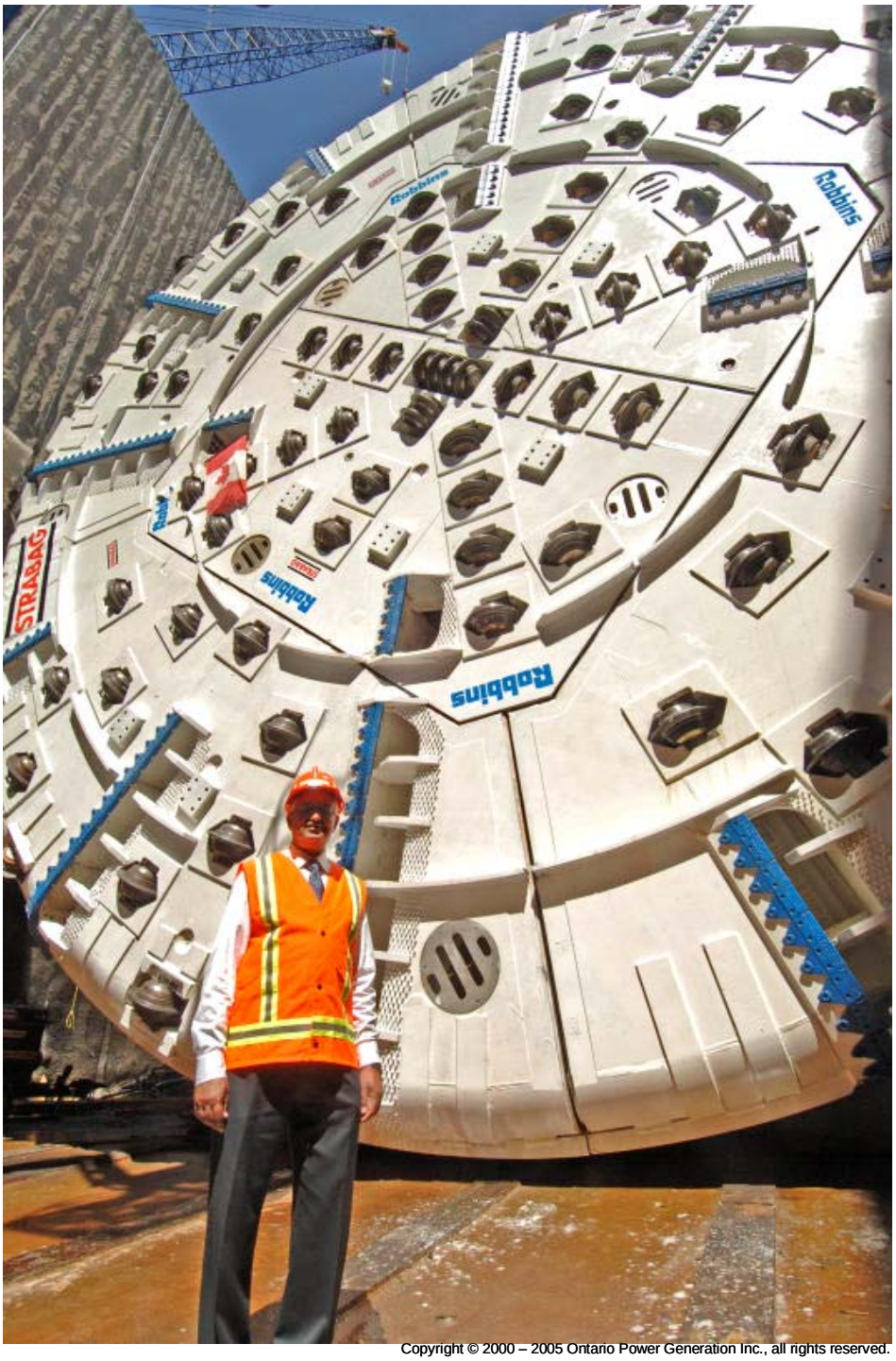
International Niagara Board of Control
One Hundred Seventh Semi-Annual Progress Report
to the
International Joint Commission



Covering the Period March 29 through October 4, 2006

EXECUTIVE SUMMARY

Although slightly above the long-term average in March, the level of Lake Erie declined to below the long-term average for the rest of the reporting period due to dry weather conditions and low inflows from upstream. The lake arrived at its seasonal peak in July when it almost reached its average level (Section 2). Precipitation on the Lake Erie basin was about 11% above average for the period.

The level of the Chippawa-Grass Island Pool was regulated in accordance with the International Niagara Board of Control's 1993 Directive (Section 3). Tolerances for regulation of the Pool were suspended for August 23 as the result of actions taken to assist in a Niagara Parks Police operation.

The flow over Niagara Falls was below the required Treaty minimum on two occasions (Section 4).

A series of discharge measurements, part of the on-going program to verify the gauge ratings used to determine flows, were made at the International Railway Bridge and Cableway Sections in the Spring and are scheduled for the American Falls section in the Spring of 2007 (Section 7).

The New York Power Authority (NYPA) is nearing completion of its generator upgrade program at the Robert Moses Niagara Power Project (Section 8a).

On September 1, Ontario Power Generation (OPG) began boring a new tunnel at Niagara (Section 8b).

The Board held a meeting with the public on October 3, 2006 in Niagara Falls, New York (Section 9).

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COVER: Emad Elsayed, Vice President of Hydroelectric Development with Ontario Power Generation, standing in front of the 14.4 metre diameter cutter head of "Big Becky", the largest hard rock tunnel boring machine (TBM) in the world (Section 8b).
The photograph is courtesy of Ontario Power Generation.

TABLES **PAGE**

FIGURES

ENCLOSURES

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

October 4, 2006

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

Commissioners:

1. GENERAL

The International Niagara Board of Control (Board) submits its One Hundred Seventh Semi-Annual Progress Report, covering the period March 29 through October 4, 2006

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 5 centimetres (2.0 inches) above the long-term average. Generally dry weather conditions in the spring, coupled with low

inflows from upstream, slowed the normal seasonal rise and the level was below the long-term average for the rest of the reporting period. Substantial precipitation in July did allow the lake to rise to very near average. The lake reached its seasonal peak level in July. The July mean water level was 174.29 metres (571.82 feet), which is 3 centimetres (1.2 inches) below the long-term average for the month. In August, the level was at 174.24 metres (571.65 feet), or 1 centimetre (0.4 inch) below average. Recorded water level data for the period March through August 2006 and departures from long-term averages are shown in Table 1 and depicted graphically on Figure 1.

The Lake Erie basin received approximately 54.1 centimetres (21.3 inches) of precipitation during the period March through August 2006. This is about 11% above average for the period. In March, April and August, precipitation was below average, but in July precipitation was well above the monthly average. Precipitation data for the period March through August 2006 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 of the below average water levels, inflows to Lake Erie from the upstream lakes were about 8% below the long-term average for the six-month period March through August 2006.

Water supplied to Lake Erie from its local drainage basin (net basin supply) reflected the amount of precipitation the basin received during the reporting period. Supplies were above average in May and July, as was precipitation. In August, despite below average precipitation, the net basin supply was above average. This could be partly due to the lingering effects of heavy rain at the end of July. Net basin supplies for the period March through August 2006, 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 only the first month of the reporting period - the only month of the period that the water level of Lake Erie was above its average. The flows in the Niagara River are graphically depicted in Figure 4 and summarized in Section 6.

The September 2006 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)

	Metres			Feet		
	Recorded*	Average		Recorded*	Average	
Month	2006	1918-2005**	Departure	2006	1918-2005**	Departure
March	174.12	174.07	0.05	571.26	571.10	0.16
April	174.18	174.22	-0.04	571.46	571.59	-0.13
May	174.20	174.30	-0.10	571.52	571.85	-0.33
June	174.26	174.33	-0.07	571.72	571.95	-0.23
July	174.29	174.32	-0.03	571.82	571.92	-0.10
August	174.24	174.25	-0.01	571.65	571.69	-0.04

*Provisional **Period of record is 1918-2005

TABLE 2 - MONTHLY AVERAGE PRECIPITATION ON THE LAKE ERIE BASIN

	Centimetres			Inches			
	Recorded*	Average		Recorded*	Average		Departure
Month	2006	1900-99^{+}	Departure	2006	1900-99^{+}	Departure	in percent
March	6.78	7.01	-0.23	2.67	2.76	-0.09	-3
April	6.91	8.03	-1.12	2.72	3.16	-0.44	-14
May	10.69	8.33	2.36	4.21	3.28	0.93	28
June	8.76	8.76	0.00	3.45	3.45	0.00	0
July	14.17	8.43	5.74	5.58	3.32	2.26	68
August	6.68	8.10	-1.42	2.63	3.19	-0.56	-18

*Provisional $^{+}$Most recent period of record is 1900-99

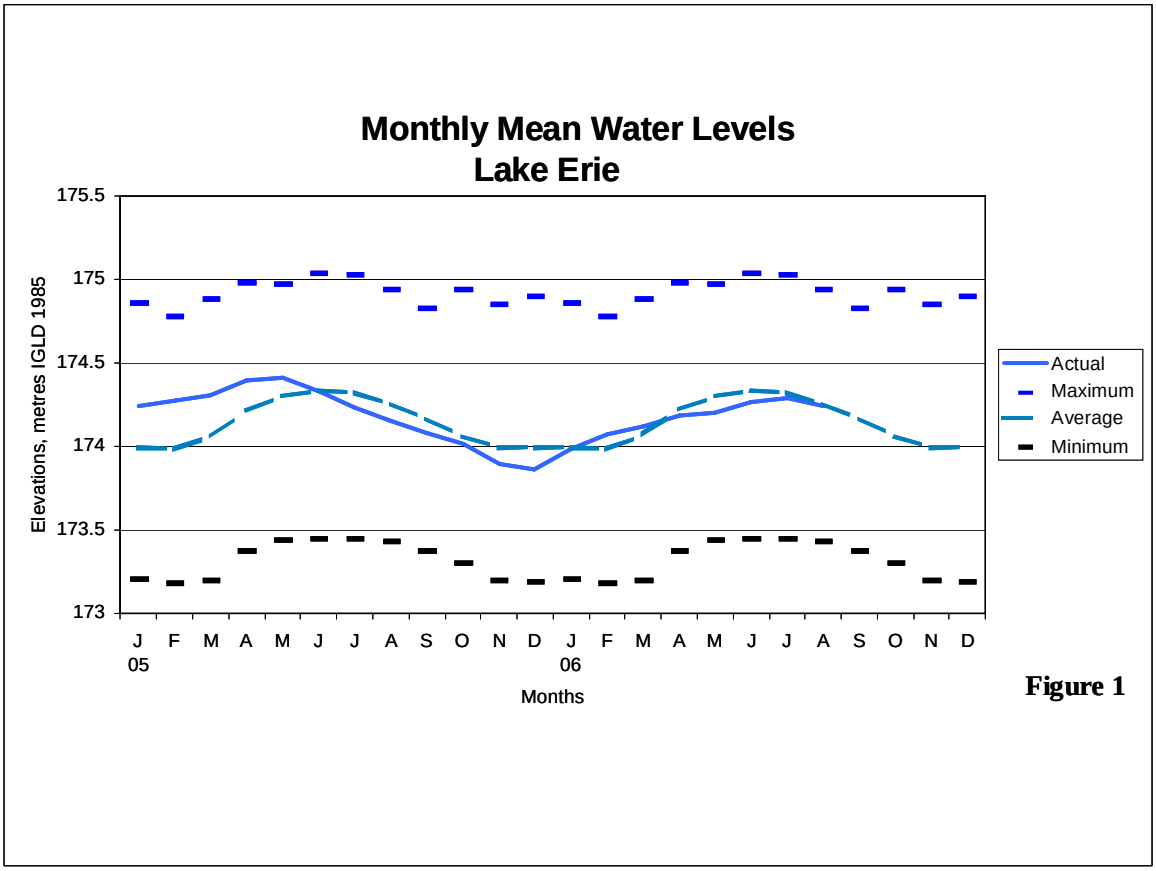


Figure 1

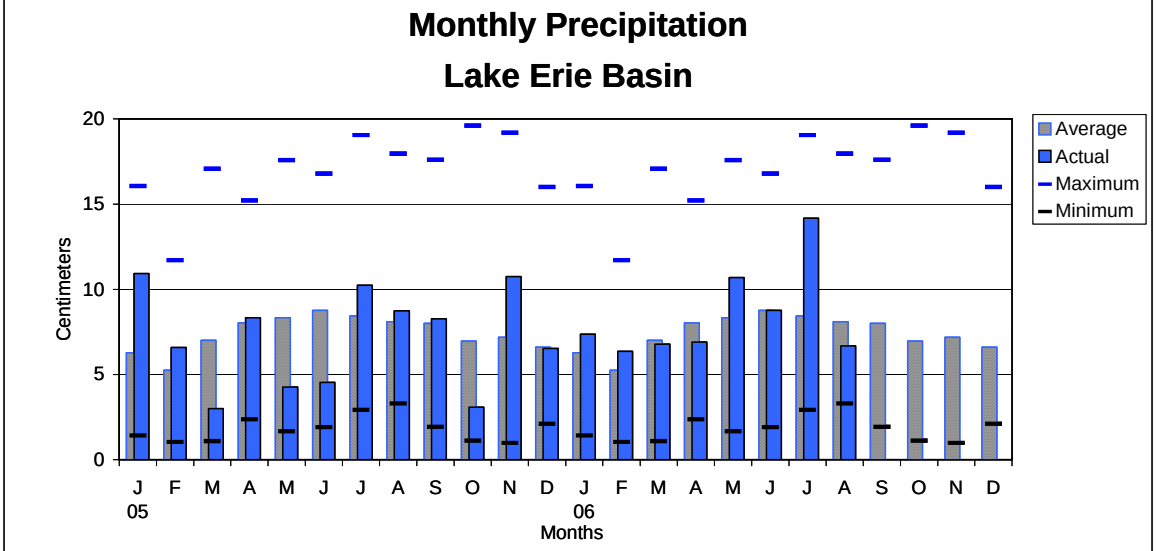


Figure 2

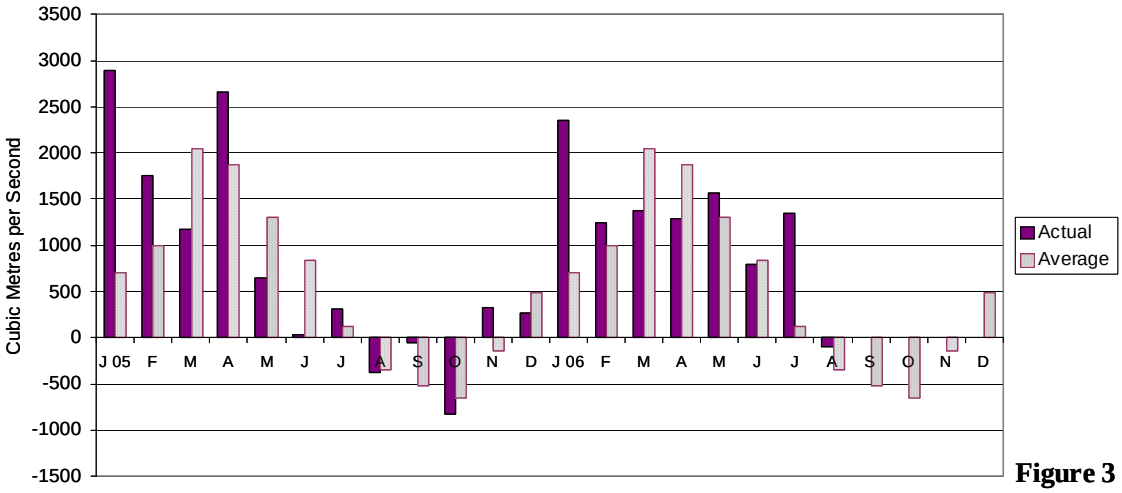


Figure 3

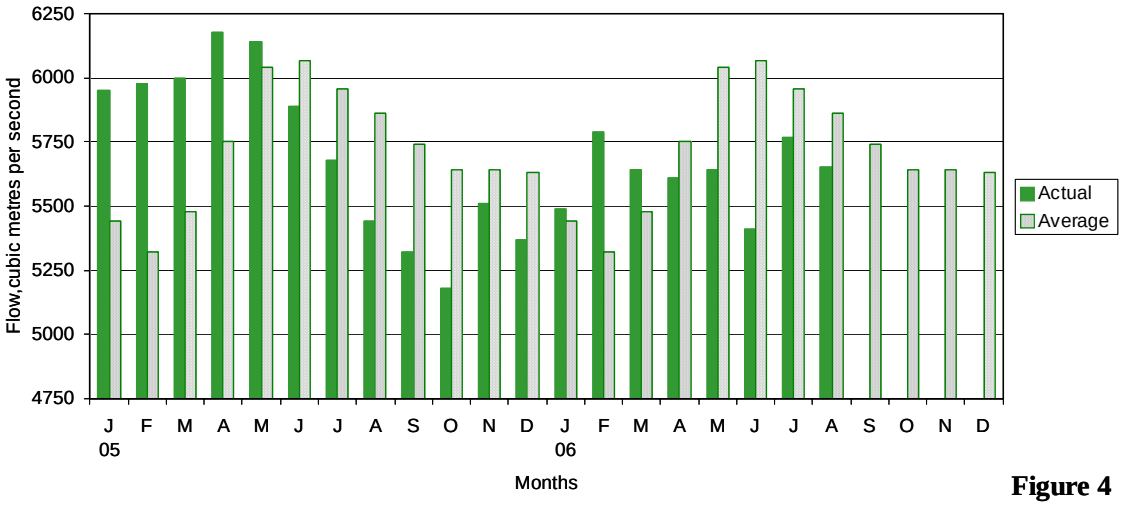


Figure 4

3. 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, Ontario Power Generation (OPG) and the New York Power Authority (NYPA), 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 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 August 31, 2006 was 0.77 metre-month (2.53 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 level were suspended for August 23 as the result of actions taken in response to a police request (see Section 4).

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 2006 are shown in Enclosure 2.

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 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.

For the hour ending 21:00 on July 21, the flow over Niagara Falls was 36 m^3/s (1,270 cfs) below the required minimum of 2832 m^3/s (100,000 cfs). This was due to a manned work barge being drawn by the current out of the safe work area (intake portion of the OPG Niagara Tunnel Project) just upstream of the control structure. Gates were prevented from opening to maintain the minimum falls flow until the barge could be returned to a safe area and the workman removed. Procedures to be followed by the construction crew and River Control operator have since been developed to avoid a repetition.

At the request of the Niagara Parks Police, transition to meet the daytime falls flow minimum was delayed during the morning hours of August 23 to assist in the recovery of a body located in the river near the Canadian shore downstream of the Control Structure. The operation was completed and the police were clear of the area by 9:15. The minimum amount of flow over the Falls was restored by 11:00.

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 March through August 2006, 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 2006, diversion for the Sir Adam Beck 1 and 2 plants averaged 1610 m^3/s (56,860 cfs) and diversion to the Robert Moses Niagara Power Project averaged 1802 m^3/s (63,640 cfs).

The average flow from Lake Erie to the Welland Canal for the period March through August 2006 was 195 m^3/s (6,890 cfs) as compared to 264 m^3/s (9,320 cfs) for the same period one year ago. Diversion from the canal to OPG's DeCew Generating Stations averaged 140 m^3/s (4,940 cfs) for the period March through August 2006.

Records of diversions for power generation covering the period March through August 2006 are shown in Enclosure 4.

The monthly average Niagara River flows at Queenston, Ontario for the period March through August 2006 and departures from long-term averages are shown in Table 3. Maximum and minimum monthly average flows for the months of March through August are shown in Table 4.

TABLE 3 - MONTHLY NIAGARA RIVER FLOWS AT QUEENSTON

	Cubic Metres per Second			Cubic Feet per Second		
Month	Recorded 2006	Average 1900-2006	Departure	Recorded 2006	Average 1900-2006	Departure
March	5746	5627	119	202920	198710	4210
April	5714	5888	-174	201790	207930	-6140
May	5693	6090	-397	201050	215070	-14020
June	5401	6075	-674	190730	214540	-23810
July	5766	5972	-206	203620	210900	-7280
August	5590	5856	-266	197410	206800	-9390

TABLE 4 - MONTHLY MAXIMUM AND MINIMUM NIAGARA RIVER FLOWS AT QUEENSTON

	Cubic Metres per Second				Cubic Feet per Second	
Month	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 this period, the flow at Queenston averaged 5652 m^3/s (199,590 cfs). One year ago, flows averaged 5930 m^3/s (209,420 cfs) for the period March through August 2005 with the monthly averages ranging between 5450 m^3/s (192,460 cfs) and 6272 m^3/s 221,490 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. On July 23, the Ontario Power Generating Station tailwater gauge was used for a three hour period to determine the Maid-of-the-Mist pool level and calculate the flow over Niagara Falls as the result of a communication interruption to the signal between the Ashland Avenue gauge and the control structure. For short periods of time on both July 29 and August 17, a communication failure between the Material Dock Gauge and the control structure required the use of the Slater's Point Gauge to determine the Chippawa-Grass Island Pool levels.

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 will be 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 made at the following locations:

Measurements are taken near the International Railway Bridge to provide information for evaluating stage-discharge relationships for flow entering the Niagara River from Lake Erie. Measurements are scheduled in accordance with a 3-year cycle. In the spring of 2006, a series of 40 discharge measurements were made at this section using Acoustic Doppler Current Profilers (ADCP) which is the methodology accepted by the Board for use at this section. Preliminary results show that the 2006 measured discharges are within technical tolerance and fit well with the 2001 Buffalo equation and the Buffalo-Material Dock equation. The Fort Erie equation is used by the Power Entities for flow forecasting. This equation did not fit as well with the measured data and so the Board suggests that the Power Entities may want to consider revising this rating. Measurements are scheduled again for this reach in 2009, however, measurements may be taken if periods of specific Lake Erie levels occur that have not yet been measured using ADCP technology.

Measurements are made at the Cableway Section, for verification of the Ashland Avenue rating equation, which is used to determine the outflow from the Maid-of-the-Mist pool, downstream of Niagara Falls. Measurements are usually made at this section every 3 years. In May 2006 ADCP technology was used to make a series of 28 discharge measurement at this section. This measurement series is outside of the normal 3-year cycle, because of an ongoing analysis of the appropriateness of using boat mounted hydro-acoustic methods to make discharge measurements at this particular location. If sufficient data supports the use of the ADCP, this method will replace the use of conventional flow measurement methods, which employ an aerial cablecar. The cablecar would be decommissioned. The May 2006 measurements will also be used to investigate a possible

revision to the present rating equation. In preliminary review of the 2006 measurements a lot of variability is seen in the measured discharges, although this is consistent with previous ADCP measurements. Almost all of the measured discharges are greater than those computed using the rating curve. While historically the conventional discharge measurements at this site do not show as much variability within a series, they too show that the rating curve seems to be under estimating the flow. The analysis of past measurements at this section, including a comparison using different methodologies to determine cross sectional area at the site, will be submitted to the Board in the spring of 2007.

The American Falls Section is measured to verify the rating used to determine the amount of flow in the American Falls Channel and to demonstrate that a dependable and adequate flow of water is maintained over the American Falls and in the vicinity of Three Sisters Islands. Since American Falls flow is directly related to the operation of the Chippawa-Grass Island Pool, the Board monitors this relationship. At this section, measurements have traditionally been made from pedestrian bridges between Goat Island, Green Island and the U.S. mainland, using conventional measurement methods. The American Falls Section was scheduled for measurement in 2005, per the usual 5-year cycle for this location, but a temporary superstructure placed over the main bridge by the New York State park service made the prospect of taking conventional measurements there difficult. Plans were formulated to utilize new technology in the form of an ADCP mounted on a remote controlled tethered boat, at a location upstream of the bridge, closer to the American Falls gauge. Measurements were scheduled for October 2006 however this system is not yet available for this field use. The Board's Working Committee will make preparations for a spring 2007 program of ADCP measurements at this new site. Measurements using this new hydro-acoustic method will be compared with data previously acquired using conventional methods. This process may require additional measurements be made, outside of the 5-year cycle. Data from conventional measurements made from the bridge since 1984 have generally been slightly higher than the 1978 American Falls rating. This may be due to the fact that the 1978 rating was derived from measurement data

affected by weed retardation. Subsequent measurements were taken during weed free months. It has been recommended that the rating be reviewed for possible revision. If changes are made to the measurement methodology and section location, equation revision would be delayed until sufficient data is collected to evaluate these.

Discharge measurements are made in the Welland Canal to verify the rating curves for the Lock 8 supply weir at Port Colborne, Ontario. The measurement section is located upstream of the weir. In recent years ADCP technology has been used at this section. These measurements are scheduled on a 3-year cycle. The last set of measurements was made in 2004. The next measurement series is scheduled for the spring of 2007.

8. **POWER PLANTS**

a) New York Power Authority

Twelve of the thirteen generating units at the Robert Moses Niagara Power Plant have been upgraded. Upgrade of Unit 8 is scheduled for completion in December 2006, concluding the upgrade program which will increase generating capacity by 325 megawatts. Testing to verify performance and finalize water use determination will follow in 2007.

The New York Power Authority is proceeding with the re-licensing process for the Robert Moses Niagara Power Project. The current license expires August 31, 2007. The process is following the U. S. Federal Energy Regulatory Commission's (FERC) Alternative Licensing Procedures (ALP). Agreements have been reached between NYPA and all major stakeholders. FERC issued its draft environmental impact statement (EIS) on July 14, 2006 and NYPA anticipates it to be finalized by the end of 2006. Issuance of a new FERC licence is expected in the spring of 2007. The Niagara re-licensing website at http://niagara.nypa.gov continues to be updated.

b) Ontario Power Generation

On August 8, Ontario Power Generation's Niagara Tunnel Project announced that assembly of the world's largest hard rock tunnel boring machine (TBM), named "Big Becky", was completed and that boring of a new 10.4 kilometre (6.5 mile) long Niagara Tunnel was about to began. The project, using a TBM that measures 14.4 metres (47.2 feet) in diameter, will allow for an increase in the conveyance of water to the Sir Adam Beck complex. Tunneling started on September 1 at the outlet area near the Beck generating stations.

Additional power generation from the increased diversion of water is expected to commence in late 2009.

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.

9. **MEETING WITH THE PUBLIC**

In accordance with the Commission's requirements, the Board held an annual meeting with the public. The meeting was during the evening of October 3, 2006 in Niagara Falls, New York. The Board welcomed participation 8 members of the public along with IJC Commissioner Brooks and staff members. Information on items including current and projected Great Lakes levels and the operation of the Lake Erie-Niagara River

Ice Boom was presented. Discussions with participants centred on potential impact by structures in the upper Niagara River on Lake Erie levels, recession of the Falls and concerns about the impacts of OPG's Niagara Tunnel Project on Falls flows and power diversions.

10. MEMBERSHIP OF THE BOARD

Mr. Charles B. Goggins, New York Regional Engineer for the U.S. Federal Energy Regulatory Commission, became a member of the U.S. Section of the Board's International Niagara Working Committee on August 16. Mr. Goggins fills the position on the Working Committee vacant since the passing of Mr. Anton J. Sidoti in February 2006

11. ATTENDANCE AT BOARD MEETINGS

The Board met once during this reporting period. The meeting was held on October 4, 2006 in Niagara Falls, Ontario. Colonel John D. Drolet acted as Chair of the U.S. Section in the absence of BG Berwick. Canadian Member Mr. Messervey was unable to attend the meeting. All other Board Members were in attendance.

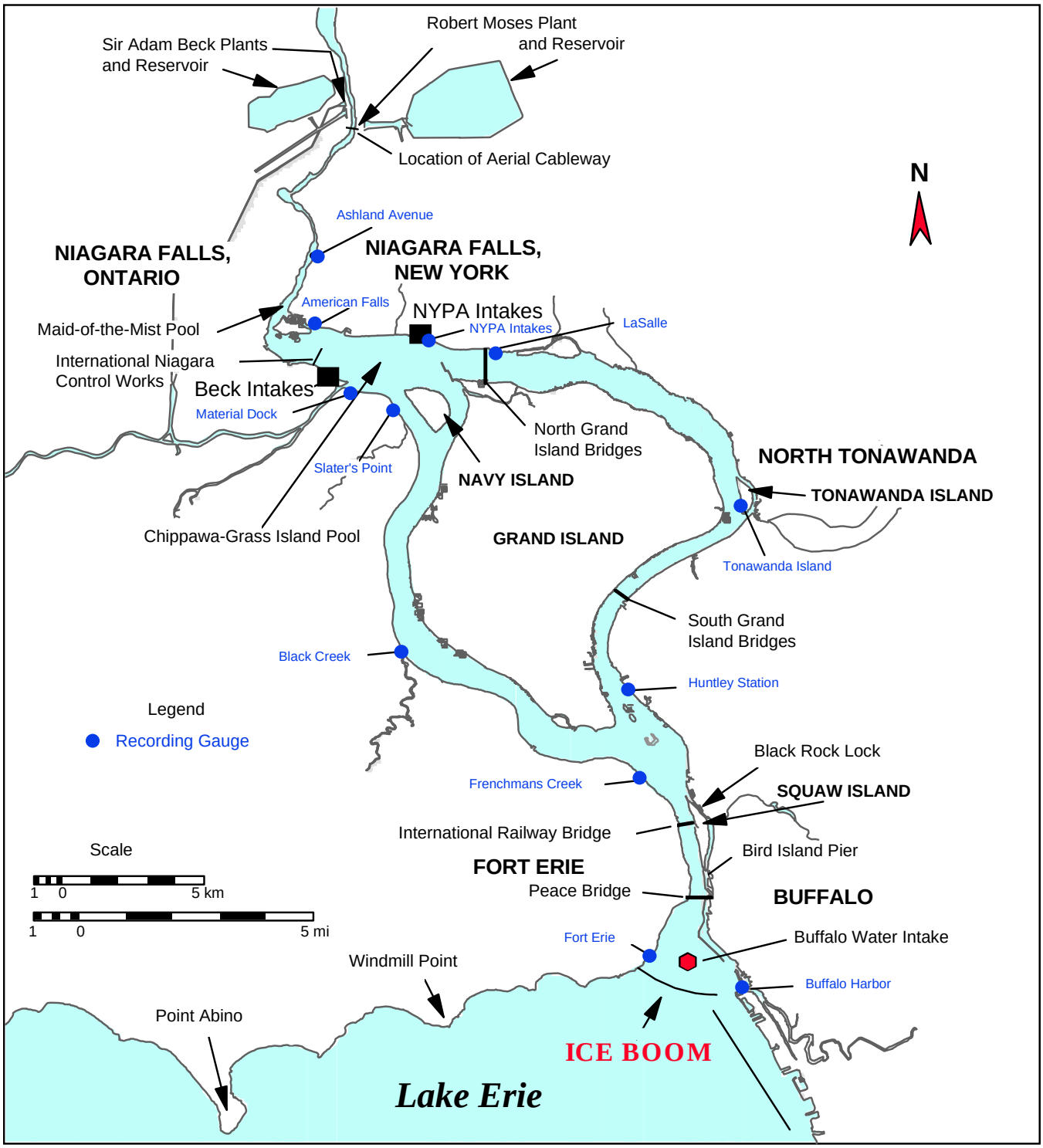
Respectfully Submitted,

CARR MCLEOD
Chair, Canadian Section

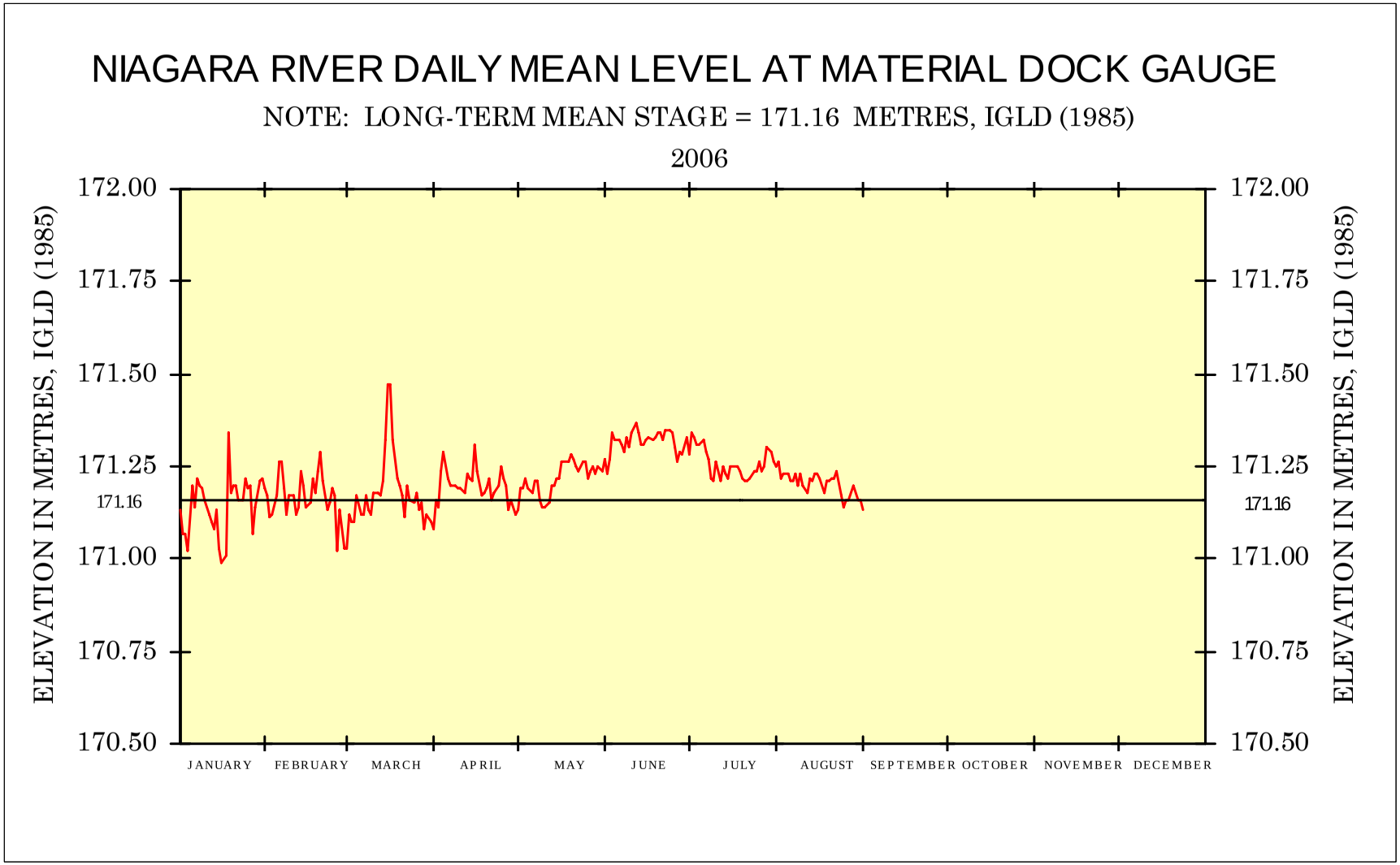
for BRIGADIER GENERAL BRUCE A. BERWICK
Chair, United States Section

ROBERT MESSERVEY
Member, Canadian Section

CONSTANTINE G. TJOUMAS
Member, United States Section


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

ENCLOSURE 1

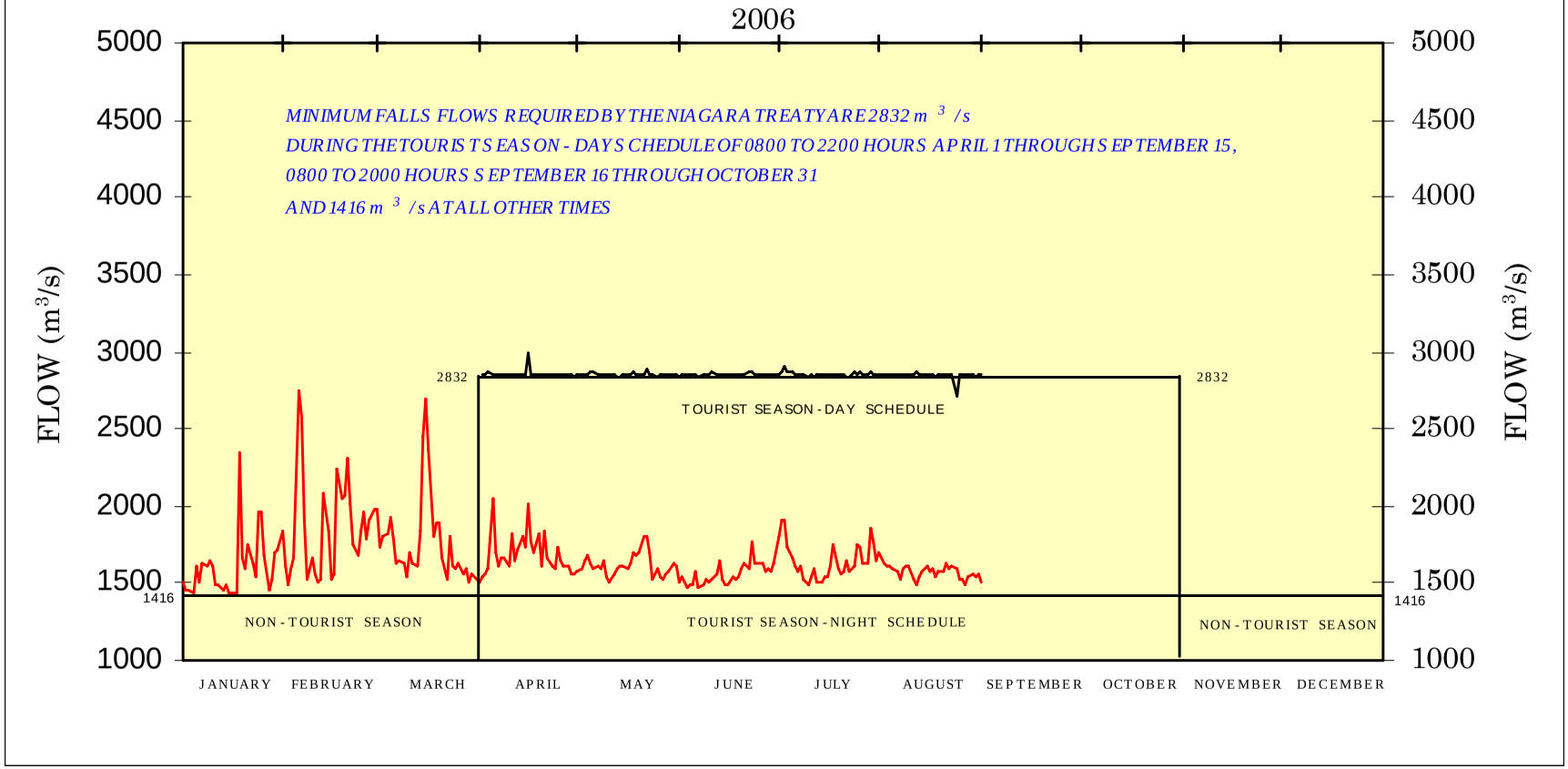

NIAGARA RIVER DAILY MEAN LEVEL AT MATERIAL DOCK GAUGE
NOTE: LONG-TERM MEAN STAGE = 171.16 METRES, IGLD (1985)
2006
ELEVATION IN METRES, IGLD (1985)
172.00
171.75
171.50
171.25
171.16
171.00
170.75
170.50
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER

ENCLOSURE 2

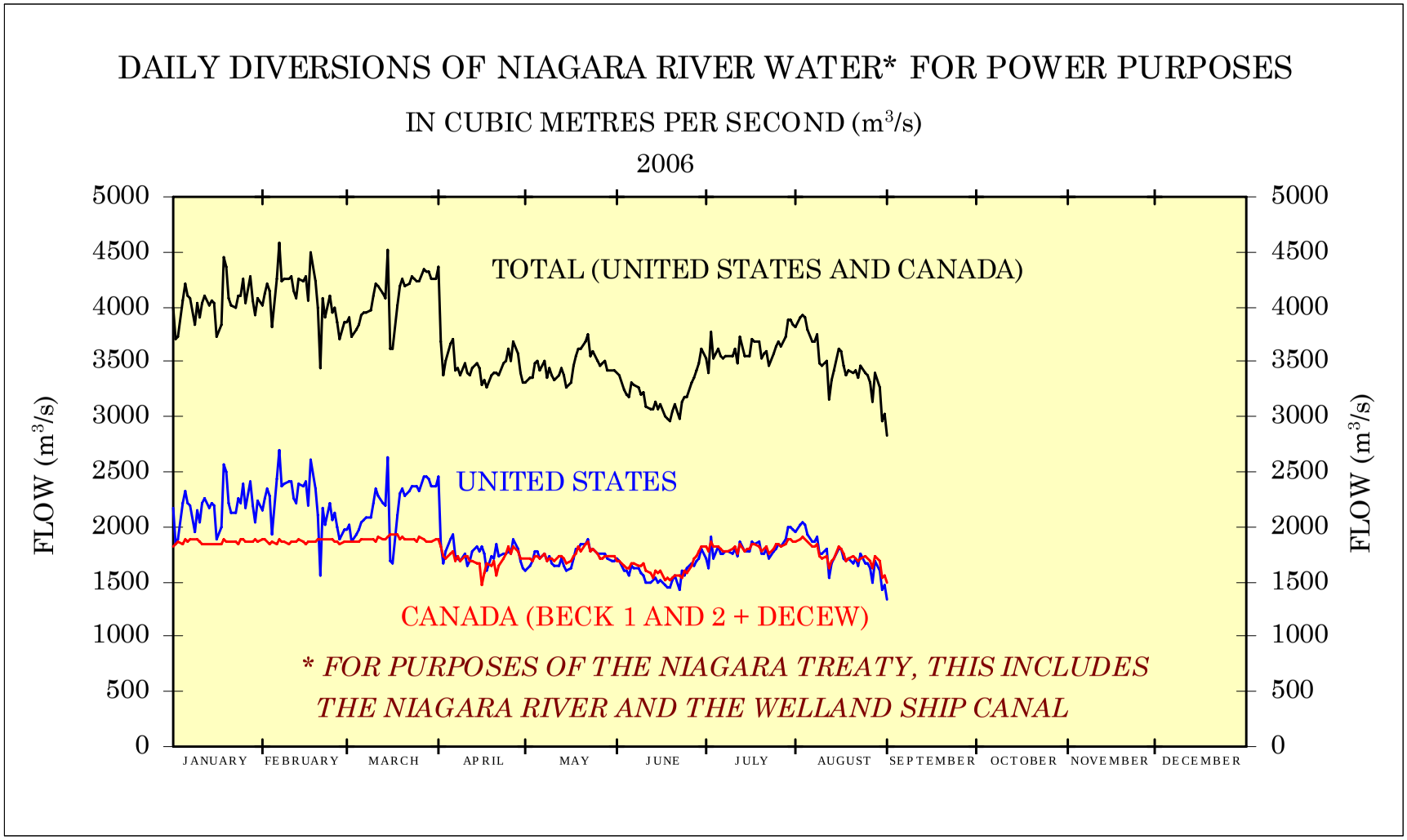
DAILY FLOW OVER NIAGARA FALLS

FLOW AT ASHLAND AVENUE GAUGE MINUS CN AND OP DIVERSIONS

IN CUBIC METRES PER SECOND (m^3/s)



ENCLOSURE 3


DAILY DIVERSIONS OF NIAGARA RIVER WATER* FOR POWER PURPOSES
IN CUBIC METRES PER SECOND (m3/s)
2006
TOTAL (UNITED STATES AND CANADA)
UNITED STATES
CANADA (BECK 1 AND 2 + DECEW)
* FOR PURPOSES OF THE NIAGARA TREATY, THIS INCLUDES THE NIAGARA RIVER AND THE WELLAND SHIP CANAL
FLOW (m3/s)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER

ENCLOSURE 4