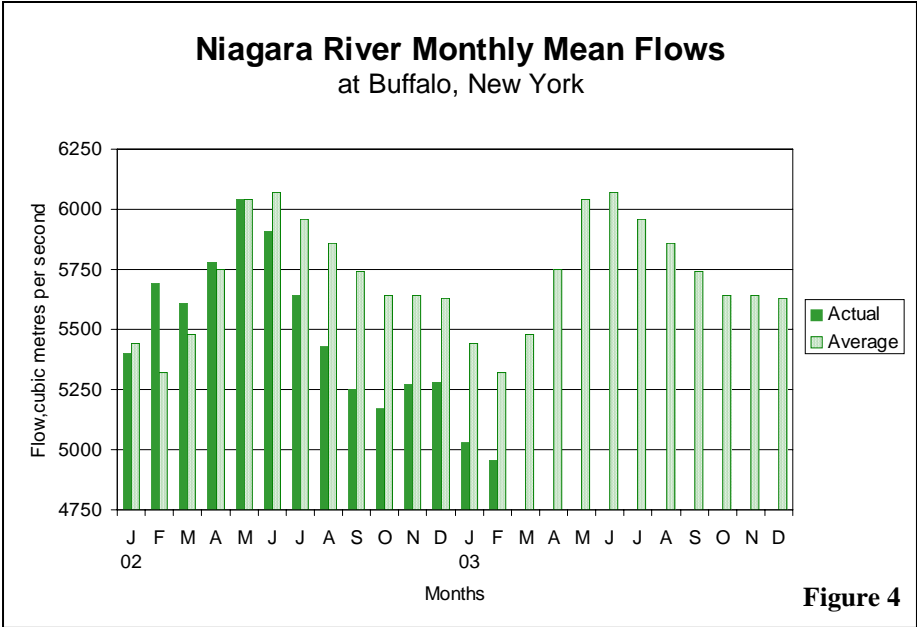
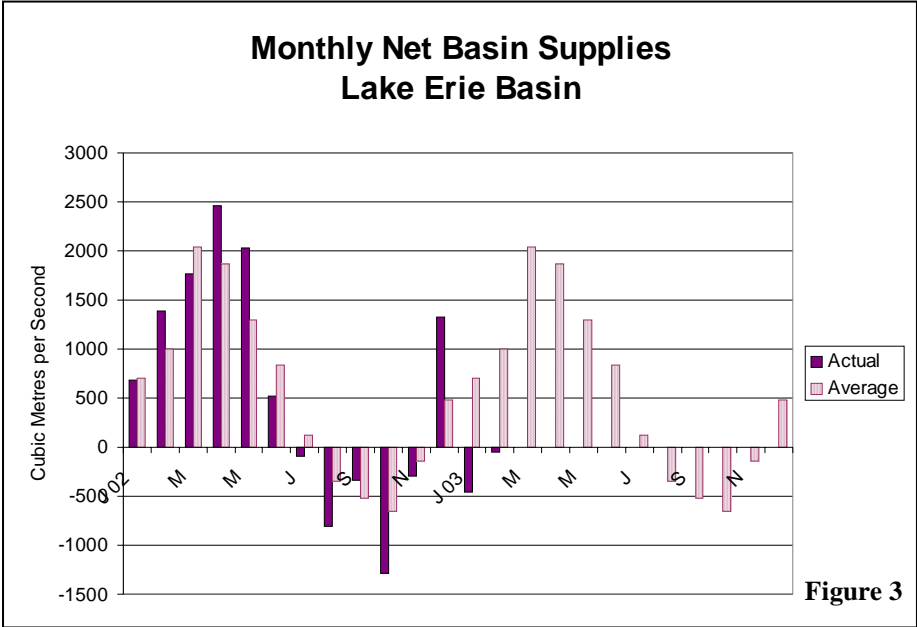
*Provisional

TABLE 2 - MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN

Month	Centimetres			Inches			
	Recorded*	Average		Recorded*	Average		Departure
	2002-2003	1900-96	Departure	2002	1900-96	Departure	in percent
September	8.18	8.03	+0.15	3.22	3.16	+0.06	+ 2
October	4.83	6.98	-2.15	1.90	2.75	-0.85	-31
November	8.92	7.24	+1.68	3.51	2.85	+0.66	+23
December	7.95	6.63	+1.32	3.13	2.61	+0.52	+20
January	3.91	6.20	-2.29	1.54	2.44	-0.90	-37
February	5.54	5.23	+0.31	2.18	2.06	+0.12	+ 6

*Provisional





4. OPERATION AND MAINTENANCE OF THE CHIPPAWA-GRASS ISLAND POOL CONTROL STRUCTURE

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 operate the Chippawa-Grass Island Pool control structure 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 certain tolerances for the Pool's level as measured at the Material Dock gauge. The Power Entities complied with the Board's Directive throughout the reporting period.

The accumulated deviation of the Pool's level from March 1, 1973 through February 28, 2003 was 0.42 metre-month (1.38 foot-months) above the long-term average elevation. The maximum permissible accumulated deviation is 0.91 metre-month (3.00 foot-months).

Tolerances for regulation of the Pool levels were suspended for November 16, 2002, January 1, 2 and February 16 and 17, 2003 as the result of abnormally low flows. Tolerances were also suspended on January 14 through 17, 21 through 30, February 4, 6, 13, 25 and 26 and March 3 and 4, 2003, to assist in ice management.

A major overhaul of the International Niagara Control Works (INCW) Gate 17, including seal modification/replacement, hydraulic system overhaul and hydraulic cylinder rehabilitation was completed in November 2002. Electrical upgrade continued with 4 gates completed in 2002. Only one gate, Gate 16 remains to be upgraded. This will be accomplished in 2003 as will a mechanical overhaul. Hydraulic oil system

upgrades will be completed on 7 of the original 13 gates. An upgrade of the INCW control tower's active fire system protection will be made.

Recorded daily Material Dock water levels covering the period September 2002 through February 2003 are shown in Enclosure 1. The locations of the water level gauges on the Niagara River are shown in Enclosure 2.

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 Chippawa-Grass Island Pool control structure, in conjunction with power diversion operations, ensures sufficient flow over the Falls to meet the requirements of the Niagara Treaty of 1950.

Falls flows met or exceeded minimum Treaty requirements at all times during the reporting period. The recorded daily flows over Niagara Falls, covering the period September 2002 through February 2003 are shown in Enclosure 3.

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 to below the amounts specified for scenic purposes.

The high head 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 2002 through February 2003, diversion for the Sir Adam Beck 1 and 2 plants averaged $1563 \text{ m}^3/\text{s}$ (55,200 cfs) and those by the Robert Moses Niagara Power Project averaged $1764 \text{ m}^3/\text{s}$ (62,300 cfs).

The low head generating station, Fortis Ontario's Rankine Plant, diverts water from the Cascades, just upstream of the Horseshoe Falls, and discharges it into the Maid-of-the-Mist Pool. Since the operating efficiency of this older plant is much lower than those of the high head plants, water that is available for power generation is normally dispatched on a priority basis to the high head plants, with the excess being directed to the low head installation.

During the period September 2002 through February 2003, diversion flow for the Rankine plant averaged $1 \text{ m}^3/\text{s}$ (40 cfs).

The average flow from Lake Erie to the Welland Canal for the period September 2002 through February 2003, was $211 \text{ m}^3/\text{s}$ (7,450 cfs) compared to $208 \text{ m}^3/\text{s}$ (7,340 cfs) for the same period one year ago. Diversion from the canal to OPG's DeCew Generating Stations averaged $172 \text{ m}^3/\text{s}$ (6,070 cfs) for the period September 2002 through February 2003.

Records of Niagara River diversions for power generation covering the period September 2002 through February 2003 are shown in Enclosure 4.

The monthly average Niagara River flows at Queenston, Ontario for the period September 2002 through February 2003 were:

September	5235 m ³ /s	(184,870 cfs)
October	5179 m ³ /s	(182,890 cfs)
November	5262 m ³ /s	(185,820 cfs)
December	5319 m ³ /s	(187,838 cfs)
January	5098 m ³ /s	(180,030 cfs)
February	4929 m ³ /s	(174,060 cfs)

During this period, the flow at Queenston averaged 5170 m³/s (182,580 cfs). One year ago, flows averaged 5303 m³/s (187,270 cfs) for the period September 2001 through February 2002. The monthly averages ranged between 4891 m³/s (172,720 cfs) and 5728 m³/s (202,280 cfs).

7. GAUGING STATIONS

The Niagara River gauges used to monitor the Chippawa-Grass Island Pool levels and the flows over Niagara Falls are Slater's Point, Material Dock, American Falls and Ashland Avenue gauges (see Enclosure 2). 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.

In the fall of 2002, NYPA finished upgrading both the American Falls and LaSalle gauges along with building a new enclosure for the LaSalle gauge.

8. **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 flows in these channels for water level management. The present schedule calls for measurements at the International Railway Bridge Section in May 2003, the Cableway (Ashland rating) Section and the Welland Supply Weir in 2004, and at the American Falls Section in 2005. All measurements will be obtained through joint efforts of the United States Army Corps of Engineers and Environment Canada.

The Board accepted a report on the Welland Canal measurement program that was conducted in 2001. The conclusion was that measured values did not support the 1965 rating. As a result, the application of that rating by the St. Lawrence Seaway Management Corporation leads to a reported discharge of about 13% more than is actually the case. Many factors determine the discharge through the supply weir and the accuracy of the reported discharge. These include the level of Lake Erie and Welland Canal, the accuracy of the telemetry system, calibration and setup of the water level gauges, setting of the weir valves and accuracy of measured supply canal discharge. Any or all of the above could account for the discrepancy. To remove these factors, in 2003, the SLSMC will install acoustic technology to determine discharge in the supply weir. The International Niagara Committee approved the use of this technology in 1991.

In November of 2002, a field crew was on the Niagara River collecting data for a hydraulic model being designed for the upper Niagara River by the Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data. This opportunity was used to collect some additional Acoustic Doppler Current Profiler (ADCP) measurements at the Cableway Section on the lower river. The ADCP measurements are made while the power plants operate normally, and will be used to help evaluate the feasibility of using ADCP as the preferred methodology for making measurements at the Cableway Section.

9. **POWER PLANTS**

a) New York Power Authority

Nine of the thirteen units at the Robert Moses Niagara Power Plant have been upgraded. Upgrading of Unit 11 began in January 2002 and the unit was returned to commercial service in November. Upgrade to the next unit, Unit 7, began in January 2003 with completion scheduled for October 2003.

On August 2, 2001, NYPA filed a formal notice of intent (NOI) with the U.S. Federal Energy Regulatory Commission (FERC) that it will seek a new license to continue operating the Robert Moses Niagara Power Project. The current license expires August 31, 2007.

On March 6, 2002, NYPA's request to use Alternative Licensing Procedures (ALP) for the Niagara Project was filed with FERC. A Niagara re-licensing website has been launched at: <http://niagara.nypa.gov>

On July 15, 2002, FERC issued a letter order approving NYPA's request to use ALP for the re-licensing of the Niagara Project. NYPA's ALP is structured around the cooperative scoping of an Applicant Prepared Environmental Assessment with all interested stakeholders. In the ALP, FERC compliance with the U.S. National Environmental Policy Act (NEPA) begins before an applicant files its application and before comments, recommendations, prescriptions and terms and conditions are filed with FERC for consideration. The early collaboration results in an applicant and stakeholders identifying studies they collectively believe need to be conducted in support of the application, including environmental and power-related proposals for a new license, and a preliminary draft NEPA document for filing along with the application. FERC staff are involved in the ALP process and advise the collaborative team throughout the ALP's pre-filing activities.

A facilitator was selected in October 2002 to help with the re-licensing process. Organizational meetings were held on December 18 and 19, 2002, in Niagara Falls, New York. A series of seven scoping meetings are planned during the period January through April 2003. These meetings are to identify issues and interests of concern to stakeholders and discuss how studies of the issues will be conducted.

b) Ontario Power Generation

The Province of Ontario, sole shareholder of Ontario Power Generation, has directed the company to proceed with the Beck tunnel project, the first phase of its expansion at the Sir Adam Beck complex. In addition, the province will issue a request for proposals for a feasibility study to expand generation capacity.

To date, twelve of the sixteen units at the Sir Adam Beck II Generating Station have been rehabilitated. The most recent upgrade was on Unit 12, with work beginning

in April 2002 and completed in December 2002. Currently, work is proceeding on Unit 21. This began in October 2002, with expected completion in June 2003. The next upgrade will be on Unit 22 which is scheduled to start in March and be completed in November 2003.

The upgrades and expansions by the Power Entities will not affect the regulation of the Chippawa-Grass Island Pool water levels as governed by the International Niagara Board of Control's Directive. In addition, they will not require any modifications to other rules or regulations (such as the 1950 Niagara Treaty) relating to the diversion of water for operation of the projects.

10. **ICE CONDITIONS AND ICE BOOM OPERATIONS**

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 11, 2002. The water temperature at Buffalo reached 4 degrees Celsius (°C) (39 degrees Fahrenheit (°F)) on December 3. Installation may begin when the Lake Erie water temperature at Buffalo reaches 4° C (39° F) or on December 16th, whichever occurs first.

Preparations for span placement began on December 2 when six floatation barrels were installed. A further eight barrels were installed on December 3 and the final nine were placed on December 4. All strings of pontoons were removed from the summer storage area and placed inside the Buffalo Harbor breakwall by December 9.

Installation of the ice boom's spans began on December 11 when 16 spans were placed starting from the Canadian side. The last six spans, continuing on towards the US shore, were installed on December 12.

The monthly weather summary for Buffalo for November 2002 characterized it as a typical dark and chilly November. The monthly averages were very close to normal for temperature, precipitation and snowfall. The November average temperature of 4.1° C (39.4° F) was 0.5 ° C (0.8° F) below the monthly average. There were no significant weather events in the Buffalo area during November. The Lake Erie at Buffalo water temperature was 5.6 ° C (42.0° F) at month's end compared to 8.3° C (47.0° F) at the same time in 2001.

December started out cold and snowy with a major lake effect storm dropping around 38 centimetres (cm) (15 inches (in)) over the first two days of the month. The first week was very cold but conditions moderated during the second week. Below freezing temperatures dominated the last half of the month. The December average air temperature of -2.0° C (28.4° F) was 0.5 ° C (0.8° F) below the monthly average. The Lake Erie at Buffalo water temperature remained above freezing.

January 2003 was cold and snowy. There was a 21 day stretch of below freezing temperatures that did not end until the last day of the month. The January average temperature of -7.2° C (19.0° F) was 3.0 ° C (5.5° F) below the monthly average. Ice, which had formed in the river, was first observed at the International Niagara Control Works on January 11. By January 14, ice procedures and ice breaker activity were required to maintain movement of river ice through the Chippawa-Grass Island Pool (CGIP). An ice bridge formed in the Maid-of-the-Mist Pool below the Falls on January 17.

Ice began forming behind the Lake Erie-Niagara River Ice Boom during the second week of the month. Strong southwest winds with gusts of up to 82 kilometres per hour (km/h) (51 miles per hour (mi/h)) were experienced on January 13. Subsequently, span "E" of the ice boom was found to be broken, allowing small amounts of lake ice to enter the river. No problems were experienced as a result of the break. Repairs were

completed on January 20. Lake Erie had become ice covered by the last week of January.

At the beginning of the day on February 4, the water level at the Buffalo gauge was at 173.70 metres (569.88 feet). A storm system with strong winds from the southwest passed over the Buffalo/Fort Erie area that morning. The barometric pressure dropped to 986.0 millibars (29.11 inches) around 6 a.m. Average wind speeds of up to 60 km/h (37 mi/h), with gusts of up to 92 km/h (57 mi/h), were experienced later that morning. The water level at Buffalo peaked at 174.54 m (572.64 ft) just before noon.

As a result of this storm, 12 of the ice boom's 22 spans were breached. Ice overtopped the boom, combined with ice that had passed through the open spans and entered the upper Niagara River. The lake ice run lasted for a few hours but was handled through ice management procedures at the Chippawa-Grass Island Pool where the early warning system for ice stoppages/jamming was in place. NYPA's Flood Warning Notification Plan (in the event of ice affected flooding in the upper Niagara River) would have been implemented had conditions warranted. As the storm subsided, the intact spans restrained ice as a stable ice arch reformed upstream of the boom. Weather conditions after the event delayed repairs. However, no significant amounts of lake ice entered the river. The NYPA crew began re-attaching the opened spans on February 7 and completed boom closure on February 26. There was no ice jamming and no instances of flooding or reports of shoreline property damage.

Ice thickness measurements were taken at six sites in the eastern part of Lake Erie on February 17, with the average thickness of five of the six sites being 38 centimetres (15 inches). The sixth site, located south of Point Abino, Ontario, had a thickness of 106 centimetres (42 inches). The difference in thickness from the rest of the sites may be attributed to the concentration of ice off the end of the Point from wind

action. By comparison, the last time similar measurements were taken in February was 2001 when the thickness averaged 26 centimetres (10 inches) for the six sites sampled.

As part of a routine summer ice boom maintenance program, NYPA will replace hardware where necessary. In addition, cables spliced to facilitate repairs this winter will be replaced with new cables.

11. **PEACE BRIDGE**

The Buffalo and Fort Erie Public Bridge Authority (PBA) have undertaken a Bi-National Integrated Environmental Process. This is a planning process, with emphasis on public involvement, to consider capacity expansion of the Peace Bridge, U.S. Plaza and improvement of the connecting roadway system. It includes consultation with federal, state, provincial and local agencies regarding environmental screening/assessments as well as public meetings and workshops on a number of bridge-related issues.

The preliminary schedule proposes up to two years for the planning and environmental review, a further two years for design, permits and related work, and then up to four years of construction.

As a result of public input, around fifty new ideas (in addition to the original proposals of the late 1990s) have been considered. An Alternative Screening Process was undertaken through a series of Public Collaborative Workshops. These were held over the period mid-September to early December, 2002. By February 2003, screening, with public involvement, reduced the alternatives from 59 down to a few with the greatest potential to achieve the project's goals and objectives. Selection of a preferred alternative will follow, hopefully by late 2003, with final approval by mid-2004.

12. **MEETING WITH THE PUBLIC**

In accordance with the Commission's requirements, the Board will hold an annual meeting with the public in September, 2003 in Ontario. The date and location are to be determined. The Board welcomes participation by Commissioners and staff and will keep them apprised. Information on items including current and projected Great Lakes levels, the Public Bridge Authority expansion undertaking and the operation of the Lake Erie-Niagara River Ice Boom will be presented.

13. **MEMBERSHIP OF THE BOARD**

Mr. Carr McLeod of Environment Canada's Meteorological Service of Canada, Ontario Region, succeeded Mr. Doug Cuthbert as Chair of the Canadian Section of the Board on January 15, 2003. Mr. Cuthbert, who retired from federal service in October 2002, became a member of the Board's International Niagara Working Committee in 1977 and served as its Canadian Co-Chair from 1979 through 1993. Mr. Cuthbert was appointed Canadian Chair of the Board in April 1994.

14. **ATTENDANCE AT BOARD MEETINGS**

The Board met once during this reporting period. The meeting was held on March 5, 2003 in Chicago, Illinois. Colonel Mark Roncoli acted on behalf of Brigadier General Steven Hawkins who was unable to attend. Mr. Gus Tjoumas, U.S. Board Member was also unable to attend. All other Board Members were in attendance.

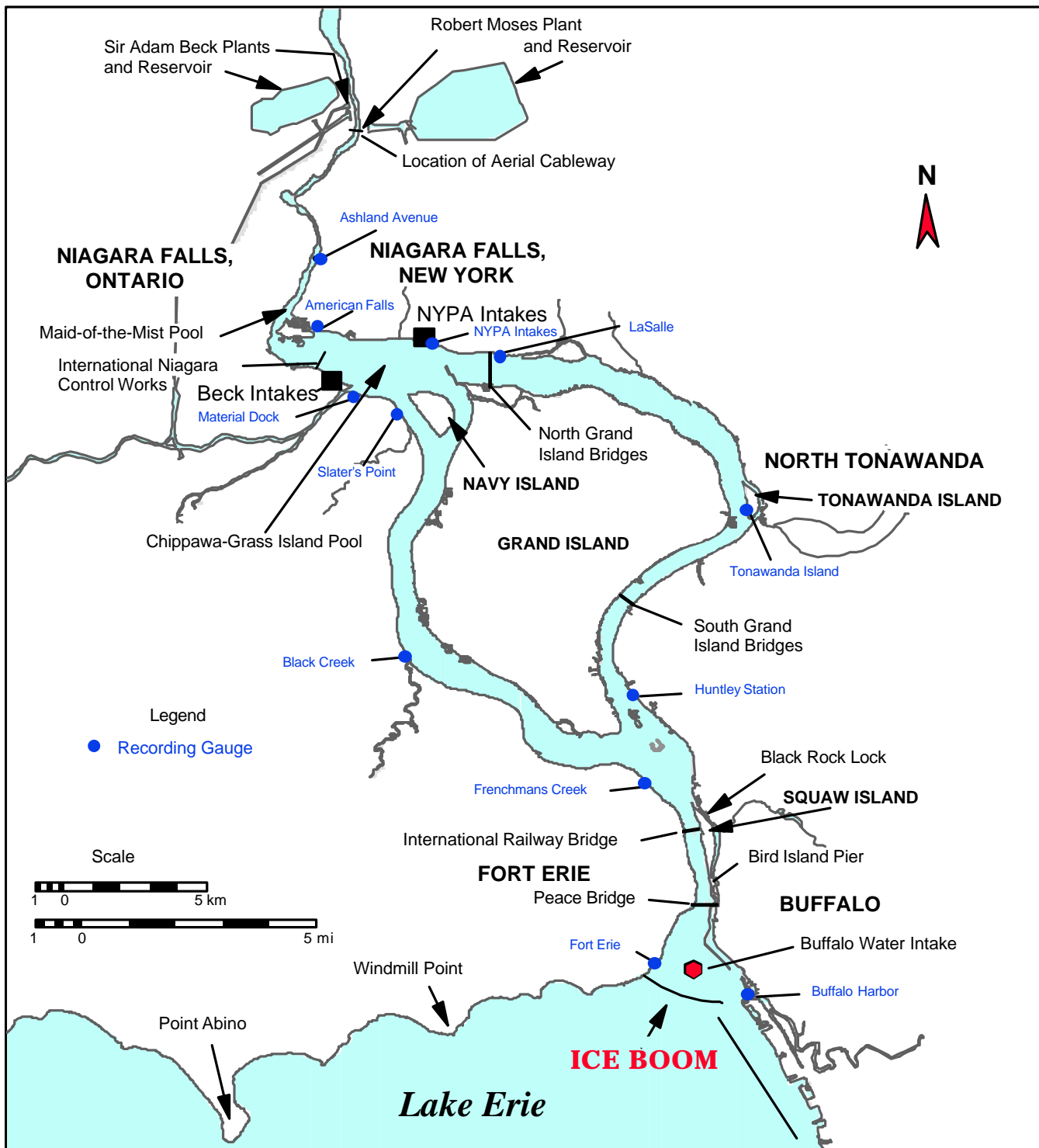
Respectfully Submitted,

COLONEL MARK A. RONCOLI
Chair (Alternate), United States Section

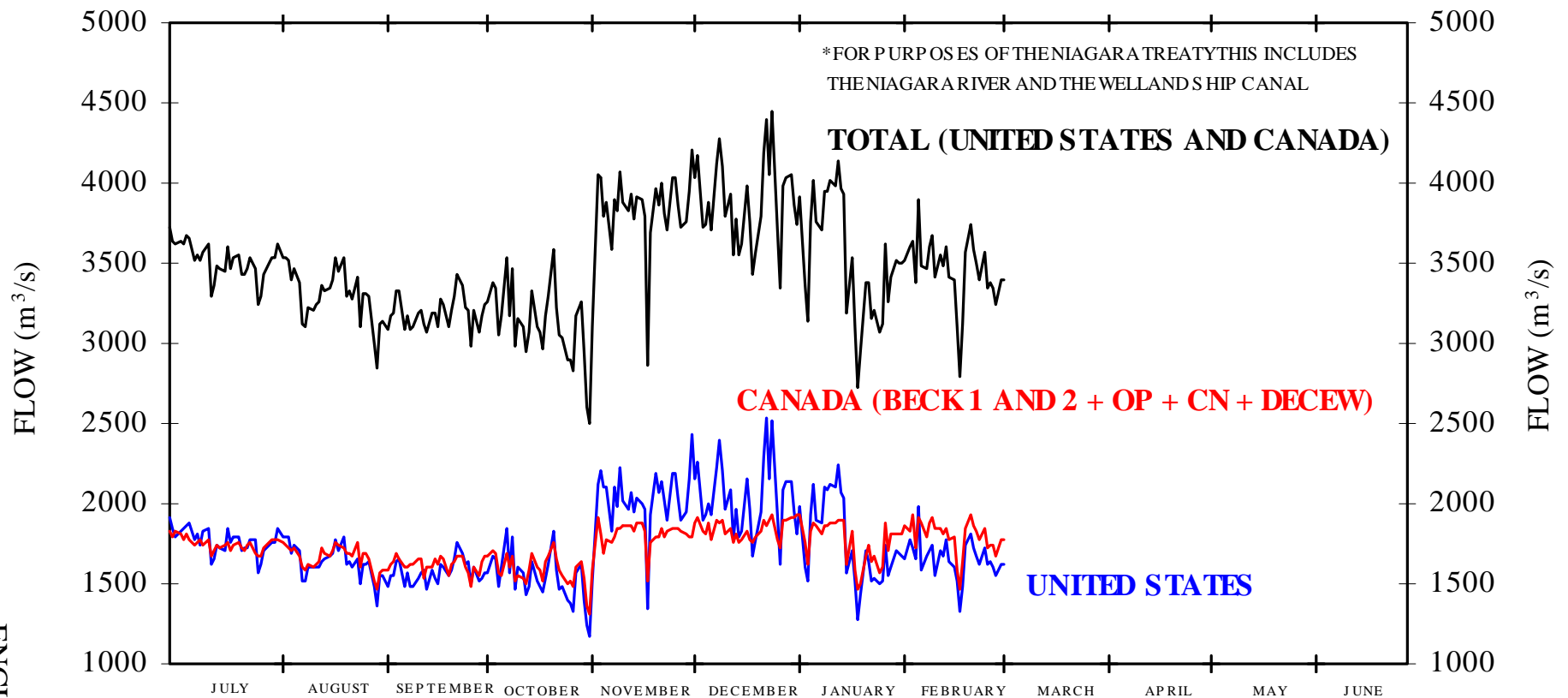
CARR MCLEOD
Chair, Canadian Section

CONSTANTINE G. TJOUMAS
Member, United States Section

DAVID de LAUNAY
Member, Canadian Section



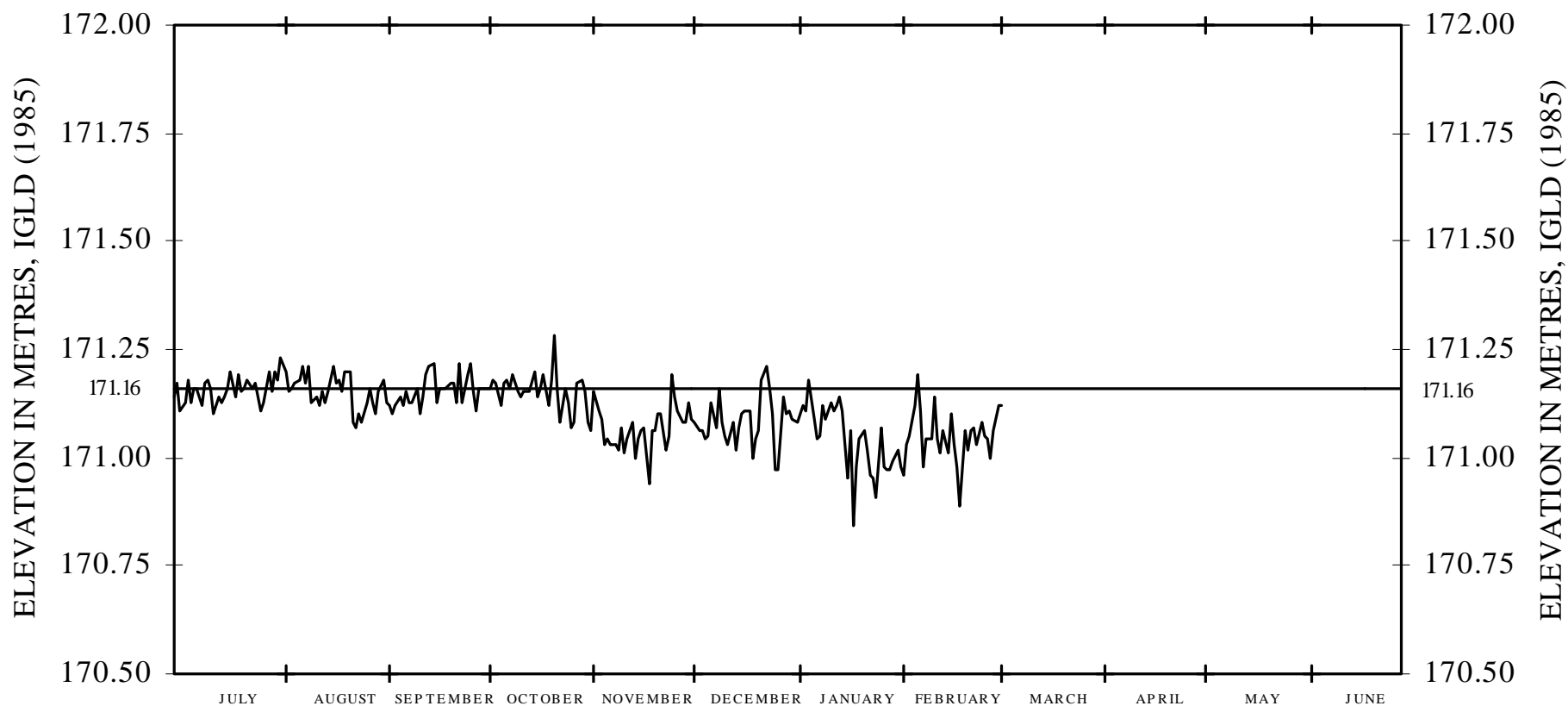
DAILY DIVERSIONS OF NIAGARA RIVER WATER* FOR POWER PURPOSES IN CUBIC METRES PER SECOND (m³/s) JULY 2002 THROUGH FEBRUARY 2003



NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAGE

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

JULY 2002 THROUGH FEBRUARY 2003



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 2002 THROUGH FEBRUARY 2003

