

WATER LEVELS OF LAKE ONTARIO

REPORT TO

THE GOVERNMENT OF CANADA

AND

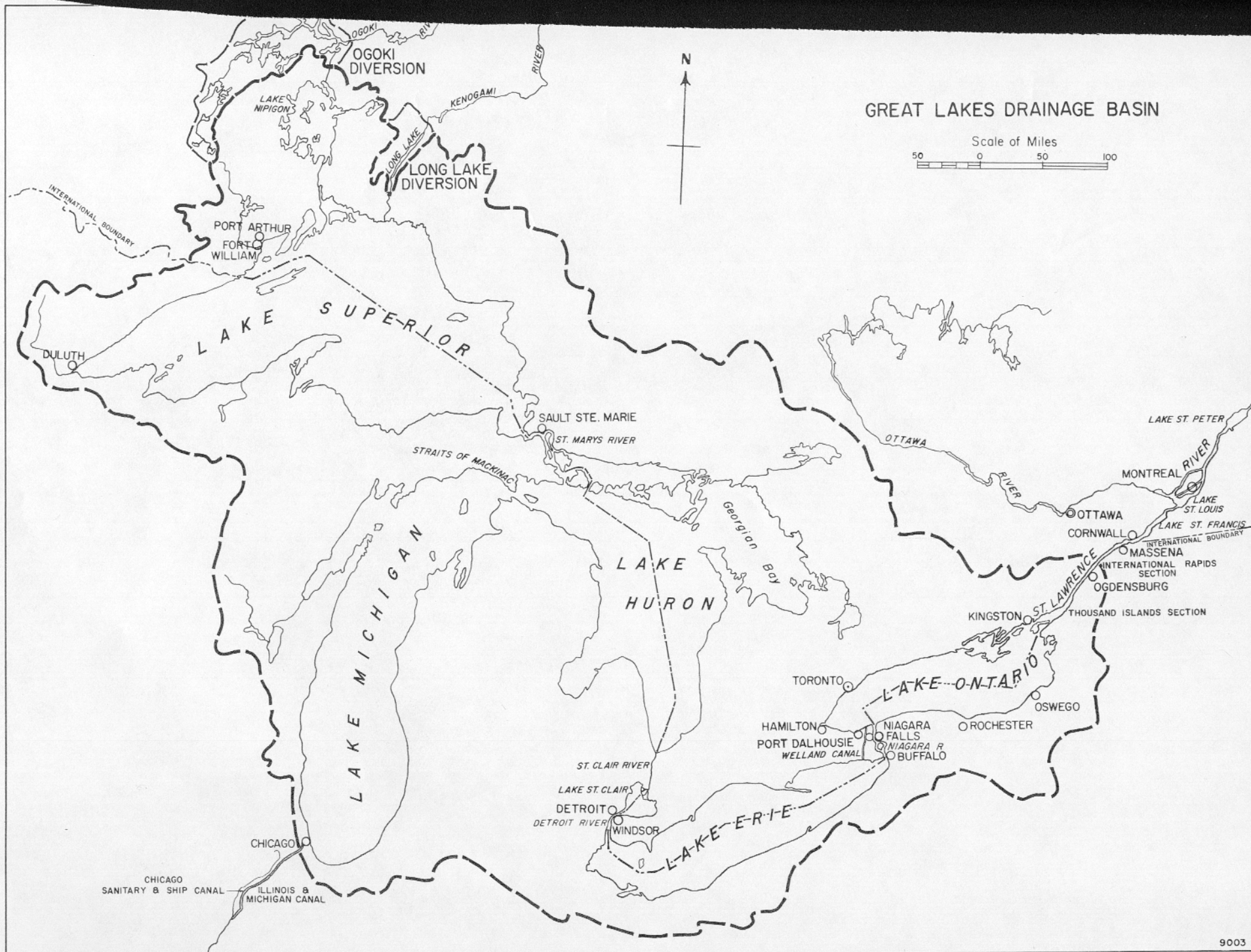
THE GOVERNMENT OF THE UNITED STATES

(Under the Reference of June 25 1952)

BY

THE INTERNATIONAL JOINT COMMISSION

5 April 1961



9 June 1961

The Honourable H.C. Green
The Secretary of State
for External Affairs
Ottawa

The Honourable Dean Rusk
Secretary of State
of the United States
Washington

Dear Sir,

Under Reference of 25 June, 1952, the Governments of the United States and Canada requested the International Joint Commission to determine, having regard to all other interests, whether measures can be taken to regulate the level of Lake Ontario for the benefit of property owners on the shores of the lake in the United States and Canada so as to reduce the extremes of stage which have been experienced.

The Commission's studies under this Reference were carried on in conjunction with the studies related to the Application received from the Governments of United States and Canada under date of 30 June 1952, for an order of approval of the construction of certain works for development of power in the International Rapids Section of the St Lawrence River. These studies were so scheduled as not to delay the construction of the works for development of power. Various recommendations under the Reference were submitted to the Governments from time to time. These various recommendations and the supporting studies are described in the report of the Commission signed in Washington on 5 April, 1961 and hereby transmitted together with the Appendices mentioned in the report.

This constitutes the final report of the Commission under the Lake Ontario Levels Reference of 25 June 1952.

The Commission is preparing additional copies of this report and twenty-five will be forwarded to you as soon as they are completed.

D.G.Chance
Secretary, Canadian Section
International Joint Commission

H.J. Donohue
Secretary, United States Section
International Joint Commission

TABLE OF CONTENTS

	<u>Page</u>
FRONTISPIECE	
LETTER OF TRANSMITTAL	
INTRODUCTION.....	1
INTERNATIONAL LAKE ONTARIO BOARD OF ENGINEERS.....	3
DESCRIPTION OF THE GREAT LAKES-ST LAWRENCE RIVER BASIN.....	4
PROBLEMS WITH RESPECT TO LEVELS AND OUTFLOW FROM LAKE ONTARIO	8
Navigation.....	9
Riparian Interests.....	10
Power Interests.....	12
OBJECTIVES.....	14
STUDIES.....	15
Description of General Approach.....	15
Factors Affecting the Fluctuations of Lake Ontario Water Levels.....	16
Regulation.....	21
SUMMARY OF ACTIONS UNDER THE REFERENCE.....	30
CONCLUSIONS.....	32
RECOMMENDATIONS.....	40
PLATES	
1. Great Lakes Drainage Basin.....	Frontispiece
2. Lake Ontario Drainage Basin.	
3. St Lawrence River - Lake Ontario to Lake St Peter.	
4. North Channel and Galop Rapids Section Showing 1874 Conditions and Location of Improvements.	

INTERNATIONAL JOINT COMMISSION

Report to the Governments of the United States of America and Canada on the Water Levels of Lake Ontario

INTRODUCTION

This report to the Governments of the United States of America and Canada is submitted pursuant to the Reference to this Commission embodied in identical letters dated 25 June 1952 and signed by the Acting Secretary of State for the United States and the Secretary of State for External Affairs for Canada, respectively. The full text of the Reference is quoted below:

"In order to determine, having regard to all other interests, whether measures can be taken to regulate the level of Lake Ontario for the benefit of property owners on the shores of the lake in the United States and Canada so as to reduce the extremes of stage which have been experienced, the Governments of the United States and Canada have agreed to refer the matter to the International Joint Commission for investigation and report pursuant to Article IX of the Treaty relating to boundary waters between the United States and Canada, signed January 11, 1909.

"It is desired that the Commission study the various factors which affect the fluctuations of water level on Lake Ontario, including the construction in the St Lawrence River known as 'Gut Dam', and any diversion of water into or out of the Great Lakes basin, and shall determine whether in its judgment action can be taken by either or both Governments to bring about a more beneficial range of stage, having regard to the proposed plan for improvement for navigation and power of the International Rapids Section of the St Lawrence River and the proposed method of regulation of the levels of Lake Ontario which is an essential feature of that plan.

"As a result of its studies under this Reference, it is desired that the Commission shall determine whether, in its judgment, changes in regard to existing works or other measures would be practicable and in the public interest from the points of view of the two Governments, having in mind the order of precedence to be observed in the uses of boundary waters as provided in Article VIII of the Boundary Waters Treaty of 1909.

"In the event that the Commission should find that changes in existing works or that other measures would be feasible and desirable, it should indicate how the interests on either side of the boundary would be benefited or adversely affected thereby. The Commission should estimate the cost of such changes in existing works or of such other measures, including indemnification for damage to public and private property arising therefrom and the cost of any remedial works that may be found to be necessary. With due regard to the final paragraph of this Reference and to the arrangements presently being proposed for development of power in the International Rapids Section of the St Lawrence River, the Commission should indicate how the cost of any measures and the amounts of any resulting damage should be apportioned between the interests involved.

"In the conduct of its investigation and otherwise in the performance of its duties under this Reference, the Commission may utilize the services of engineers and other specially qualified personnel of the technical agencies of Canada and the United States and will as far as possible make use of information and technical data heretofore acquired by such technical agencies or which may become available during the course of the investigation, thus avoiding duplication of effort and unnecessary expense.

"It is the desire of both Governments that consideration of this Reference shall not delay action by the Commission with respect to applications submitted to the Commission concerning the development of power in the International Rapids Section of the St Lawrence River."

The arrangements for development of power in the International Rapids Section of the St Lawrence River referred to in the fourth and sixth paragraphs of this Reference are those provided for in the Applications of the Government of Canada and the Government of the United States of America to the International Joint Commission for an Order of Approval of the Construction of Certain Works for Development of Power in the International Rapids Section of the St Lawrence River under date of 30 June 1952. These Applications were approved by this Commission in an Order of Approval dated 29 October 1952. A Supplementary Order dated 2 July 1956 was issued subsequently by the Commission to implement among other things the approval

by the Governments of a range of stage for Lake Ontario levels, criteria for the operation of the regulatory works, and a basis for calculating the critical water profiles and designing the channel excavations. Copies of the texts of the Applications for the power development dated 30 June 1952 are attached hereto as Appendix A. The Order of Approval dated 29 October 1952 and the Supplementary Order dated 2 July 1956 are contained herein as Appendix B.

The timing and primary emphasis of the Lake Ontario studies in a number of instances were influenced to a considerable extent by requirements of the Commission in connection with the St Lawrence River power development. As a result a number of the actions taken by this Commission relative to the power development were based on results of investigations made under the Lake Ontario Reference. As knowledge of the timing and sequence of events is necessary for a clear understanding of the various actions taken, a chronological statement of events is included in this report under the Section entitled "Studies."

INTERNATIONAL LAKE ONTARIO BOARD OF ENGINEERS

Following receipt of the Reference, the Commission, early in 1953, established the International Lake Ontario Board of Engineers consisting of one member each from Canada and the United States. The Board was instructed to undertake, through appropriate agencies in the two countries, the necessary investigations and studies and to advise the Commission on all technical engineering matters which it must consider in making a report or reports to the two Governments under the Reference. The Board was requested to keep the Commission advised on problems which might be

resolved prior to completion of the Board's studies. The following interim reports were received by the Commission:

1. Interim Report on Regulation of Lake Ontario, dated 14 March 1955. (This report is included as Appendix D of the report, Regulation of Lake Ontario, dated March 1957.)
2. Effect on Lake Ontario Water Levels of an Increase of 1,000 Cubic Feet Per Second in the Diversion at Chicago for a Period of Three Years, dated 14 June 1955.
3. Effect of Diversions on Lake Ontario Water Levels, dated 15 March 1956.
4. Regulation of Lake Ontario (three Volumes), dated March 1957.
5. Effects on Lake Ontario Water Levels of the Gut Dam and Channel Changes in the Galop Rapids Reach of the St Lawrence River (with three appendices) dated October 1958.

Summaries of the results of the studies covered by these interim reports are contained in the Board's final report, dated December 1958, a copy of which is attached hereto as Appendix C.

DESCRIPTION OF THE GREAT LAKES - ST LAWRENCE RIVER BASIN

The Great Lakes Basin, shown on Plate 1 constitutes the major part of the St Lawrence River system and has a drainage area at the outlet of Lake Ontario of approximately 295,000 square miles, about one-third of which is water surface. The Great Lakes with their vast storage capacity provide one of the finest natural regulatory systems in the world producing an unusually uniform flow in the St Lawrence River with a minimum recorded flow of approximately one half the maximum flow.

Lake Superior, the uppermost and largest of the Great Lakes, discharges through the St Mary's River into Lake Huron. Since 1921

this discharge has been controlled under the supervision of this Commission through the International Lake Superior Board of Control pursuant to Orders of Approval, dated 26 and 27 May 1914. The natural supply to Lake Superior has been increased by diversions from the Albany River basin through the Long Lake and Ogoki projects in Canada commencing in 1939 and 1943 respectively. During the period of 1945 through 1957 the annual sum of these diversions has averaged about 5,000 c.f.s.

Lakes Michigan and Huron are connected by the broad and deep Straits of Mackinac and are usually treated as one lake in hydrologic considerations. The natural supply to these lakes has been decreased by diversions from Lake Michigan, at Chicago into the Mississippi River basin. These diversions commenced in 1848 and averaged about 500 c.f.s. annually until 1900 when they were increased progressively until a maximum annual average of about 10,000 c.f.s. was reached in 1928. By decree of the United States Supreme Court dated 21 April 1930, the diversion was decreased progressively from 1929 through 1938. Since 1938, with few exceptions, the diversion, as limited by the decree, has been maintained at an annual average of 1,500 c.f.s. exclusive of domestic pumpage, which has averaged about 1,600 c.f.s.; this makes a total diversion out of the system at that point of about 3,100 c.f.s.

The natural outlet for the discharge from Lakes Michigan-Huron is through the St Clair River, Lake St Clair and the Detroit River into Lake Erie. Improvements to increase depths in the channels of these rivers have increased their discharge capacity. In later years works were built for the purpose of compensating for these increases.

The natural outlet for the discharge from Lake Erie is through the Niagara River into Lake Ontario. Water from Lake Erie also reaches Lake Ontario by way of the Welland Canal and the DeCew Falls power plant tailrace and has averaged about 7,000 c.f.s. since 1950.

Lake Ontario, shown on Plate 2 is the lowest in the Great Lakes chain and, with the exception of Lake St Clair, is also the smallest. Variations in the water levels of Lake Ontario are of considerable significance to the owners of riparian property along the shores of the lake, and to other interests. Lake levels are dependent on the relationship between the rates at which water is supplied from the upper lakes, about 85% of the total inflow, and from the local drainage basin to the lake, and the rates at which water discharges from the lake through the St Lawrence River. With the construction of the St Lawrence seaway and power projects the outflows from Lake Ontario are being regulated.

The St Lawrence River falls about 246 feet in the distance of 533 miles from the outlet of Lake Ontario at Kingston, Ontario, to Father Point, Quebec, which marks its transition into the Gulf of St Lawrence. The major portion of this fall, some 226 feet, occurs between Lake Ontario and Montreal Harbour, 183 miles downstream from the lake. This section is shown on Plate 3. The reach of the river from Chimney Point, four miles east of Ogdensburg, New York, to the head of Lake St Francis, referred to as the International Rapids Section, is 47 miles long with a total drop in water level of 92 feet at mean stage. The development for navigation and power in this section commenced in 1954 in accordance with the Commission's Order of Approval of 29 October 1952 (see Appendix B).

The works include a dam in the vicinity of Iroquois Point to control the levels of Lake Ontario; a dam in the Long Sault Rapids between Barnhart Island and the United States shore; and two powerhouses, one on either side of the international boundary at the foot of Barnhart Island, with a total installation rated at 1.8 million kilowatts. Excavations in the river are designed to provide a controlling depth of 27 feet in the navigation channels and satisfactory velocities for navigation and for the formation of ice cover for winter power operations. A navigation lock and canal on the Canadian side, by passing the Iroquois control dam, and a canal with two locks on the United States side, by passing Long Sault dam, are designed to provide a 30-foot depth over the lock sills and a 27-foot controlling depth in the canals.

A few miles below the Barnhart Island power plants the river widens into Lake St Francis which, with the exception of a small area at the upstream end bounded by about three miles of shoreline, lies in Canada. The level of the lake was under partial control from 1932 to 1943 but since that time it has been fully controlled by the Beauharnois power plant and a series of dams at its natural outlet near Coteau Landing. The Beauharnois power plant, on the shore of Lake St Louis, develops the full head of about 83 feet between Lake St Francis and Lake St Louis. The forebay of this plant is connected to Lake St Francis by a combined power and navigation canal about 16 miles long and 3,000 feet wide. Two locks at the lower end of the canal, having depths of 30 feet over the sills, bypass the power plant.

Lake St Louis receives, in addition to the inflow from the St Lawrence River, a portion of the runoff of the Ottawa River through the Vaudreuil and Ste Anne outlets of the Lake of Two Mountains. From the outlet of Lake St Louis to Montreal Harbour, a distance of about 13 miles, the fall in the river is about 47 feet, 33 feet of which occurs through the Lachine Rapids and Narrows before the river widens to form Laprairie basin. Various schemes for developing power from this fall have been proposed but the final plan has not been formulated. The St Lawrence River from the lower end of Lake St Louis to Montreal Harbour is bypassed by a 27-foot navigation canal on the south shore. Two locks providing 30-foot depths over the sills in conjunction with a dyked channel overcome the difference in level between Lake St Louis and Montreal Harbour. The upper portion of this canal has been designed to permit a flow of 40,000 c.f.s. to be bypassed from Lake St Louis to Laprairie Basin during the non-navigation season.

PROBLEMS WITH RESPECT TO LEVELS AND OUTFLOWS FROM LAKE ONTARIO

Just as there are a large number of natural and artificial factors which can affect the levels and outflows of Lake Ontario, there are a correspondingly large number of aspects to the effects of actual levels and outflows, or changes thereto, on the various interests involved. These interests have been grouped into three categories for general consideration, namely, navigation, riparian and power. In discussing the effect of levels and outflows of Lake Ontario on these interests, changes in levels and outflows resulting from and made possible by

regulation are used as the basis for presentation of the available information. However, similar changes resulting from other factors would have similar impact on the navigation, riparian, and power interests. In many instances the desires of the various interests with respect to possible changes are divergent and in some cases conflicting.

Navigation

The navigation interests are concerned with maintaining a relatively high minimum level on Lake Ontario, which allows greater drafts for vessels, as well as with maintaining high minimum flows in the St Lawrence River to assure satisfactory downstream levels. This latter aspect is of particular importance in the Montreal area where it is essential also to ensure that the frequency of occurrence of low flow is not adversely increased due to the regulation of the outflows of Lake Ontario. A decrease in the minimum flow as a result of the regulation of Lake Ontario would adversely affect the available drafts and would necessitate dredging or other appropriate remedial measures. Additional dredging in Montreal Harbour could affect the stability of many of the existing harbour facilities. This problem is complicated by the possibility of coincidence of low regulated outflows from Lake Ontario with low flows from the Ottawa River.

Navigation interests are concerned, but to a lesser degree, with maximum water levels as they govern elevations of their structures. Frequency and duration of high flows must also be considered as they affect river currents, their directions and velocities.

Riparian Interests

Shore property on Lake Ontario is subject to damage by flooding and by wave action. Damage to shore property results from flooding alone when the mean lake level exceeds the level of natural or artificial barriers. The problem however is intensified and the flood damage increased when storm activity over the lake causes a temporary tilting of the lake's surface. The resultant rise in stage superimposed on the mean lake level causes greater inshore depths thus increasing the force of the waves as they approach the shore with a consequent increase in severity of damage. Although major damage results from flooding during the high lake stages, far greater damage is caused by wave action during storms, particularly when coincident with high lake levels. This results in erosion of the shore and damage to or destruction of structures, buildings and valuable arable land. Fortunately the storms are generally less frequent and less severe during the summer season when the lake is at its highest seasonal stage.

Any plan for regulation of the outflows from Lake Ontario will produce levels different from those which would obtain under natural conditions or without regulation. Changes in lake levels and their duration will have an effect on the damage to shore property from flooding and wave action. Shore property interests desire a reduction of high lake levels. However, in developing a plan of regulation which will benefit shore property on Lake Ontario, consideration must be given not only to the maximum level reached under regulation, but also to the duration of intermediate and high levels and their possible coincidence

with storms.

All interests, bordering on Lake St Francis, Lake St Louis and the other reaches of the river below the International Rapids Section are concerned with the flows and levels of the St Lawrence River. The major problems with which downstream riparian interests are concerned are:

(a) High water levels on Lake St Louis and downstream during April, May or June resulting from high flows in the St Lawrence River which are coincident with floods on the Ottawa River.

(b) Low flows on the St Lawrence and Ottawa Rivers resulting in low water levels on Lake St Louis and downstream which would adversely affect the uses of the waters for domestic water supply and sewage disposal purposes and for boating and other recreational purposes particularly during the late summer.

(c) Ice Conditions in the Montreal area where at the onset of winter and during Spring breakup the St Lawrence River is subject to ice jams with the most severe occurring in Laprairie Basin and in Montreal Harbour and below. However, it is believed that the operation of ice breakers below Montreal in recent years has somewhat reduced the flood hazard due to ice jams particularly during Spring breakup. Many factors contribute to this flood hazard and it is difficult to predict accurately the effect of the St Lawrence River discharge on the magnitude of flooding due to ice conditions in Montreal Harbour and Laprairie Basin. The hazard

could be aggravated with increased discharges or substantial or rapid variations in discharge as compared to past conditions.

Riparian use of waters of Lake Ontario for domestic and sanitary purposes are not significantly affected by small changes in levels of that lake and will be benefited by a regulation of the lake levels which results in an increase in the minimum stage and a reduction in the range of stage.

Power Interests

The power interests in the International Rapids Section desire generally high Lake Ontario stages to provide greater heads combined with a range of stage adequate to improve the distribution of lake outflows for greater firm power production.

The higher the elevations selected for a given range of stage, the greater would be the advantage accruing to the power entities which are responsible for the channel enlargements above the powerhouses in the International Rapids Section. In addition to their effect in reducing the cost of the works, increased minimum and maximum levels would increase the potential output at the powerhouses. Concurrently, however, there would possibly be some reduction in the power output of the hydro-electric generating plants at Queenston and Lewiston on the Niagara River.

Also of importance to the power entities is the regulation of flows during the winter months. To ensure the formation of an ice cover it is essential that the velocity should not exceed that at which an ice cover

can be secured. This can be achieved by limiting the flow and/or by enlarging the channel, the final determination being based on economic considerations. Also, since both power entities have greater load requirements during winter months, they would find it desirable if the minimum regulated flows during the winter could be greater than those for the summer.

The downstream power interests include the developments of the Quebec Hydro-Electric Commission at Cedars and Beauharnois, and the undeveloped power of the Lachine reach of the river. As in the case of the upstream power interests the regulation of flows during the winter months is important and it is desirable that river velocities permit the formation and maintenance of an ice cover above the different power projects. As the water flowing from Lake Ontario gradually cools as it proceeds downstream, the freeze-up in the Montreal area is usually two to three weeks earlier in the season than in the International Rapids Section. Because of this, it will be necessary, in order not to aggravate operating conditions for the downstream power interest, to limit the regulated outflow from Lake Ontario during the latter half of December or during the month of January.

At present, plans are being considered for a power development in the Lachine section. To assure the safe and dependable operation of such a development, the discharge capacity of the restrictive reaches above the Lachine Rapids must be enlarged so that the resulting velocities will permit the formation of an ice cover. For this reason, one of the factors that must be considered in the regulation of Lake Ontario is the resulting

outflow from Lake St Louis during the ice-forming period in the Lachine area. As noted on page 8 hereof, assistance in this regard was provided in the redesign of the St Lawrence Seaway Canal in this vicinity to permit the passage of 40,000 c.f.s. through the canal in the non-navigation season.

OBJECTIVES

The studies conducted under the Lake Ontario Reference of 25 June 1952 were organized so as to meet the following objectives:

- (a) Evaluate effects of various factors on the levels of Lake Ontario.
- (b) Determine possibilities for regulation of Lake Ontario so as to reduce the extremes of stage.
- (c) Determine desirable changes in existing works or other measures in the public interest.
- (d) Evaluate effects of changes in existing works and other measures on various interests.

In evaluating the effects of various factors on the levels of Lake Ontario, particular attention was given to the effects of diversions into and out of the basin, the Gut Dam, and channel changes in the Galop Rapids reach of the St Lawrence River. To fit in with the requirements of the Orders of Approval and of design criteria the studies to determine the possibility of reducing the extremes of stage by regulation of Lake Ontario were scheduled to provide necessary design data early in the studies so as not to delay construction of the power and associated navigation works in the

International Section. Economic evaluations of the results of several ranges of stage were also made to provide a basis for comparing the effects of such measures on the various interests.

STUDIES

Description of General Approach

To carry out the detailed studies, this Commission appointed an engineering board designated the International Lake Ontario Board of Engineers; this Board in turn, appointed a Working Committee consisting of representatives of the agencies in each country having assigned responsibilities for the types of work involved. The regular field organizations of the appropriate agencies were asked to perform the studies needed, thus ensuring that the services of specialists available in both countries were utilized on the problem as required.

Water level and discharge data for the Great Lakes and the St Lawrence River are available from 1860 and the analysis of these records by accepted engineering procedures yielded answers to the questions in the Reference. In order to cover all aspects of the effects of channel changes in the Galop Rapids reach of the St Lawrence River on Lake Ontario water levels, the Commission utilized a hydraulic model constructed for the Government of Canada at the National Research Council, Ottawa, to supplement the analysis of the records. In addition, models constructed by the Hydro-Electric Power Commission of Ontario were used to determine channel dimensions compatible with the requirement of the plan of regulation.

Factors Affecting the Fluctuation of Lake Ontario Water Levels

There are both natural and artificial factors affecting the water levels of Lake Ontario. The effects of these factors are described in some detail in Section IV of the Board's report, dated December 1958 (Appendix C). The predominant natural factor has been the variation in the supplies of water to the lake. During the 95-year period of record, 1860-1954, the monthly mean lake level has varied through a range of 6.61 feet, from 242.68 for November 1934 to 249.29 for June 1952. Seasonal variations between high and low levels have ranged from 4.07 feet to 0.32 foot. Tilting of the lake's surface through meteorological phenomena results in daily and hourly fluctuations, which are superimposed upon the long-term and seasonal variations and may reach a maximum of three feet at the east end of the lake primarily as a result of high sustained winds. Effects of other natural factors such as evaporation, barometric changes and ice retardation are of lesser magnitude.

Apart from these hydrometeorological factors, differential crustal movement of the earth's surface also affects the levels of Lake Ontario. There has been a progressive increase in the water levels with respect to the land around Lake Ontario as a result of the earth's crust in the Galop Rapids reach rising at a rate of 0.55 foot per 100 years with respect to the land at Oswego and at a rate of about one foot per 100 years with respect to the land at the west end of the lake. With the natural control of the levels of Lake Ontario in the Galop Rapids reach, crustal movement at the above rates has had the effect of decreasing the discharge capacity of the lake outlet for the same lake level or of increasing the water

levels of the lake at any point on the shore for the same water supply conditions. Thus, the water level with respect to the land at Oswego has risen about 0.5 foot and at the western end of the lake has risen about 1.0 foot during the period from 1860 to 1954. The effects of the other natural factors and all the artificial factors would be superimposed on, and be independent of, this crustal movement effect.

The net total supply of water to Lake Ontario and the discharge capacity of the natural outlet of Lake Ontario have been affected by the works of man. The major artificial factors which have affected the levels of Lake Ontario are: diversions out of and into the Great Lakes basin; Gut Dam and channel changes in the Galop Rapids reach of the St Lawrence River; and the regulation of outflows from Lake Superior. Other minor factors have been the regimen changes in the connecting river channels between the Great Lakes and diversions from Lake Erie and the Niagara River for power and navigation.

As mentioned on page 5 hereof, diversions out of Lake Michigan at Chicago to the Mississippi River drainage basin and into Lake Superior from the Hudson Bay drainage basin were started in 1848 and 1939 respectively and are still continuing as of this time. The effects on Lake Ontario levels of these diversions have varied with the magnitude and timing of the actual diversions. The full effect of a constant diversion, either into or out of the system, is not attained immediately but builds up progressively over a period of time. For example, studies indicate that the ultimate effect on Lake Ontario levels of a constant diversion

out of Lakes Michigan-Huron would be reached in about 15 years from the commencement of such a diversion. The comprehensive studies of the effects of these diversions on Lake Ontario water levels are summarized in Section V of Appendix B.

Diversions out of the Great Lakes basin have the effect of lowering Lake Ontario levels while those into the Great Lakes basin raise them. The maximum lowering of Lake Ontario levels due to diversions from Lake Michigan was reached during the period 1930 to 1935 when lake levels were on the average about 0.43 foot lower than they would have been without the diversions. In November 1934 when the recorded monthly mean level of Lake Ontario was at its minimum the effect of diversions out of Lake Michigan was a lowering of about 0.42 foot. Prior to 1947, the net effect of diversions out of Lake Michigan and into Lake Superior was a lowering of Lake Ontario levels. During 1947 the raising effect on Lake Ontario levels of diversions into Lake Superior was about the same as the lowering effect due to diversions out of Lake Michigan. The maximum effect of the Ogoki and Long Lake diversions alone was reached in 1951 and caused a rise in Lake Ontario water levels of about 0.22 foot at medium stages. In June 1952 when the maximum monthly mean level of record was reached on Lake Ontario, the raising effect on Lake Ontario levels due to the diversions into Lake Superior exceeded the lowering effect of the diversions out of Lake Michigan to the extent that the lake level was about 0.06 foot higher than it would have been without the diversions. With the average rates of diversion of 3,100 c.f.s. out of Lake Michigan

and of 5,000 c.f.s. into Lake Superior, or a net rate of 1,900 c.f.s into the Great Lakes basin, the ultimate effect on Lake Ontario water levels at an average elevation of about 246.0 feet, is to raise Lake Ontario water levels by about 0.09 foot under outlet conditions existing prior to construction of the St Lawrence seaway and power projects. In the regulation plan recommended by the Commission this additional supply of water to Lake Ontario is treated as part of the natural supply to the lake in the maintenance of the approved regulation criteria.

The Galop Rapids reach of the St Lawrence River was the natural control for the water levels of Lake Ontario prior to the construction of the St Lawrence seaway and power projects so that any changes to the river channel in this area would affect the levels of Lake Ontario. Between 1881 and 1908, several changes in the channel of the Galop Rapids reach were made for the improvement of navigation as follows: dredging in the Canadian Galop Rapids during the period 1881-1888, 1897-1901 and 1904-1908; realignment of the Galop Canal between 1889 and 1896; improvement of the North Channel between 1897 and 1908; and the construction of Gut Dam in 1903. The locations of these improvements are shown on Plate 4. During the period 1909-1952 no known changes were made to the river channel so that the levels of Lake Ontario with respect to its outlet control, were stable.

In compliance with the term of the Order of Approval of 29 October 1952, providing that "The Government of Canada shall proceed forthwith

to carry out its expressed intention to remove Gut Dam", the dam was removed between 30 October 1952 and 6 January 1953.

The comprehensive studies on the effects of these channel changes on Lake Ontario water levels are summarized in Section V of Appendix C and the results are detailed in Table 1 thereof. During the stable period 1909-1952 the net effects of these channel changes, for improvement to navigation, on Lake Ontario water levels were: at high stages of the lake, a raising of 0.33 foot or four inches; at medium stages, a raising of 0.30 foot or three and one half inches; and at low stages a raising of about three inches. With the removal of Gut Dam, the Lake Ontario water levels were lowered four inches at high stages, four and one half inches at medium stages and four and one quarter inches at low stages.

Since August 1921, the outflow from Lake Superior has been completely controlled under the direction of the International Lake Superior Board of Control in accordance with the Orders of Approval of the International Joint Commission, dated 26 and 27 May 1914 which require that the monthly mean level of Lake Superior be maintained as nearly as may be between elevations 602.1 and 603.6 above mean tide at New York, U.S. 1903 Datum, in such a manner as to provide maximum water for power without detriment to navigation and other interests. Under regulation the outflow from Lake Superior has frequently been increased above and decreased below what the natural flow would have been. The equalizing effect of the large areas and storage capacities of Lakes Michigan-Huron and Erie has reduced the effect on Lake Ontario of rapid

and abrupt fluctuations of outflows from Lake Superior and has distributed the effect of each of these changes over longer periods of time. Due to this modulation, the effects on Lake Ontario levels have varied from a raising of about two and three-quarter inches to a lowering of about two and one-quarter inches. The effects are not related to Lake Ontario stages and can be either a raising or lowering at either high or low stages on Lake Ontario. In June 1952, when the maximum monthly mean level of record was reached on Lake Ontario the effect on Lake Ontario levels of Lake Superior regulation was a raising of about one and one-half inches; in November 1934 when the minimum monthly mean level was recorded the effect was a lowering of about one and one-quarter inches. During 1951 and 1952 when all of the Great Lakes had attained very high levels, the Commission, through its Board of Control, kept the regulation of Lake Superior under constant surveillance in order to ensure regulation which would attain optimum benefits to all concerned.

Other artificial factors such as regimen changes in the connecting rivers between the Great Lakes and in the St Lawrence River above the Galop Rapids reach and diversions from Lake Erie and the Niagara River for power and navigation have had only minor and transitory effects on the levels of Lake Ontario.

Regulation

The proceedings under this Reference and in connection with the St Lawrence Power Applications of 30 June 1952 are closely inter-related. Under the Reference, of course, authority is limited to investigating,

reporting and making recommendations to the two Governments while under the Application the Commission has authority to "pass upon" and approve the Applications and to attach appropriate conditions to such approval.

Under date of 30 June 1952 the Government of Canada and the Government of the United States filed similar Applications with the International Joint Commission, with the request that "both applications be considered as in the nature of a joint application for approval of the construction of the works (for development of power in the International Rapids Section of the St Lawrence River) to be jointly undertaken by an entity to be designated by the Government of Canada and an entity to be designated by the United States of America." In their Applications (See Appendix A) the Governments described the works and facilities to be constructed and requested the Commission's approval for the establishment by the two Governments of a Joint Board of Engineers to review, supervise and co-ordinate the plans, specifications and construction of the works. The Application then stated "The works shall be designed, constructed, operated and maintained according to the following conditions" This was followed by a recital: of various operating criteria which would have to be met to protect the prior rights and interests of navigation interests on the St Lawrence River and downstream power developments; of method of regulation No 5 which was "designed to permit the lowering of the extreme high water levels and the raising of the extreme low water levels of Lake Ontario" and to govern discharge and flow upon completion of the works; of the continuing duties and authority of a Board of Control proposed

for establishment by the Commission; of provisions by which such Board could modify or change the restrictions as to flow and water levels in order to carry out experiments to determine what permanent modifications or changes might be advisable; and a provision by which the Governments would make permanent any changes or modifications in levels and flows recommended by the Commission and approved by the two Governments.

In the final paragraph the Application requested that "the International Joint Commission give priority to these Applications and expedite its consideration thereof and its action thereon, so that construction of the project may be undertaken at the earliest possible date."

The Application was considered during the summer and autumn of 1952 and public hearings were held, during the course of which it was indicated that Method of Regulation No 5 did not provide the improvements in control of water levels and flows desired under the Reference by the lakeshore interests. Studies also indicated that some of the basic river flow data were in error due to incorrect assumptions made with respect to the effects of ice retardation. It was thus apparent to the Commission that the Method of Regulation would need to be changed in order to protect the several interests affected, and that detailed studies and additional data would be required before this could be done. Having in mind the request of the Governments for expeditious action on the Applications, however, the Commission concluded that the Applications should be approved substantially as submitted, subject to general conditions to protect all affected interests both upstream and downstream and with the Commission retaining jurisdiction to modify or change the method of regulation as required in the light of subsequent studies.

On 29 October 1952 the Commission issued its Order of Approval (Appendix B) for the construction, maintenance and operation of the works specified in the Application, subject to conditions substantially in accord with the statements contained in the Application. Provision was made for the establishment by the two Governments of a Joint Board of Engineers "to review and co-ordinate, and if both Governments so authorize, approve the plans and specifications of the works and the programmes of construction thereof submitted for the approval of the respective Governments ... and to assure the construction of the works in accordance therewith as approved". Provision was made for the establishment by the Commission of a Board of Control "to ensure that the provisions of this Order relating to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section ... are complied with ...". Provision was made also for the Board of Control, with the approval of the Commission, to temporarily modify or change the restrictions as to discharge and flow. A further condition of the approval was that "The Government of Canada shall proceed forthwith to carry out its expressed intention to remove Gut Dam". Finally, the Commission specifically reserved jurisdiction over the subject matter of the Application and the authority to make such further Order or Orders relating thereto as may be necessary in the judgment of the Commission. As indicated above the Commission recognized at the time of issuing the Order of Approval that a further Order would be required in relation to the method of regulation and this was one of the reasons for specifically retaining jurisdiction.

Meanwhile, the Commission had established the International Lake Ontario Board of Engineers to assist in the studies and investigations required under the Reference of 25 June 1952. After exhaustive study and consultation with the many interests involved, the Commission was satisfied that, having due regard to the interests of all concerned, the level of Lake Ontario could be regulated "for the benefit of property owners on the shores of the lake in both countries so as to reduce the extremes of stage which had been experienced in the past", and this conclusion was transmitted to the two Governments on 17 March 1955.

Public Hearings were held in Rochester, New York and Toronto, Ontario on 12 and 14 April 1955 respectively at which all interested parties were given convenient opportunity to express their views upon the criteria and range of stage tentatively proposed.

On 9 May 1955 the Commission recommended to the two Governments that the works in the St Lawrence, approved on 29 October 1952, should be operated in accordance with certain criteria, which had been worked out as being consistent with the basic, governing requirements of paragraphs b, c and d of the Order of Approval of 29 October 1952; that the level of Lake Ontario should be regulated within a range of mean monthly elevations, 244 (navigation season) to 248.0 feet as nearly as may be; and that a plan of regulation No 12-A-9, developed within this range be adopted. The governments were advised that the St Lawrence seaway and power entities could proceed with the determination of the critical water surface profiles and the final design of channel

excavations on the basis of this range of stage and plan of regulation, with the assurance that any adjustments subsequently required in the plan as a result of further detailed study and evaluation, would be of a minor nature. The criteria are as follows:

- (a) The regulated outflow from Lake Ontario from 1 April to 15 December shall be such as not to reduce the minimum level of Montreal Harbour below that which would have occurred in the past with the supplies to Lake Ontario since 1860 adjusted to a condition assuming a continuous diversion out of the Great Lakes Basin of 3,100 c.f.s at Chicago and a continuous diversion into the Great Lakes Basin of 5,000 from the Albany River Basin (hereinafter called the "supplies of the past as adjusted").
- (b) The regulated winter outflows from Lake Ontario from 15 December to 31 March shall be as large as feasible and shall be maintained so that the difficulties of winter power operation are minimized.
- (c) The regulated outflow from Lake Ontario during the annual spring breakup in Montreal Harbour and in the river downstream shall not be greater than would have occurred assuming supplies of the past as adjusted.
- (d) The regulated outflow from Lake Ontario during the annual flood discharge from the Ottawa River shall not be greater than would have occurred assuming supplies of the past as adjusted.
- (e) Consistent with other requirements, the minimum regulated monthly outflow from Lake Ontario shall be such as to secure the maximum dependable flow for power.
- (f) Consistent with other requirements, the maximum regulated outflow from Lake Ontario shall be maintained as low as possible to reduce channel excavations to a minimum.
- (g) Consistent with other requirements, the levels of Lake Ontario shall be regulated for the benefit of property owners on the shores of Lake Ontario in the United States and Canada so as to reduce the extremes of stage which have been experienced.

- (h) The regulated monthly mean level of Lake Ontario shall not exceed elevation 248.0 with the supplies of the past as adjusted.
- (i) Under regulation, the frequency of occurrences of monthly mean elevations of approximately 247.0 and higher on Lake Ontario shall be less than would have occurred in the past with the supplies of the past as adjusted and with present channel conditions in the Galop Rapids Section of the St Lawrence River. *
- (j) The regulated level of Lake Ontario on 1 April shall not be lower than elevation 244.0. The regulated monthly mean level of the lake from 1 April to 30 November shall be maintained at or above elevation 244.0
- (k) In the event of supplies in excess of the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to the riparian owners upstream and downstream. In the event of supplies less than the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to navigation and power interests.

On the instruction by the Commission the International Lake Ontario Board of Engineers undertook further review of Plan 12-A-9 to determine what minor adjustments might be made to meet the requirements of all interests, particularly those downstream. The Commission was subsequently advised that studies indicated that such modifications could be made with only minor revision.

On 3 December 1955, the Governments of Canada and the United States

* "present channel conditions" refers to conditions as of March 1955.

advised the Commission that they approved the recommended range of elevations and criteria, and Plan of Regulation No 12-A-9 for the purpose of calculating critical profiles and the design of channel excavations. At the same time, the Commission was urged to continue its studies with a view to perfecting the plan of regulation so as best to meet the requirements of all interests, both upstream and down, within the approved range of elevations and criteria.

It should be noted that the range of elevations on Lake Ontario and criteria recommended by the Commission and approved by both Governments differ from those on which Method of Regulation No 5, mentioned in both the Application and the Order of Approval of 1952, was based. Method of Regulation No 5 did not provide the reduction in the extremes of stage on Lake Ontario, requested by the Governments in the Reference of 25 June 1952, and moreover, revisions had been made by the responsible federal agencies of the two countries to certain of the basic flow data on which Method No 5 was based.

On 2 July 1956, the Commission issued a Supplementary Order to its Order of Approval of 29 October 1952. All reference to Method of Regulation No 5 was deleted and the range of elevations on Lake Ontario and the criteria previously approved by the Governments were substituted. The Supplementary Order provides that "The Commission will indicate in an appropriate fashion, as the occasion may require, the inter relationship of the criteria, the range of elevations and the other requirement".

Further refinements and improvements to Plan of Regulation No 12-A-9 so as best to meet the requirements of all interests both upstream and downstream as requested by the Governments, were carried out by the International St Lawrence River Board of Control which had been established under the Order of Approval of 29 October 1952. As the result of this further study the Board of Control prepared a plan of regulation designated Plan 1958-A which the Commission approved from the technical standpoint but without determining the date on which it should be instituted.

On 24 October 1958, the Commission forwarded Plan 1958-A to the two Governments stating that it believed the plan to be "fully workable and consistent with the range of stage, criteria and other requirements" set forth in the Order of Approval and the Supplementary Order. (See Appendix D).

On 19 March 1959, the Commission advised that 1 April 1959 would be an appropriate date on which to institute plan of regulation 1958-A (See Appendix E). Subsequently in Canada an Order in Council P.C. 1959 506 dated 23 April 1959 and in the United States a Federal Power Commission Order, dated 10 April 1959, were passed to implement the recommendation of the Commission. Under date of 7 May 1959, the Power Authority of the State of New York, the United States power entity, applied for a rehearing with respect to the Federal Power Commission Order of 10 April 1959. The rehearing was granted on 28 May 1959 and the Order of Rehearing was issued, dated 3 August 1959. (Copies of the above-mentioned orders are included herewith as Appendix F). As conditions obtaining as of August were inappropriate, initiation of the Regulation Plan was postponed pending more favourable circumstances.

At the semi-annual meeting of this Commission in April 1960, the International St Lawrence River Board of Control advised that water supply conditions were again appropriate for the institution of Plan of Regulation 1958-A. As a result, in a letter dated 8 April 1960, the Commission directed the International St Lawrence River Board of Control that regulation of the outflows of Lake Ontario in accordance with Plan 1958-A be brought into effect on 20 April 1960. (See Appendix G). Operations since that date have been carried out in general accordance with Plan 1958-A and have been satisfactory except for a period in October and November when the resultant flows through Montreal Harbour were objectionably low. This aspect is presently under review by the Commission.

SUMMARY OF ACTIONS UNDER THE REFERENCE

The studies to determine the possibility of reducing the extremes of stage by regulation of Lake Ontario were so scheduled as not to delay construction of the power works:

- (a) On 17 March 1955, as a result of the comprehensive regulation studies and consultation with all interests, it was concluded, and the Governments so advised, that: (See Appendix H).

"...measures can be taken, having due regard to the interests of all concerned, to regulate the level of Lake Ontario for the benefit of property owners on the shores of the lake in both countries, so as to reduce the extremes of stage which have been experienced in the past".

- (b) On 9 May 1955, the Commission recommended adoption by the two Governments of the following: (See Appendix I).

- (i) A range of mean monthly elevations for Lake Ontario of 244 feet (navigation season) to 248.0 feet as nearly as may be; and
 - (ii) Criteria for a method of regulation of outflows and levels of Lake Ontario applicable to the works in the International Rapids Section of the St Lawrence River; and
 - (iii) Plan of Regulation No 12-A-9, subject to minor adjustments that may result from further detailed study and evaluation by the Commission.
- (c) On 3 December 1955, the two Governments concurred in the Commission's recommendations and approved the range of mean monthly elevations for Lake Ontario and the criteria. Plan of Regulation No 12-A-9, was also approved, but only for the purpose of calculating critical profiles and the design of channel excavation in the International Rapids Section of the St Lawrence River. The Commission was urged to continue its studies with a view to perfecting the Plan of Regulation so as best to meet the requirements of all interests both upstream and downstream, within the range of elevations and criteria approved. (See Appendix J).
- (d) On 2 July 1956, the Commission issued a Supplementary Order to its Order of Approval of 29 October 1952 deleting reference to Method of Regulation No 5 and incorporating the approved criteria and range of elevations for Lake Ontario and plan of regulation 12-A-9 as a basis for channel design. (See Appendix B).
- (e) The Commission, through its International St Lawrence River Board of Control, continued the regulation studies which led to the development of Plan 1958-A. Technical approval was given to this plan and it was transmitted to the two Governments on 24 October 1958. (See Appendix D).

CONCLUSIONS

Conclusions on the matters referred to the Commission by the two Governments are presented hereunder.

1. In the second paragraph of the Reference the governments stated:

"It is desired that the Commission study the various factors which affect the fluctuations of water level on Lake Ontario, including the construction in the St Lawrence River known as 'Gut Dam', and any diversion of water into or out of the Great Lakes basin...".

The Commission's studies of the factors affected the fluctuations of Lake Ontario water levels reveal that:

(a) Natural factors have been predominant, resulting in a variation in the monthly mean water level of more than six feet over the long period and as much as four feet from season to season. Short-term fluctuations caused by wind may be superimposed on the longer term variations.

(b) Differential crustal movement has resulted in a progressive increase in the water level with respect to the land around the lake. Since 1860 this has resulted in an increase of about one-half foot at Oswego and about one foot at the western end of the lake.

(c) Artificial factors, viz: diversions into and out of the Great Lakes basin, channel changes in the Galop Rapids reach, and Lake Superior regulation, have had the following effects under high and low recorded stages on the lake:

At the Highest Mean Monthly Recorded Stage, June 1952

Effect of Gut Dam and Channel Changes in the Galop Rapids Reach	+ 0.33 foot
Effect of diversions	+ 0.06 foot
Effect of Lake Superior regulation	+ 0.13 foot
Total effect in June 1952	+ 0.52 foot
Recorded mean monthly level at Oswego, June 1952	249.29
Without effects of artificial factors, mean monthly water level in June 1952 would have been	248.77

At the Lowest Mean Monthly Recorded Stage, November 1934

Effect of Gut Dam and Channel Changes in the Galop Rapids Reach	+ 0.25 foot
Effect of diversions	- 0.42 foot
Effect of Lake Superior regulation	- 0.11 foot
Total effect in November 1934	- 0.28 foot
Recorded mean monthly level at Oswego, November 1934	242.68
Without effects of artificial factors, mean monthly water level in November 1934 would have been	242.96

2. Also in the second paragraph of the Reference the Governments asked that the Commission "determine whether in its judgment action can be taken by either or both Governments to bring about a more beneficial range of stage having regard to the proposed plan for improvement for navigation and power of the International Rapids Section of the St Lawrence River and the proposed method of regulation of the levels of Lake Ontario which is an essential feature of that plan".

Pursuant to the foregoing, the Commission, after public hearings and consideration of the views of all concerned, determined that action

could be taken by the two Governments to bring about a more beneficial range of stage by adopting a range of stage and operating criteria for the works proposed by the two Governments in the St Lawrence Power Application (Appendix A). Accordingly, as outlined previously in this report, the Commission recommended and the Governments approved the range of stage and criteria which are now prescribed in the Supplementary Order to the Order of Approval dated 29 October 1952 which the Commission issued on 2 July 1956. The works are now being operated in accordance with the Orders of Approval. The Commission concludes therefore that the objectives of the Reference in this respect have been accomplished.

3. In the third paragraph of the Reference, the Governments stated:

"As a result of its studies under this Reference, it is desired that the Commission shall determine whether, in its judgment, changes in regard to existing works or other measures would be practicable and in the public interest from the points of view of the two Governments, having in mind the order of precedence to be observed in the uses of boundary waters as provided in Article VIII of the Boundary Waters Treaty of 1909".

In this respect, the Commission concludes that, other than the measures already taken in connection with the St Lawrence project which included the elimination of the effect of Gut Dam, no other changes in regard to existing works or other measures are considered practicable or in the public interest at this time from the points of view of the two Governments.

Furthermore, the Commission considers that the measures taken in connection with the St Lawrence project have sufficient flexibility to permit adjustments found necessary or desirable in the future to meet changing conditions or to provide further improvements considered practicable or in the public interest. The order of precedence to be observed in the uses of boundary waters, as prescribed in Article VIII of the Boundary Waters Treaty, has been followed in the Order of Approval of the St Lawrence project dated 29 October 1952 (Appendix B). This Order requires that the works shall be planned, located, constructed, maintained and operated so as not to conflict with or restrain uses of the waters of the St Lawrence River for purposes given preference by the treaty over uses for power purposes, namely uses for domestic and sanitary purposes and uses for navigation.

4. In the fourth paragraph of the Reference the Governments specified that "In the event that the Commission should find that changes in existing works or that other measures would be feasible and desirable, it should indicate how the interests on either side of the boundary would be benefited or adversely affected thereby".

On this point the only measures found practicable and in the public interest are those already taken as described previously.

All interests in both countries affected by the construction and operation of the St Lawrence power project have been safeguarded by the Commission's Orders of Approval (Appendix B). The effects of the Orders on the interests on either side of the boundary are as follows:

(a) Riparian interests upstream from the project and on Lake Ontario are benefited through the improved range of stage which provides for a maximum mean monthly water level of 248 feet, as nearly as may be, in the future as compared with the maximum mean monthly level of past record, 249.29 feet.

(b) Navigation upstream from the project and on Lake Ontario is benefited because the lower limit of mean monthly water levels will not be lower than 244.0 feet, as nearly as may be, during the navigation season in the future as compared with the minimum mean monthly level of past record, 242.68 feet.

(c) Navigation in the International Rapids section of the St Lawrence is benefited in a number of ways. The development of the deep water navigation project in this section was facilitated by the construction of the works necessary for power purposes under the power applications (Appendix A). The Orders of Approval for the power projects include conditions for project operation designed to provide levels, flows and velocities satisfactory for navigation.

(d) Conditions for power development in the International Rapids section are better than if the Orders of Approval merely safeguarded all other interests by requiring conformance to preproject conditions. Specifically the power output of the St Lawrence project is improved by the river regulation afforded through application of the conditions and criteria of the Orders of Approval.

(e) As regards other power interests, the Order of Approval requires operation of the project in a manner that will safeguard

the rights and lawful interests of others engaged or to be engaged in the development of power in the St Lawrence River below the International Rapids Section. Criteria in the Order of Approval are designed to give effect to this requirement.

(f) As regards navigation and riparian interests downstream from the International Rapids Section, the Order of Approval requires operation of the power project in a manner that will not conflict with or restrain uses of the waters of the St Lawrence River for domestic and sanitary purposes or for navigation; and that will provide no less protection for navigation and riparian interests downstream than would have occurred under preproject conditions. Criteria in the Order of Approval are designed to give effect to these requirements and contain certain minimal safeguards which can be modified by the Commission if experience indicates a need for additional safeguards to give effect to the said requirements.

In summary, the measures recommended by the Commission, approved by the two Governments and already put into effect through implementation of the Commission's Orders of Approval of the St Lawrence project, subject to improvement in detail or the Plan of Regulation 1958-A now under consideration, will provide conditions which, for all affected interests in both countries, will be as good as or better than would have been the case if those interests had been safeguarded by merely preserving the equivalent of preproject conditions. The necessity of safeguarding the interests downstream from the International Rapids

Section constitutes a limitation on the benefits that may be conferred on other interests affected.

5. In the second sentence of the fourth paragraph of the Reference the Governments stated that: "The Commission should estimate the cost of such changes in existing works or of such other measures, including indemnification for damage to public and private property arising therefrom and the cost of any remedial works that may be found to be necessary".

As to the costs, the Commission finds that the conditions of its Orders of Approval of the St Lawrence project, including the criteria prescribed after approval by the two Governments pursuant to the objectives of this Reference, do not result in any appreciable increase in costs for construction, operation and maintenance as compared with the costs that would have resulted or been necessary to meet conditions and criteria with respect to Lake Ontario Levels and outflows designed merely to preserve or conform to preproject conditions and thus protect all interests as required by the Boundary Waters Treaty of 1909.

As to indemnification for damage, the Commission similarly finds that the measures recommended, approved and put into effect pursuant to this Reference do not involve any provisions for indemnification additional to those required pursuant to the Boundary Waters Treaty of 1909 and which are incorporated in the Commission's Orders of Approval for the St Lawrence project.

6. In the final portion of the fourth paragraph of the Reference, the two Governments required that: "With due regard to the final paragraph of this Reference and to the arrangements presently being proposed for development of power in the International Rapids Section of the St Lawrence River, the Commission should indicate how the cost of any measures and the amounts of any resulting damage should be apportioned between the interests involved".

Since, as indicated previously, the measures recommended to and approved by the two Governments pursuant to this Reference and put into effect through the Commission's Orders of Approval of the St Lawrence project do not involve any appreciable increase in costs, the Commission finds that no apportionment of costs is needed other than that which was proposed by the Applicants and approved by the Commission in the Order of Approval.

As no damage is expected to result from these measures and the Commission is of the opinion that responsibility for any damage that does in fact result should be determined by the normal legal processes in each country, the Commission makes no finding with regard to how the amount of resulting damage, if any, should be apportioned between the interests involved.

7. In the final paragraph of the Reference the two Governments expressed the desire that "... consideration of this Reference shall not delay action by the Commission with respect to applications submitted to the Commission concerning the development of power in the International Rapids Section of the St Lawrence River".

The studies and actions taken pursuant to the Reference made it possible for the Commission to consider the many interests affected and the complex factors involved in a very large and important joint venture and to issue an initial order of approval within four months. This was much sooner than would have been possible if the terms of the Reference had not been available to permit simultaneous consideration and solution of problems that would otherwise have delayed formulation of appropriate conditions and criteria for inclusion in the Order of Approval. Furthermore, it was possible for the Commission to issue a Supplementary Order of Approval at a time and in a manner such that the design, construction and completion of the power project were advanced to permit the earliest possible realization of the large benefits thereby made available to the people of both countries.

The Commission finds that this desire of the Governments has been complied with fully and to the benefit of all concerned with the purposes of both the Reference and the Power Applications.

RECOMMENDATIONS

In view of the findings as a result of studies under this Reference and the actions already taken pursuant thereto the Commission recommends that the Governments of Canada and of the United States accept this report as

compliance with the objectives of the Reference and authorize publication of the report for record purposes and for reference by those concerned with or affected by future developments.

Signed at Washington, D.C., this 5th day of April, 1961.

E.A. Bacon

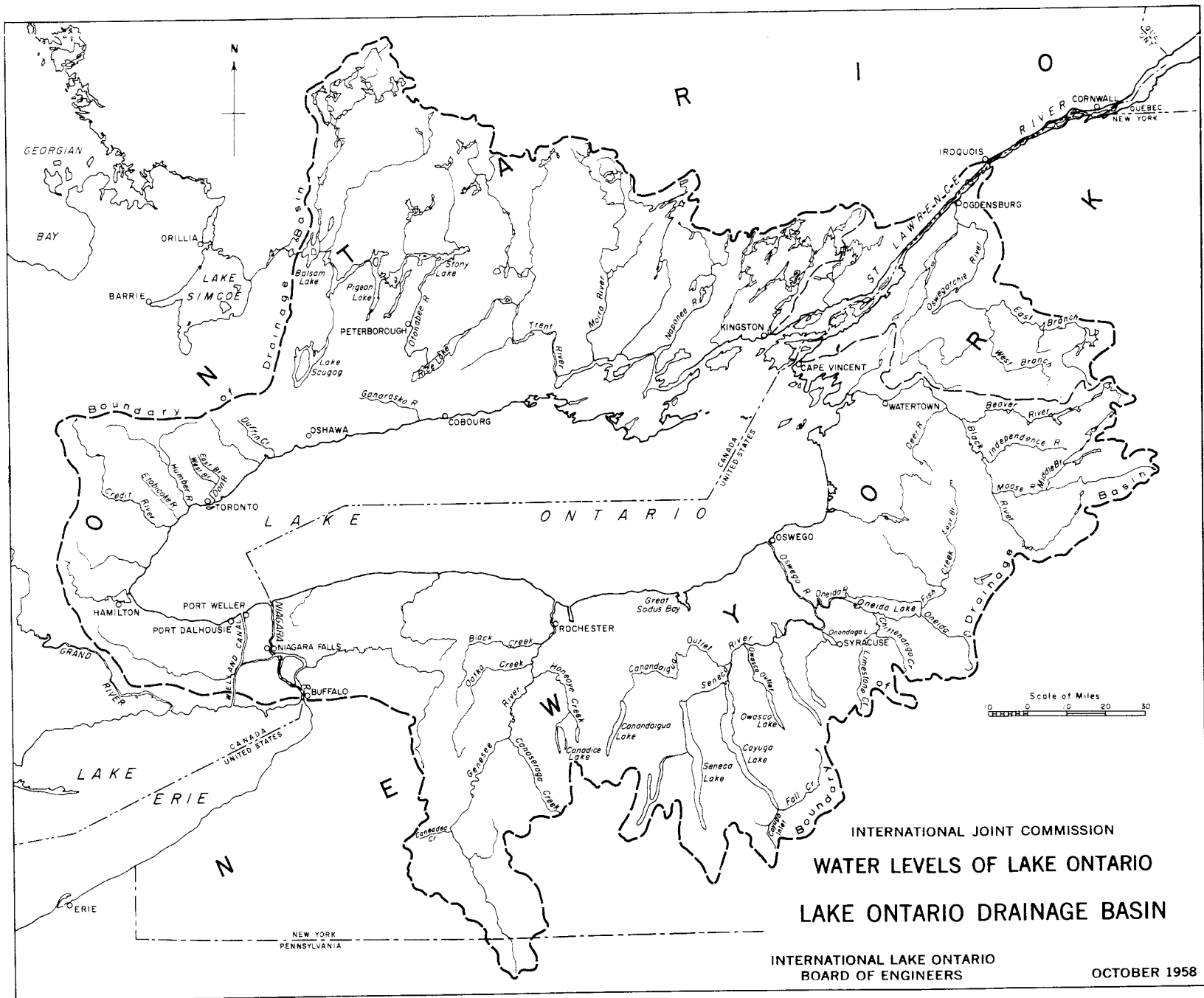
A.G.L. McNaughton

E.W. Weber

J.L. Dansereau

F.L. Adams

D.M. Stephens



Map Not Included

APPLICATION OF THE GOVERNMENT OF CANADA TO THE INTERNATIONAL JOINT COMMISSION FOR AN ORDER OF APPROVAL OF THE CONSTRUCTION OF CERTAIN WORKS FOR DEVELOPMENT OF POWER IN THE INTERNATIONAL RAPIDS SECTION OF THE ST LAWRENCE RIVER.

OTTAWA, June 30, 1952

THE INTERNATIONAL JOINT COMMISSION,
OTTAWA, Ontario.

Sirs,

1. The Government of Canada hereby submits to the International Joint Commission, under the provisions of the Boundary Waters Treaty of January 11, 1909, this application requesting that the Commission approve the construction of certain works, as described in Section 8 of this application, and the operation of such works under the conditions specified in Section 10 of this application, in the International Rapids Section of the St Lawrence River, giving consideration to such effects as the construction and operation of these works may have on the levels of water resulting therefrom to be maintained in Lake Ontario and the St Lawrence River.

2. (a) In addition to the works specified in Section 8 which are covered by this application and which are to be provided and maintained by entities to be designated by the Government of Canada and the Government of the United States of America, Canada will construct, maintain and operate all such works as may be necessary to provide and maintain a deep waterway between the Port of Montreal and Lake Erie;
- (b) Such deep waterway will be provided as nearly as possible concurrently with the completion of the power development works in the International Rapids Section as described in this application; and
- (c) In accordance with the standards contained in the proposed Agreement between Canada and the United States for the development of navigation and power in the Great Lakes-St Lawrence Basin signed March 19, 1941, and the specifications of the Joint Board of Engineers, dated November 16, 1926, such deep waterway will afford a controlling channel depth of 27 feet with locks approximately 800 feet long, 80 feet wide and 30 feet over the sills.

3. This application is filed in contemplation of the filing of a similar application by the Government of the United States of America. It is requested that both applications be considered as in the nature of a

joint application for approval of the construction of the works to be jointly undertaken by an entity to be designated by the Government of Canada and entity to be designated by the Government of the United States of America.

4. The International Rapids Section of the St Lawrence River is located in Canada within the Province of Ontario and in the United States of America within the State of New York. Throughout its length of approximately 48 miles from Chimney Point in the State of New York, downstream to the Village of St Regis, New York, it is traversed by the international boundary which follows generally the thread of the stream and which forms a part of the boundary line between Canada and the United States of America.

5. The International Rapids Section of the St Lawrence River since 1860 has an observed average flow of 237,000 cubic feet per second, with an aggregate fall of 92 feet. The total drainage area of the river at Cornwall, Ontario, is approximately 303,000 square miles, including 95,000 square miles of water surface. A suitable site is available at the foot of Barnhart Island near Cornwall, Ontario, and Massena, New York, for the development of the potential power of this section of the river. The water available would justify the installation of 2,200,000 horse power of hydro-electric generating capacity with an average annual output of approximately 12,600,000,000 kilowatt-hours of energy. The St Lawrence River is navigable throughout its entire length but navigation through the International Rapids Section, the Soulanges Section and the Lachine Section, which sections lie between Chimney Point, New York, and Montreal, Quebec, a distance of 115 miles, is effected by a series of canals and locks with a controlling depth of 14 feet, by-passing a series of rapids. (A map of the Great Lakes-St Lawrence Basin, Exhibit 1, is attached and made part of this application.)

6. The development of the International Rapids Section of the St Lawrence River has heretofore been recommended by the International Joint Commission in its report dated December 19, 1921, and by the St Lawrence Commission of the United States of America in its report dated December 27, 1926, and by the Canadian National Advisory Committee in its report of January 11, 1928, as an important stage in the progressive program for the development of the entire Great Lakes- St Lawrence Basin.

7. The Canadian Temporary Great Lakes-St Lawrence Basin Committee (consisting of representatives of the Department of External Affairs, the Department of Transport, the Hydro-Electric Power Commission of Ontario

and the Quebec Streams Commission) and the United States St Lawrence Advisory Committee (consisting of representatives of the Department of State, the Corps of Engineers, United States Army, the Federal Power Commission and the Power Authority of the State of New York) in a joint report dated January 3, 1941, recommended the various works to be constructed in connection with power development in the International Rapids Section. Since that time further study and planning have been done on the works recommended in the above report by several agencies, including the Department of Transport, Canada, and the Corps of Engineers, United States Army, with the co-operation of other public agencies of Canada and the United States of America. (A plan showing the major works to be performed in the International Rapids Section of the St Lawrence River, Exhibit 2, is attached and made part of this application; a water profile map of the International Rapids Section, Exhibit 3, showing water levels in connection with the proposed works is attached and made part of this application).

8. This application requests approval of the construction of certain works, jointly by entities to be designated by the respective Governments in accordance with the "Controlled Single Stage Project (238-242)" which was part of the Report of January 3, 1941, referred to in the preceding paragraph, containing the features described below and shown in Exhibit 2.

- (a) Channel Enlargements - Channel enlargements will be undertaken from above Chimney Point to below Lotus Island, designed to give a maximum mean velocity in any cross-section of the channel which will be used for navigation not exceeding four feet per second at any time, also between Lotus Island and Iroquois Point and from above Point Three Points to below Ogden Island designed to give a maximum mean velocity in any cross-section not exceeding two and one-quarter feet per second with the flow and at the stage to be permitted on the first of January of any year, under regulation of outflow and levels of Lake Ontario in accordance with Method of Regulation No 5, as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September, 1940. Downstream from the power houses channel enlargements will be carried out for the purpose of reducing the tail water level at the power houses.

Final locations and cross-section of these channel enlargements will be determined from further studies.

- (b) Control Facilities - Adequate control facilities will be constructed for the regulation of the outflow from Lake Ontario.

- (c) Power House Structures - The power house structures will be constructed in the north channel extending from the lower end of Barnhart Island to the Canadian shore, and so located that one structure will be on each side of the International Boundary. Each power house structure will include the main generating units to utilize economically the river flows available to it, with provision for ice handling and discharge sluices.
- (d) Dams and Associated Structures - A control dam will be constructed extending from Iroquois Point on the Canadian side of the river in an easterly direction to the United States mainland above Point Rockway.

A dam will be constructed in the Long Sault Rapids at the head of Barnhart Island.

Dykes and associated works will be provided as may be necessary in both the Province of Ontario and the State of New York.

All the works in the pool below the control dam will be designed to provide for full Lake Ontario level.

- (e) Highway Modifications - In both the Province of Ontario and the State of New York provincial and state highways, and other roads, will be relocated in those portions subject to flooding, and reconstructed to standards at least equal to those now in existence.
- (f) Railway Modifications - Such railway relocations as may be required as a result of the works herein described will be made in the Province of Ontario and the State of New York to standards at least equal to those now in existence.
- (g) Navigation Facilities - Provision will be made for the continuance of 14-foot navigation throughout the International Rapids Section during the construction period.
- (h) Flooded Areas - Lands and buildings in both the Province of Ontario and the State of New York will be acquired or rehabilitated as required. Inundated wooded areas will be cleared.

9.(a) The entity to be designated by Canada to construct the proposed facilities, shall submit to Canada for approval, prior to and during the progress of construction of the works, all detailed plans of the works, or of parts thereof, or such of these plans as Canada may require and such programs of construction as Canada may require, and before proceeding with the works shall obtain Canada's approval thereof in writing, and such entity, before making any change in the site or in the general or detailed plans which have been so approved or in the works constructed or under construction in pursuance thereof, shall submit to Canada for approval, all plans of such proposed changes, or such of these plans as Canada may require, and before proceeding with the changes shall obtain Canada's approval thereof in writing. (It is understood that Canada's approval, as provided for above, will not be unreasonably withheld or delayed.)

(b) The applicant requests the approval of the International Joint Commission for the establishment by the two Governments of a Joint Board of Engineers, consisting of an equal number of representatives of Canada and the United States to be designated by the respective Governments, for the purpose of reviewing, supervising and co-ordinating the plans, specifications and construction of the works specified above.

10. The works shall be designed, constructed, operated and maintained according to the following conditions:

(a) All main features of the project described herein shall be so planned, located, constructed and operated as to be adaptable to the improvement of the International Rapids Section of the St Lawrence River for navigation purposes, to the aid and benefit of commerce and navigation, and to the preservation of the rights and interests of Canada and the United States in the waters of the International Rapids Section of the St Lawrence River under the Boundary Waters Treaty of 1909. The works shall be operated and maintained in conformity with the requirements of the prior rights and interests of navigation on the St Lawrence River and in such a manner as to protect the rights and interests of others engaged in the development of power in the River below the International Rapids Section. The maintenance and operation of the works on the Canadian side of the International Boundary shall be subject to the supervision of Canada.

(b) Upon the completion of the works and, if necessary, during the construction thereof, and subject to the provisions of paragraph

- (e) of this Section, the discharge from Lake Ontario and the flow through the International Rapids Section shall be regulated in accordance with Method of Regulation No. 5 as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September 1940, and shall be based on the Rule Curves forming part of that Method of Regulation. This Method of Regulation is designed to permit the lowering of the extreme high water levels and the raising of the extreme low levels of Lake Ontario. Copies of these Rule Curves, with a description of the method of their application, are attached hereto as Exhibit 4.
- (c) Subject to the provisions of paragraph (e) of this Section, the flow through the International Rapids Section in any period shall equal the discharge from Lake Ontario as determined for that period in accordance with Method of Regulation No 5. referred to in paragraph (b) of this Section and this flow shall be maintained uniformly throughout that period.
- (d) A "Board of Control" (referred to hereinafter as the Board) consisting of an equal number of representatives of Canada and of the United States shall be established by the International Joint Commission. The duties of the Board shall be to ensure compliance with the conditions in regard to the regulation of the discharge from Lake Ontario and the flow through the International Rapids Section as set forth hereinbefore, and to carry out such other duties as may be delegated to it by the International Joint Commission.
- (e) The Board may temporarily modify or change any or all of the restrictions as to flow and water levels as specified above in order to carry out experiments for the purpose of determining what permanent modifications or changes may be advisable, and after such experiments the International Joint Commission may recommend to the two Governments any modifications or changes considered advisable, and the two Governments, consistent with the provisions of paragraph (a) of this Section, may by exchange of notes make such modifications or changes permanent.
- (f) Upon completion of the works, and subject to paragraph (e) of this Section, the works shall be operated initially for a test period of ten years, or such shorter period as may be approved

by the International Joint Commission, with the water level at the power houses held at a maximum elevation of 238.0, sea level datum, and in the event that the Board considers that operation with the water level at the power houses held to a maximum elevation exceeding 238.0 would be advisable, the International Joint Commission may authorize operation at a maximum elevation exceeding 238.0

11. The applicant requests approval of such allocation between the respective entities, as may hereafter be submitted, of the cost of constructing, maintaining and operating the works covered by this application.

12. In order to avoid unnecessary expense and the duplication of engineering investigations already made, the applicant will place at the disposal of the Commission engineering data relating to this project which it possesses at the date of this application and such engineering personnel as may be available to assist the Commission in the performance of its duties under this application.

13. Material and data indicating the urgent public need for hydro-electric power potentially available in the International Rapids Section of the St Lawrence River will be filed in support of this application in the course of the proceedings before the International Joint Commission.

14. In view of the increasing demand necessitating additional sources for the supply of electrical power in the Province of Ontario and the urgent need for immediate action, the applicant requests that, consistent with its rules of procedure, the International Joint Commission give priority to this application and expedite its consideration thereof and its action thereon, so that construction of the project may be undertaken at the earliest possible date.

Respectfully submitted,

(sgd) LOUIS S. ST-LAURENT

for the

Secretary of State for External
Affairs.

EXHIBIT 4

TO ACCOMPANY APPLICATION OF THE GOVERNMENT OF CANADA TO THE INTERNATIONAL JOINT COMMISSION FOR AN ORDER OF APPROVAL OF THE CONSTRUCTION OF CERTAIN WORKS FOR DEVELOPMENT OF POWER IN THE INTERNATIONAL RAPIDS SECTION OF THE ST LAWRENCE RIVER

REGULATION OF LAKE ONTARIO - METHOD NO 5

1. For the first month or period during which Regulation is to be applied, the discharge to be permitted will be that determined from Plate No 1, based on the water level of the Lake at the beginning of the month or period, modified by the application of a "Correction" that will be based on the supply to the Lake during the previous month or period and determined from Plate No 2.

2. A "Correction", determined as outlined in paragraph 1, will be applied to the discharge for each month or period, as determined from Plate No 1, subject, however, to the conditions set out in paragraph 4 hereinafter.

3. For the second and subsequent periods, the discharge to be permitted before modification by the "Correction" will be based on the water level of the Lake that would have prevailed at the end of the previous period had no "Correction" been applied, except for the month of January, when the actual water level at the end of December will be used.

4. The application of the "Correction" will be governed by the following rules:

- (i) No "Correction" to be applied during December to March inclusive.
- (ii) "Correction" for all other months to be based on mean supply during previous month.
- (iii) "Correction" to be applied in April to be based on mean supply during the previous period of November to March inclusive.
- (iv) No "Correction" to be applied in May if positive.

5. The supply to Lake Ontario during any period will be the algebraic sum of the discharge from the Lake and the storage on the Lake during the period.

The International Joint Commission
United States and Canada

Washington, D.C., and
Ottawa, Canada

Sirs:

1. The Government of the United States hereby submits to the International Joint Commission, under the provisions of the Boundary Waters Treaty of January 11, 1909, this Application requesting that the Commission approve the construction of certain works, as described in section 8 of this Application, and the operation of such works under the conditions specified in section 10 of this Application, in the International Rapids Section of the St Lawrence River, giving consideration to such effects as the construction and operation of these works may have on the levels of water resulting therefrom to be maintained in Lake Ontario and the St Lawrence River.

2. This Application is filed with the understanding on the part of the United States:

- a. That, in addition to the works specified in section 8 which are covered by this Application and which are to be constructed by entities to be designated by the Government of the United States and the Government of Canada, Canada will construct, maintain, and operate all such works as may be necessary to provide and maintain a deep waterway between the Port of Montreal and Lake Erie;
- b. That such deep waterway will be provided as nearly as possible concurrently with the completion of the power development works in the International Rapids Section as described in this Application; and
- c. That, in accordance with the standards contained in the proposed Agreement between Canada and the United States for the development of navigation and power in the Great Lakes-St Lawrence Basin, signed March 19, 1941, and the specifications of the Joint Board of Engineers, dated November 16, 1926, such deep waterway will afford a controlling channel depth of 27 feet, with locks approximately 800 feet long, 80 feet wide, and 30 feet over the sills.

3. This Application is filed in contemplation of the filing of a similar Application by the Government of Canada. It is

requested that both Applications be considered as in the nature of a joint Application for approval of the construction of the works to be jointly undertaken by an entity to be designated by the Government of the United States and an entity to be designated by the Government of Canada.

4. The International Rapids Section of the St Lawrence River is located in Canada within the Province of Ontario and in the United States within the State of New York. Throughout its length of approximately 48 miles from Chimney Point in the State of New York, downstream to the Village of St. Regis, New York, it is traversed by the International Boundary which follows generally the thread of the stream and which forms a part of the boundary line between the United States and Canada.

5. The International Rapids Section of the St Lawrence River since 1860 has an observed average flow of 237,000 cubic feet per second, with an aggregate fall of 92 feet. The total drainage area of the river at Cornwall, Ontario, is approximately 303,000 square miles, including 95,000 square miles of water surface. A suitable site is available at the foot of Barnhart Island near Cornwall, Ontario, and Massena, New York, for the development of the potential power of this section of the river. The water available would justify an installation of 2,200,000 horse power of hydroelectric generating capacity with an average annual output of approximately 12,600,000,000 kilowatt-hours of energy. The St Lawrence River is navigable throughout its entire length but navigation through the International Rapids Section, the Soulanges Section, and the Lachine Section, which sections lie between Chimney Point, New York, and Montreal, Quebec, a distance of 115 miles, is effected by a series of canals and locks, with a controlling depth of 14 feet, by-passing a series of rapids. (A map of the Great Lakes-St Lawrence Basin, Exhibit 1, is attached and made part of this Application.)

6. The development of the International Rapids Section of the St Lawrence River has heretofore been recommended by the International Joint Commission in its report dated December 19, 1921, and by the St Lawrence Commission of the United States in its report dated December 27, 1926, and by the Canadian National Advisory Committee in its report of January 11, 1928, as an important stage in the progressive program for the development of the entire Great Lakes-St Lawrence Basin.

7. The United States St Lawrence Advisory Committee (consisting of representatives of the Department of State, the Corps of Engineers, United States Army, the Federal Power Commission, and the Power Authority of the State of New York) and the Canadian Temporary

Great Lakes-St Lawrence Basin Committee (consisting of representatives of the Department of External Affairs, the Department of Transport, the Hydro-Electric Power Commission of Ontario and the Quebec Streams Commission) in a joint report dated January 3, 1941, recommended among other things the various works to be constructed in connection with power development in the International Rapids Section. Pursuant to the provisions of Executive Order 8568 issued by President Franklin D. Roosevelt on October 18, 1940, the Corps of Engineers, United States Army, in cooperation with public agencies of the United States and Canada has, among other things, prepared general plans and specifications for the power development in the International Rapids Section and contract plans and specifications for initial construction features. (A plan showing the major works to be performed in the International Rapids Section of the St Lawrence River, Exhibit 2, is attached and made part of this Application; a water profile map of the International Rapids Section, Exhibit 3, showing water levels in connection with the proposed works is attached and made part of this Application.)

8. This Application requests approval of the construction of certain works, jointly by entities to be designated by the respective governments, in accordance with the "Controlled Single Stage Project (238-242)" which was part of the Report of January 3, 1941, referred to in the preceding paragraph, containing the features described below and shown in Exhibit 2.

- a. Channel Enlargements - Channel enlargements will be undertaken from above Chimney Point to below Lotus Island, designated to give a maximum mean velocity in any cross-section of the channel which will be used for navigation not exceeding four feet per second at any time, also between Lotus Island and Iroquois Point and from above Point Three Points to below Ogden Island designed to give a maximum mean velocity in any cross-section not exceeding two and one-quarter feet per second with the flow and at the stage to be permitted on the first of January of any year, under regulation of outflow and levels of Lake Ontario in accordance with Regulation Method No. 5, as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September 1940. Downstream from the power houses channel enlargements will be carried out for the purpose of reducing the tail water level at the power houses.

Final locations and cross-sections of these channel enlargements will be determined from further studies.

- b. Control Facilities - Adequate control facilities will be constructed for the regulation of the outflow from Lake Ontario.
- c. Power House Structures - The power house structures will be constructed in the north channel extending from the lower end of Barnhart Island to the Canadian shore, and so located that one structure will be on each side of the International Boundary. Each power house structure will include the main generating units to utilize economically the river flows available to it, with provision for ice handling and discharge sluices.
- d. Dams and Associated Structures - A control dam will be constructed extending from Iroquois Point on the Canadian side of the river in an easterly direction to the United States mainland above Point Rockway.

A dam will be constructed on the Long Sault Rapids at the head of Barnhart Island.

Dykes and associated works will be provided as may be necessary in both New York State and the Province of Ontario.

All the works in the pool below the control dam will be designed to provide for full Lake Ontario level.

- e. Highway Modifications - In both the State of New York and the Province of Ontario provincial and state highways, and other roads, will be relocated in those portions subject to flooding, and reconstructed to standards at least equal to those now in existence.
- f. Railway Modifications - Such railway relocations as may be required as a result of the works herein described will be made in the State of New York and the Province of Ontario to standards at least equal to those now in existence.
- g. Navigation Facilities - Provision will be made for the continuance of fourteen-foot navigation throughout the International Rapids Section, during the construction period.
- h. Flooded Areas - Lands and buildings in both the State of New York and in the Province of Ontario will be acquired or rehabilitated as required. Inundated wooded areas will be cleared.

9. a. The entity to be designated by the United States to construct the proposed facilities shall submit to the United States for approval, prior to and during the progress of construction of the works, all detailed plans of the works, or of parts thereof, or such of these plans as the United States may require and such programs of construction as the United States may require, and before proceeding with the works shall obtain the approval of the United States thereof in writing, and, such entity before making any change in the site or in the general or detailed plans which have been so approved, or in the works constructed or under construction in pursuance thereof, shall submit to the United States for approval, all plans of such proposed changes, or such of these plans as the United States may require, and before proceeding with the changes shall obtain the approval of the United States thereof in writing. (It is understood that the approval of the United States, as provided for above, will not be unreasonably withheld or delayed.)
 - b. The Applicant requests the approval of the International Joint Commission for the establishment by the two Governments of a joint engineering board consisting of an equal number of representatives of the United States and Canada, to be designated by the respective Governments for the purpose of reviewing, supervising, and coordinating the plans, specifications, and construction of the works specified above.
10. The works shall be designed, constructed, operated, and maintained according to the following conditions:
- a. All main features of the project described herein shall be so planned, located, constructed, and operated as to be adaptable to the improvement of the International Rapids Section of the St Lawrence River for navigation purposes, to the aid and benefit of commerce and navigation, and to the preservation of the rights and interests of the United States and Canada in the waters of the International Rapids Section of the St Lawrence River under the Boundary Waters Treaty of 1909. The works shall be operated and maintained in conformity with the requirements of the prior rights and interests of navigation on the St Lawrence River and in such

a manner as to protect the rights and interests of others engaged in the development of power in the river below the International Rapids Section. The maintenance and operation of the works on the United States side of the International Boundary shall be subject to the supervision of the United States.

- b. Upon completion of the works, and if necessary during the construction thereof, and subject to the provisions of paragraph (e) of this section, the discharge from Lake Ontario and the flow through the International Rapids Section shall be regulated in accordance with Method of Regulation No. 5 as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September 1940, and shall be based on the Rule Curves forming part of that Method of Regulation. This Method of Regulation is designed to permit the lowering of the extreme high water levels and the raising of the extreme low water levels of Lake Ontario. Copies of these Rule Curves, with a description of the method of their application, are attached hereto as Exhibit 4.
- c. Subject to the provisions of paragraph (e) of this section, the flow through the International Rapids Section in any period shall equal the discharge from Lake Ontario as determined for that period in accordance with Method of Regulation No. 5 referred to in paragraph (b) of this section and this flow shall be maintained uniformly throughout that period.
- d. A "Board of Control" (referred to hereinafter as the Board) consisting of an equal number of representatives of the United States and Canada shall be established by the International Joint Commission. The duties of the Board shall be to ensure compliance with the conditions in regard to the regulation of the discharge from Lake Ontario and the flow through the International Rapids Section as set forth hereinbefore, and to carry out such other duties as may be delegated to it by the International Joint Commission.
- e. The Board may temporarily modify or change any or all of the restrictions as to flow and water levels as specified above in order to carry out experiments for the purpose of determining what permanent modifications or changes may be

advisable, and after such experiments the Commission may recommend to the two governments any modifications or changes considered advisable, and the two governments, consistent with the provisions of paragraph (a) above may, by exchange of notes, make such modifications or changes permanent.

- f. Upon the completion of the works, they shall be operated initially with the water level at the power houses held at a maximum elevation of 238.0, sea level datum, for a test period of ten years or such shorter period as may be approved by the Commission, and in the event that the Board considers that operation with the water level at the power houses held to a maximum elevation exceeding 238.0 would be practical, the Commission may authorize operation at a maximum elevation exceeding 238.0.

11. The Applicant requests approval of such allocation between the respective entities, as may hereafter be submitted, of the cost of constructing, maintaining, and operating the works covered by this Application.

12. The entity or entities in the United States which will construct and will operate the United States part of the project will be such entity or entities as may be authorized by the Congress, or licensed by the Federal Power Commission under the Federal Power Act. This Application is submitted with the understanding that approval thereof by the International Joint Commission will not relieve any entity which may be authorized to construct or operate the United States part of the project from compliance with valid laws of the United States, now in force or hereafter enacted by the Congress, or with regulations now in force or hereafter issued by the Federal Power Commission, applicable to the development and utilization of the United States share of the waters of the International Rapids Section of the St Lawrence River.

13. In submitting this Application, the United States expressly reserves all its existing rights in the Great Lakes and the St Lawrence River including among others the rights mutually extended to the United States and Canada under the Boundary Waters Treaty of 1909 as follows: to undertake and carry on governmental works, in the International Rapids Section or elsewhere in boundary waters, for the deepening of channels and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its

own side of the line and do not materially affect the level or flow of the boundary waters on the other; to enjoy free and open navigation of all boundary waters and of all canals connecting boundary waters, now existing or which may hereafter be constructed, subject to any laws and regulations of either country within its own territory, not inconsistent with such privilege of free and open navigation; and to adopt rules and regulations governing the use of such canals within its own territory and to charge tolls for the use thereof, provided that all such rules and regulations and all tolls shall apply equally alike to the inhabitants and vessels of both countries and that they shall be placed on terms of equality in the use thereof.

14. The reference of this Application to the International Joint Commission shall not preclude action by the Congress of the United States to approve the United States-Canadian Agreement of March 19, 1941, at any time prior to the withdrawal or lapsing of such agreement upon notice by either Government, nor shall it preclude the enactment by the Congress at any future time of legislation consistent with this Application governing the United States part of any project for the development and utilization of the United States share of the waters of the International Rapids Section of the St Lawrence River.

15. In view of the increasing demand necessitating additional sources for supply of electric power in the United States and an urgent need for immediate action, the applicant requests that, consistent with its rules of procedure the International Joint Commission give priority to this application and expedite its consideration thereof and its action thereon so that the construction of the project may be undertaken at the earliest possible date.

16. This communication will, it is believed, be found by the Commission to contain all essential averments regarding the facts upon which this Application is based and the nature of the Order of Approval desired, and to be in conformity with the provisions of Rules 6 and 7 of the Commission's rules of procedure.

17. In order to avoid unnecessary expense and the duplication of engineering investigations already made, the Government of the United States will place at the disposal of the Commission engineering data

relating to this project which it possesses at the date of this application and such engineering personnel as may be available to assist the Commission in the performance of its duties under this Application.

The required additional copies of this Application are being forwarded to you under separate cover.

Very truly yours,

David K. Bruce
Acting Secretary of State

June 30, 1952.

EXHIBIT 4

REGULATION OF LAKE ONTARIO - METHOD NO 5

1. For the first month or period during which Regulation is to be applied, the discharge to be permitted will be that determined from Plate No 1, based on the water level of the Lake at the beginning of the month or period, modified by the application of a "Correction" that will be based on the supply to the Lake during the previous month or period and determined from Plate No 2.

2. A "Correction", determined as outlined in paragraph 1, will be applied to the discharge for each month or period, as determined from Plate No 1, subject, however, to the conditions set out in paragraph 4 hereinafter.

3. For the second and subsequent periods, the discharge to be permitted before modification by the "Correction" will be based on the water level of the Lake that would have prevailed at the end of the previous period had no "Correction" been applied, except for the month of January, when the actual water level at the end of December will be used.

4. The application of the "Correction" will be governed by the following rules:

- (i) No "Correction" to be applied during December to March inclusive.
- (ii) "Correction" for all other months to be based on mean supply during previous month.
- (iii) "Correction" to be applied in April to be based on mean supply during the previous period of November to March inclusive.
- (iv) No "Correction" to be applied in May if positive.

5. The supply to Lake Ontario during any period will be the algebraic sum of the discharge from the Lake and the storage on the Lake during the period.

INTERNATIONAL JOINT COMMISSION

IN THE MATTER OF THE APPLICATIONS OF THE GOVERNMENT OF CANADA AND THE GOVERNMENT OF THE UNITED STATES OF AMERICA FOR AN ORDER OF APPROVAL OF THE CONSTRUCTION OF CERTAIN WORKS FOR DEVELOPMENT OF POWER IN THE INTERNATIONAL RAPIDS SECTION OF THE ST LAWRENCE RIVER

ORDER OF APPROVAL

WHEREAS the Government of Canada and the Government of the United States of America under date of 30 June, 1952, have submitted Applications to the International Joint Commission (hereinafter referred to as the "Commission") for its approval of the construction, jointly by entities to be designated by the respective Governments, of certain works for the development of power in the International Rapids Section of the St Lawrence River, these being boundary waters within the meaning of the Preliminary Article of the Boundary Waters Treaty of 11 January, 1909 (hereinafter referred to as the "Treaty"), and of the construction, maintenance and operation of such works subject to and under conditions specified in the Applications, and have requested that the Applications be considered by the Commission as in the nature of a joint application; and

WHEREAS pursuant to the aforementioned request of the two Governments, the Commission is considering the two Applications as in the nature of a joint application; and

WHEREAS notices that the Applications had been filed were published in accordance with the Rules of Procedure of the Commission; and

WHEREAS Statements in Response to the Applications and Statements in Reply thereto by both Applicants were filed in accordance with the Rules of the Commission; and

WHEREAS pursuant to published notices, hearings were held by the Commission at Toronto, Ontario, on 23 July, 1952; at Ogdensburg, New York, on 24 July, 1952; at Cornwall, Ontario, on 25 July 1952; at Albany, New York, on 3 September, 1952; at Montreal, Quebec, on 8 September 1952; and at Washington, D.C. on 20 October, 1952; and

WHEREAS by reason of the said notices of the said applications and hearings, all persons interested were afforded convenient opportunities of presenting evidence to and being heard before the Commission; and

WHEREAS pursuant to the said Applications, the hearings before, the evidence given, and material filed with the Commission, the Commission is satisfied that the proposed works and uses of the waters of the International Rapids Section comply with the principles by which the Commission is governed as adopted by the High Contracting Parties in Article VIII of the Treaty; and

WHEREAS the Commission has been informed that the Government of Canada has designated The Hydro-Electric Power Commission of Ontario as the entity to construct, maintain and operate the proposed works in Canada, and that the Government of the United States intends in due course to designate the entity to construct, maintain and operate the works in the United States; and

WHEREAS the program of construction of the works, as proposed by the Applicants, includes the removal of Gut Dam from the International Rapids Section and the Government of Canada has informed the Commission that it is its intention to take steps for the early removal of Gut Dam as soon as the construction of the proposed works is approved and as soon as river conditions and the protection of down river and other interests that will be affected during its removal will permit, thereby advancing the time of removal of Gut Dam; and

WHEREAS the Commission finds that suitable and adequate provision is made by the laws in Canada and by the Constitution and laws in the United States for the protection and indemnity of all interests on either side of the International Boundary which may be injured by reason of the construction, maintenance and operation of the works; and

WHEREAS the Commission finds that it has jurisdiction to hear and dispose of the Applications by approval thereof in the manner and subject to the conditions hereinafter set out;

NOW, THEREFORE, IT IS ORDERED that the construction, maintenance and operation jointly by The Hydro-Electric Power Commission of Ontario and an entity to be designated by the Government of the United States of America of certain works (hereinafter called "the works") in accordance with the "Controlled Single Stage Project(238-242)", which was part of the joint report dated 3 January, 1941, of the Canadian Temporary Great Lakes-St Lawrence Basin Committee and the United States St Lawrence Advisory Committee, containing the features described in Appendix "A" to this Order and shown in Appendix "B" to this Order, be and the same are hereby approved subject to the conditions enumerated below, namely,

- (a) All interests on either side of the International Boundary which are injured by reason of the construction, maintenance and operation of the works shall be given suitable and adequate protection and indemnity in accordance with the laws in Canada or the Constitution and laws in the United States respectively, and in accordance with the requirements of Article VIII of the Treaty.
- (b) The works shall be so planned, located, constructed, maintained and operated as not to conflict with or restrain uses of the waters of the St Lawrence River for purposes given preference over uses of water for power purposes by the Treaty, namely, uses for domestic and sanitary purposes and uses for navigation, including the service of canals for the purposes of navigation, and shall be so planned, located, constructed, maintained and operated as to give effect to the provisions of this Order.
- (c) The works shall be constructed, maintained and operated in such manner as to safeguard the rights and lawful interests of others engaged or to be engaged in the development of power in the St Lawrence River below the International Rapids Section.
- (d) The works shall be so designed, constructed, maintained and operated as to safeguard so far as possible the rights of all interests affected by the levels of the St Lawrence River upstream from the Iroquois regulatory structure and by the levels of Lake Ontario and the lower Niagara River; and any change in levels resulting from the works which injuriously affects such rights shall be subject to the requirements of paragraph (a) relating to protection and indemnification.
- (e) The hydro-electric plants approved by this Order shall not be subjected to operating rules and procedures more rigorous than are necessary to comply with the provisions of the foregoing paragraphs (b), (c) and (d).
- (f) Before The Hydro-Electric Power Commission of Ontario commences the construction of any part of the works, it shall submit to the Government of Canada, and before the entity designated by the Government of the United States commences the construction of any part of the works, it shall submit to the Government of the United States, for

approval in writing, detailed plans and specifications of that part of the works located in their respective countries and details of the program of construction thereof or such details of such plans and specifications or programs of construction relating thereto as the respective Governments may require. If after any plan, specification or program has been so approved, The Hydro-Electric Power Commission of Ontario or the entity designated by the Government of the United States wishes to make any change therein, it shall, before adopting such change, submit the changed plan, specification or program for approval in a like manner.

- (g) In accordance with the Applications, the establishment by the Governments of Canada and of the United States of a Joint Board of Engineers to be known as the St Lawrence River Joint Board of Engineers (hereinafter referred to as the "Joint Board of Engineers") consisting of an equal number of representatives of Canada and the United States to be designated by the respective Governments, is approved. The duties of the Joint Board of Engineers shall be to review and coordinate, and, if both Governments so authorize, approve the plans and specifications of the works and the programs of construction thereof submitted for the approval of the respective Governments as specified above, and to assure the construction of the works in accordance therewith as approved. The Joint Board of Engineers shall consult with and keep the Board of Control, hereinafter referred to, currently informed on all matters pertaining to the water levels of Lake Ontario and the International Rapids Section and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section, and shall give full consideration to any advice or recommendations received from the Board of Control with respect thereto.
- (h) A Board of Control to be known as the International St Lawrence River Board of Control (herein referred to as the "Board of Control") consisting of an equal number of representatives of Canada and of the United States, shall be established by this Commission. The duties of the Board of Control shall be to give effect to the instructions of the Commission as issued from time to time with respect to this Order.

During construction of the works the duties of the Board of

Control shall be to keep itself currently informed of the plans of the Joint Board of Engineers insofar as these plans relate to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section, and to consult with and advise the Joint Board of Engineers thereon.

Upon completion of the works, the duties of the Board of Control shall be to ensure that the provisions of this Order relating to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section as herein set out are complied with, and The Hydro-Electric Power Commission of Ontario and the entity designated by the Government of the United States shall duly observe any direction given them by the Board of Control for the purpose of ensuring such compliance. The Board of Control shall report to the Commission at such times as the Commission may determine.

In the event of any disagreement amongst the members of the Board of Control which they are unable to resolve, the matter shall be referred by them to the Commission for decision. The Board of Control may, at any time, make representations to the Commission in regard to any matter affecting or arising out of the terms of this Order with respect to water levels and the regulation of the said discharge and flow.

- (i) Upon the completion of the works, the discharge of water from Lake Ontario and the flow of water through the International Rapids Section shall be regulated to meet the requirements of paragraphs (b), (c) and (d) hereof, and, subject as hereinafter provided, shall be regulated in accordance with Method Regulation No. 5 as prepared by the Department of Transport, Canada, dated September, 1940, and shall be based on the rule-curves forming part of that Method Regulation. The flow of water through the International Rapids Section in any period shall equal the discharge of water from Lake Ontario as determined for that period in accordance with such Method of Regulation and shall be maintained as uniformly as possible throughout that period.

Subject to the requirements of paragraphs (b), (c) and (d) hereof, the Board of Control, after obtaining the approval of the Commission, may temporarily modify or change the

restrictions as to discharge of water from Lake Ontario and the flow of water through the International Rapids Section set out in this paragraph, for the purpose of determining what modifications or changes therein may be advisable. The Board of Control shall report to the Commission the results of such experiments together with its recommendations as to any changes or modifications in said restrictions. Recommendations as to any changes or modifications which the Commission desires should be made permanent will be referred by the Commission to the two Governments, and if the two Governments thereafter agree, they shall be given effect as if contained in this Order.

- (j) Subject as hereinafter provided, upon completion of the works, the works shall be operated initially for a test period of ten years, or such shorter period as may be approved by the Commission with the forebay water level at the power houses held at a maximum elevation of 238.0 feet, sea level datum. Subject to the requirements of paragraphs (b), (c) and (d) hereof, the Board of Control, after obtaining the approval of the Commission, may temporarily modify or change the said forebay water level in order to carry out experiments for the purpose of determining whether it is advisable to increase the forebay water level at the power houses to a maximum elevation exceeding 238.0 feet. If the Board of Control, as a result of these experiments considers that operation during this test period at a maximum elevation exceeding 238.0 feet would be advisable, and so recommends, the Commission will consider authorizing operation during this test period at a maximum elevation exceeding 238.0 feet. At the end of this test period, the Commission will make such recommendations to the two Governments with respect to a permanent forebay water level as it deems advisable or it may recommend an extension of the test period. Such of these recommendations as the two Governments thereafter agree to adopt shall be given effect as if contained in this Order.
- (k) The Hydro-Electric Power Commission of Ontario and the entity designated by the Government of the United States shall maintain and supply for the information of the Board of Control accurate records relating to water levels and the discharge of water through the works and the regulation of the flow of water through the International Rapids Section, as the Board of Control may determine to be suitable and necessary, and shall install such gauges, carry out such measurements, and perform such other services as the Board may deem necessary for these purposes.

- (l) The Board of Control shall report to the Commission as of 31 December each year on the effect, if any, of the operation of the downstream hydro-electric power plants and related structures on the tailwater elevations at the hydro-electric power plants approved by this Order.
- (m) The Government of Canada shall proceed forthwith to carry out its expressed intention to remove Gut Dam.

AND IT IS FURTHER ORDERED that the allocation set out in Appendix "C" of the costs of constructing, maintaining and operating the works approved by this Order between The Hydro-Electric Power Commission of Ontario and the entity to be designated by the Government of the United States be and the same is hereby approved but such approval shall not preclude the Applicants from submitting to the Commission for approval any variation in the said allocation that may be agreed upon between them as being appropriate or advisable.

AND IT IS FURTHER ORDERED that the Commission retains jurisdiction over the subject matter of these Applications, and may, after giving such notice and opportunity to all interested parties to make representations as the Commission deems appropriate, make such further Order or Orders relating thereto as may be necessary in the judgment of the Commission.

Signed at Montreal, this 29th day of October, 1952.

(Signed) A.G.L. McNaughton

A.O. Stanley

Geo. Spence

Eugene W. Weber

J. Lucien Dansereau

Commissioner McWhorter dissenting.

APPENDIX A

FEATURES OF THE WORKS APPROVED BY THIS ORDER:

(a) Channel Enlargements

Channel enlargements will be undertaken from above Chimney Point to below Lotus Island, designed to give a maximum mean velocity in any cross-section of the channel which will be used for navigation not exceeding four feet per second at any time, also between Lotus Island and Iroquois Point and from above Point Three Points to below Ogden Island designed to give a maximum mean velocity in any cross-section not exceeding two and one-quarter feet per second with the flow and at the stage to be permitted on the first of January of any year, under regulation of outflow and levels of Lake Ontario in accordance with Method of Regulation No 5, as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September, 1940. Downstream from the power houses channel enlargements will be carried out for the purpose of reducing the tail water level at the power houses.

Final locations and cross-section of these channel enlargements will be determined from further studies.

(b) Control Facilities

Adequate control facilities will be constructed for the regulation of the outflow from Lake Ontario.

(c) Power House Structures

The power house structures will be constructed in the north channel extending from the lower end of Barnhart Island to the Canadian shore, and so located that one structure will be on each side of the International Boundary. Each power house structure will include the main generating units to utilize economically the river flows available to it, with provision for ice handling and discharge sluices.

(d) Dams and Associated Structures

A control dam will be constructed extending from Iroquois Point on the Canadian side of the river in an easterly direction to the United States mainland above Point Rockway.

A dam will be constructed in the Long Sault Rapids at the head of Barnhart Island.

Dykes and associated works will be provided as may be necessary in both the Province of Ontario and the State of New York.

All the works in the pool below the control dam will be designed to provide for full Lake Ontario level.

(e) Highway Modifications

In both the Province of Ontario and the State of New York provincial and state highways, and other roads, will be relocated in those portions subject to flooding, and reconstructed to standards at least equal to those now in existence.

(f) Railway Modifications

Such railway relocations as may be required as a result of the works herein described will be made in the Province of Ontario and the State of New York to standards at least equal to those now in existence

(g) Navigation Facilities

Provision will be made for the continuance of 14-foot navigation throughout the International Rapids Section during the construction period.

(h) Flooded Areas

Lands and buildings in both the Province of Ontario and the State of New York will be acquired or rehabilitated as required. Inundated wooded areas will be cleared.

APPENDIX B

Great Lakes - St Lawrence Basin

St Lawrence River Power Project,

International Rapids Section

General Plan Showing Major Works
in Project.

To accompany Applications of the United States of America and Canada to the International Joint Commission for approval of the construction of certain works jointly by entities to be designated by the Governments of the United States of America and Canada respectively.

Date - May 12, 1952

Exhibit 2

Note; Map not included in this copy of Order of Approval.

APPENDIX C

1. The power development works under this Application are those specified in Section 8 of the Application.
2. Total costs of the works described in Section 8 shall be based on Canadian costs and United States costs and the total shall be equally divided between the two constructing entities.
3. The costs to be divided should be based on actually experienced and audited expenses.
4. In relation to the three principles above, the three following provisions apply:
 - (a) The amount to be paid to Canada, as specified in the Agreement of December 3, 1951, between Canada and Ontario, in lieu of the construction by the power-developing entities of facilities required for the continuance of 14-foot navigation, shall be excluded from the total cost of the power project to be divided between the Canadian and United States power-developing entities, in consideration of the fact that actual replacement of 14-foot navigational facilities will be rendered unnecessary by reason of the concurrent construction of the deep waterway in Canada.
 - (b) The Authority to be established pursuant to the provisions of the St Lawrence Seaway Authority Act, Chapter 24 of the Statutes of Canada, 1951 (Second Session), shall contribute an agreed sum of money towards the cost of the channel enlargement which the power-developing entities must undertake in the St Lawrence River, as set out in paragraph 4 of the Annex to the Canada-Ontario Agreement of December 3, 1951, and in section 8 of the Application to the International Joint Commission, in consideration of the benefits which will accrue to navigation from such channel enlargement.
 - (c) All costs for construction, maintenance and operation of the project except machinery and equipment in the respective power houses shall be borne equally by the two entities. All costs for construction, maintenance and operation of machinery and equipment in their respective power houses shall be paid by the respective entities and shall be deemed to satisfy the principle of an equal division between the two entities.

INTERNATIONAL JOINT COMMISSION

IN THE MATTERS OF DEVELOPMENT OF POWER IN THE INTERNATIONAL
RAPIDS SECTION OF THE ST LAWRENCE RIVER (Docket 68) AND
REGULATION OF THE LEVEL OF LAKE ONTARIO (Docket 67)

SUPPLEMENTARY ORDER TO ORDER OF
APPROVAL DATED 29 OCTOBER, 1952

WHEREAS the Commission, by Order dated 29 October 1952 (Docket 68), approved the construction, maintenance and operation jointly by the Hydro-Electric Power Commission of Ontario and an entity to be designated by the Government of the United States of America of certain works for the development of power in the International Rapids Section of the St Lawrence River, subject to the conditions enumerated in the said Order; and

WHEREAS the Commission has been informed that the President of the United States of America by Executive Order No. 10,500, dated 4 November 1953, designated the Power Authority of the State of New York as the United States entity to construct, maintain and operate the proposed works in the United States; and

WHEREAS Appendix A to the said Order describes the features of the works so approved and provides that channel enlargements will be undertaken in specified areas, designed to give stated maximum mean velocities in any cross-section of the channel, under regulation of outflow and levels of Lake Ontario in accordance with Method of Regulation No 5, as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September 1940; and

WHEREAS, condition (i) of the said Order provides that, upon completion of the works, the discharge of water from Lake Ontario and the flow of water through the International Rapids Section shall be regulated to meet the requirements of conditions (b), (c) and (d) thereof, and subject to possible modifications and changes to be recommended subsequently by the International St Lawrence River Board of Control, in accordance with the said Method of Regulation No 5; and

WHEREAS, by the said Order of 29 October 1952, the Commission specifically retained jurisdiction to make such further Order or Orders relating to the subject matter of the Applications of the United States of America and Canada (Docket 68) as may be necessary in the judgment

of the Commission; and

WHEREAS the Commission, as a result of its investigations under the Reference from the Governments of Canada and the United States of America, dated 25 June 1952, regarding the levels of Lake Ontario (Docket 67), has determined that it would not be practicable to base the regulation of flows from Lake Ontario on the said Method of Regulation No 5; and

WHEREAS, pursuant to published notices, hearings were held by the Commission at Detroit, Michigan, on 4 June 1953, Rochester, New York, on 17 November 1953 and 12 April 1955, Hamilton, Ontario on 18 November 1953, and Toronto, Ontario, on 14 April 1955, at which all persons interested were afforded convenient opportunity of presenting evidence to and being heard before the Commission; and at the said hearings held at Toronto and Rochester in April 1955 all interested persons were given convenient opportunity to express their views upon the criteria and range of stage which had been tentatively proposed by the Commission; and

WHEREAS the Commission, on 9 May 1955, by letters addressed to the Secretary of State for External Affairs of Canada and the Secretary of State of the United States of America, respectively, recommended adoption by the two Governments of the following:

- (i) A range of mean monthly elevations for Lake Ontario of 244 feet (navigation season) to 248.0 feet as nearly as may be; and
- (ii) Criteria for a method of regulation of outflows and levels of Lake Ontario applicable to the works in the International Rapids Section of the St Lawrence River; and
- (iii) Plan of Regulation No 12-A-9, subject to minor adjustments that may result from further detailed study and evaluation by the Commission; and

WHEREAS, by letters dated 3 December 1955, the Secretary of State for External Affairs of Canada and the Under Secretary of State of the United States of America advised the Commission that the Government of Canada and the Government of the United States of America, respectively, approved the range of mean monthly elevations for Lake Ontario and the criteria recommended in the Commission's said letters of 9 May, 1955; and

WHEREAS, in the said letters dated 3 December 1955, the Commission was advised further that the Government of Canada and the Government of

the United States of America approved Plan of Regulation No 12-A-9 for the purpose of calculating critical profiles and the design of channel excavations in the International Rapids Section of the St Lawrence River; and

WHEREAS, in the said letters dated 3 December 1955, the two Governments urged the Commission to continue its studies with a view to perfecting a plan of regulation so as best to meet the requirements of all interests both upstream and downstream, within the range of elevations and criteria therein approved; and

WHEREAS, by letter dated 3 December 1955, the Secretary of State for External Affairs, on behalf of the Government of Canada, has informed the Commission of the arrangements that have been made for the redesign of a portion of the St Lawrence Seaway Canal in the vicinity of Montreal, between Lake St Louis and the Laprairie Basin; and

WHEREAS, condition (i) of the said Order of Approval dated 29 October 1952 makes provision for adjustments and progressive improvements in the plan of regulation, subject to requirements and procedures specified therein.

NOW, THEREFORE, THIS COMMISSION DOETH ORDER AND DIRECT that the Order of Approval issued by the International Joint Commission on 29 October 1952, be and the same is hereby amended as follows:

(1) Paragraph (a) of Appendix A to the said Order is amended by deleting the words, "Method of Regulation No 5, as prepared by the General Engineering Branch, Department of Transport, Canada, dated Ottawa, September, 1940", and substituting the words, "Plan of Regulation No 12-A-9, as prepared by the International Lake Ontario Board of Engineers, dated 5 May 1955"; and by adding the following sub-paragraph, "As approved by the Government of Canada and the Government of the United States of America in similar letters dated 3 December 1955, the said Plan of Regulation No 12-A-9 shall be the basis for calculating critical profiles and designing channel excavations". The said paragraph (a) will then read as follows:

"(a) Channel enlargements will be undertaken from above Chimney Point to below Lotus Island, designed to give a maximum mean velocity in any cross-section of the channel which will be used for navigation not exceeding four feet per second at any time, also between Lotus Island and Iroquois Point and from above Point Three Points to below

Ogden Island designed to give a maximum mean velocity in any cross-section not exceeding two and one-quarter feet per second with the flow and at the stage to be permitted on the first of January of any year, under regulation of outflow and levels of Lake Ontario in accordance with Plan of Regulation No 12-A-9 as prepared by the International Lake Ontario Board of Engineers, dated 5 May 1955. Downstream from the power houses channel enlargements will be carried out for the purpose of reducing the tail water level at the power houses.

Final locations and cross-sections of these channel enlargements will be determined from further studies.

As approved by the Government of Canada and the Government of the United States of America in similar letters dated 3 December 1955, the said Plan of Regulation No 12-A-9 shall be the basis for calculating critical profiles and designing channel excavations."

(2) Condition (i) of the said Order of 29 October 1952 is deleted and the following substituted therefor:

"(i) Upon the completion of the works, the discharge of water from Lake Ontario and the flow of water through the International Rapids Section shall be regulated to meet the requirements of conditions (b), (c), and (d) hereof; shall be regulated within a range of stage from elevation 244.0 feet * (navigation season) to elevation 248.0 feet, as nearly as may be; and shall be regulated in accordance with the criteria set forth in the Commission's letters of 17 March 1955 to the Governments of Canada and the United States of America and approved by the said governments in their letters of 3 December 1955 and qualified, by the terms of separate letters from the Government of Canada and the Government of the United States of America dated 11 April 1956 and 1 May 1956, respectively, to the extent that these letters agree that the criteria are intended to establish standards which would be maintained with the minimum variation. The project works shall be operated in such a manner as to provide no less protection for navigation and riparian interests downstream than would have occurred under pre-project conditions and with supplies of the past as adjusted, as defined in criterion (a) herein. The Commission will indicate in an appropriate fashion, as the occasion may require, the inter-relationship of the criteria, the range of elevations and the other requirements.

* All elevations mentioned in this Order are stated in relation to the United States Lake Survey 1935 datum.

The criteria are as follows:

(a) The regulated outflow from Lake Ontario from 1 April to 15 December shall be such as not to reduce the minimum level of Montreal Harbour below that which would have occurred in the past with the supplies to Lake Ontario since 1860 adjusted to a condition assuming a continuous diversion out of the Great Lakes Basin of 3,100 cubic feet per second from the Albany River Basin (hereinafter called the "supplies of the past as adjusted").

(b) The regulated winter outflows from Lake Ontario from 15 December to 31 March shall be as large as feasible and shall be maintained so that the difficulties of winter power operation are minimized.

(c) The regulated outflow from Lake Ontario during the annual spring break-up in Montreal Harbor and in the river downstream shall not be greater than would have occurred assuming supplies of the past as adjusted.

(d) The regulated outflow from Lake Ontario during the annual flood discharge from the Ottawa River shall not be greater than would have occurred assuming supplies of the past as adjusted.

(e) Consistent with other requirements, the minimum regulated monthly outflow from Lake Ontario shall be such as to secure the maximum dependable flow for power.

(f) Consistent with other requirements, the maximum regulated outflow from Lake Ontario shall be maintained as low as possible to reduce channel excavations to a minimum.

(g) Consistent with other requirements, the levels of Lake Ontario shall be regulated for the benefit of property owners on the shores of Lake Ontario in the United States and Canada so as to reduce the extremes of stage which have been experienced.

(h) The regulated monthly mean level of Lake Ontario shall not exceed elevation 248.0 with the supplies of the past as adjusted.

(i) Under regulation, the frequency of occurrences of

monthly mean elevations of approximately 247.0 and higher on Lake Ontario shall be less than would have occurred in the past with the supplies of the past as adjusted and with present channel conditions in the Galops Rapids Section of the Saint Lawrence River. *

(j) The regulated level of Lake Ontario on 1 April shall not be lower than elevation 244.0. The regulated monthly mean level of the lake from 1 April to 30 November shall be maintained at or above elevation 244.0.

(k) In the event of supplies in excess of the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to the riparian owners upstream and downstream. In the event of supplies less than the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to navigation and power interests.

The flow of water through the International Rapids Section in any period shall equal the discharge of water from Lake Ontario as determined for that period in accordance with a plan of regulation which, in the judgment of the Commission, satisfies the afore-mentioned requirements, range of stage and criteria and when applied to the channels as determined in accordance with Appendix A hereto produces no more critical governing velocities than those specified in that appendix, nor more critical governing water surface profiles than those established by Plan of Regulation 12-A-9, when applied to the channels as determined in accordance with Appendix A hereto, and shall be maintained as uniformly as possible throughout that period.

Subject to the requirements of conditions (b), (c) and (d) hereof, and of the range of stage, and criteria, above written, the Board of Control, after obtaining the approval of the

* "present channel conditions" refers to conditions as of March 1955.

Commission, may temporarily modify or change the restrictions as to discharge of water from Lake Ontario and the flow of water through the International Rapids Section for the purpose of determining what modifications or changes in the plan of regulation may be advisable. The Board of Control shall report to the Commission the results of such experiments, together with its recommendations as to any changes or modifications in the plan of regulation. When the plan of regulation has been perfected so as best to meet the requirements of all interests, within the range of stage and criteria above defined, the Commission will recommend to the two Governments that it be made permanent and, if the two Governments thereafter agree, such plan of regulation shall be given effect as if contained in this Order."

Signed at Montreal this second day of July, 1956.

(Signed) A.G.L. McNaughton

Len Jordan

Geo. Spence

Roger B. McWhorter

J. Lucien Dansereau

Eugene W. Weber

24 October 1958.

Dear Dr Smith,

1. The purpose of this letter is to bring to your attention the present status of the construction and operation of the works constructed in the International Rapids Section of the St Lawrence River pursuant to the Applications made by the Governments of Canada and the United States under date of 30 June, 1952, and this Commission's Order of Approval of 29 October, 1952, and its Supplementary Order of 2 July, 1956. It is desired also to advise you for your consideration the position which has been taken by the two power entities designated by the respective Governments of the United States and Canada in regard to responsibility for any damage that may be claimed to result from the regulation of the levels of Lake Ontario and the flows in the St Lawrence River, both upstream and downstream from the power station at Barnhart Island.

2. The construction and operation status of the project as of this date is essentially as follows: The Iroquois regulating dam has been completed and is available for the regulation of levels and outflow of Lake Ontario. The Long Sault dam is substantially complete and, together with the Barnhart Island Power dam, is controlling the levels of the International Rapids Section at the initial 238-foot level specified in the Order of Approval of 29 October, 1952. The State of New York and the Province of Ontario generating stations are now operating for the production of hydro-electric power with a total of twelve units in service. The remaining twenty units are scheduled to be brought into service by the end of the year 1960. With the filling of the power pool, between Iroquois dam and Barnhart Island, the existing 14-foot navigation canals in Canada have been flooded and ships are being routed through the new deep-sea navigation locks constructed at Iroquois and in the lower portion of the International Rapids Section. Channel work throughout the entire international section including the Cornwall Island area is continuing on a schedule that provides for its completion in time for inauguration of 25-foot draft navigation in the spring of 1959.

3. Under these conditions there is need for early institution of a plan for regulation of the levels and outflow of Lake Ontario which will satisfy the criteria and other requirements of the Commission's Orders of Approval.

4. A brief review of the actions taken to date with respect to a plan of regulation will be helpful in considering the situation with which we are now faced. In its Order of 29 October, 1952, the Commission provided that

The Honourable Sidney E. Smith,
Secretary of State for External Affairs,
Ottawa.

upon completion of the works the discharge of water from Lake Ontario and the flow of water through the International Rapids Section be regulated to meet the requirements of the Order and in accordance with Method of Regulation No 5, prepared by the Department of Transport of Canada. Subsequently, as construction of the project progressed and after public hearings at various points in the Great Lakes region, the Commission recommended to the two Governments and received approval of the adoption of (a) a range of mean monthly elevations for Lake Ontario of 244 feet (navigation season) to 248 feet, as nearly as may be; and (b) a plan of regulation designated No 12-A-9, prepared by the International Lake Ontario Board of Engineers, as a basis for calculating critical profiles and designing channel excavations. Upon issuance of the Commission's Supplementary Order of 2 July, 1956, the power entities were advised by the St Lawrence River Joint Board of Engineers to use Plan 12-A-9 in the design and construction of the various channels for the project. The work has been carried out accordingly. It is understood that this same plan of regulation has been used as the basis of design of the navigation channels in Canada downstream from the International Section.

5. As provided in paragraph (h) in the Order of Approval of 29 October, 1952, the Commission established in November 1953 an International St Lawrence River Board of Control with the duty of giving effect to instructions of the Commission and ensuring compliance with the provisions of the Order relating to water levels and the regulation of the discharge of water from Lake Ontario and the flow of water through the International Rapids Section. The Commission instructed its Board of Control to study the plan of regulation 12-A-9 developed by the International Lake Ontario Board of Engineers, with a view to refining and improving it. Such continuing study of a plan of regulation was contemplated and provided for in the Commission's Order of 29 October, 1952, and in its Supplementary Order of 2 July, 1956. As a result of this further study the Board of Control has prepared, and the Commission has approved, a plan of regulation designated 1958-A which the Commission believes to be fully workable and consistent with the range of stage, criteria and other requirements set forth in the said Orders.

6. Although a satisfactory plan of regulation has now been developed, the Commission has not presented it to the Governments for use by the power entities in operating the project works for two reasons: (1) The power plants at Barnhart have not yet been completed to a stage at which the available generating equipment could fully utilize the greater wintertime flows which would be provided under the plan; and (2) there is a question as to responsibility for damages, either upstream or downstream, that might be claimed to result from the project operation. At present the power entities are,

in accordance with advice given by the St Lawrence River Joint Board of Engineers, controlling the outflows of Lake Ontario and the flow through the International Rapids Section to accord with a calculation of preproject conditions that would have occurred "with supplies of the past as adjusted", as defined in the criteria. At this point it must be noted that with the falling supply to the Great Lakes Basin the levels in the Lakes and the flows in the connecting channels and in the St Lawrence River are now at a stage approaching critical period conditions; indeed there is concern that they may recede further even to a point such as previously experienced in the lowest period of record occurring in 1933-34. With these possible conditions in prospect steps need to be taken promptly to ensure that the storage in Lake Ontario during the coming winter and early spring months is increased in anticipation of the need for additional water supplies to maintain 25-foot draft navigation depths when the new navigation channel is opened for ocean-going vessels next summer. A step in this direction can be taken by deferring the institution of plan of regulation 1958-A and meanwhile continuing regulation as at present but with such modification as may be possible without unacceptable reduction in power production at Beauharnois or the creation of hazards to navigation in the St Lawrence downstream from Barnhart. To do so, however, would require departure from the present advice to the power entities that the project be operated to maintain levels and flows on the basis of preproject conditions.

7. The Power Authority of the State of New York and The Hydro-Electric Power Commission of Ontario, as the designated entities, have filed with the Commission Briefs giving their views in respect to their responsibilities in operating the regulating works at Iroquois in accordance with a plan of regulation developed by the International Joint Commission through its International St Lawrence River Board of Control. The principal difficulty is in respect to responsibility for any damage or injury which may be claimed to result therefrom. The position expressed by the entities is that they cannot accept responsibility for any damage resulting from the regulation of Lake Ontario. They have asserted that if any damage claims result from operations under a plan prescribed by the International Joint Commission, the two Governments and not the operating entities would be liable. Furthermore, the entities contend that upon institution of the prescribed plan of regulation the International Joint Commission should give them detailed and specific instructions on a continuous basis with respect to operation of the gates at the Iroquois control dam. However, such action might place the Commission in the position of an operating agency, and the question of responsibility under those circumstances would require clarification.

The accompanying letters dated 29 July, 1958, and 19 August, 1958, addressed to the International Joint Commission by The Hydro-Electric Power Commission of Ontario and the Power Authority of the State of New York, describe fully the position of the power entities on this aspect of the matter.

8. It has been represented to the Commission that the very strongest objection would probably be raised by or on behalf of the Province of Quebec unless responsibility for the regulation of the flows of the St Lawrence River into that Province were vested in the Federal Governments rather than delegated to their designated power entities.

9. Under the provisions of the Order of Approval of 29 October, 1952, and the Supplementary Order of 2 July, 1956, it is the responsibility of the Governments of the United States and Canada, as Applicants, to assure that the project facilities constructed by the entities designated by the two Governments are operated in such a manner as to meet the criteria and other requirements set forth in the Order.

As pointed out in preceding paragraphs, a workable plan designed to meet this objective has been developed by the Commission, and it can be instituted within the coming year as seems appropriate under the existing hydrologic and physical conditions. It is suggested, therefore, that the Government of Canada take such steps as it deems advisable to resolve this issue.

The steps indicated herein as required to be taken as soon as may be practicable for the conservation of water in Lake Ontario in the interest of adequate navigation depths next summer constitute a transition arrangement which would lead to the institution of plan of regulation 1958-A as soon as conditions permit. This is desirable in order that the many benefits from project operation contemplated by the Order of Approval of 29 October, 1952, as amended by the Supplementary Order of 2 July, 1956, may be realized by all interests affected, including those upstream on Lake Ontario and downstream on the St Lawrence.

Transmitted herewith is the report, in two volumes, to the International Joint Commission by the International St Lawrence River Board of Control dated 14 May, 1958, in which Plan 1958-A is described. Technical approval of this plan was given by the Commission at its meeting in Montreal on 14 July, 1958.

A similar letter is being sent to the Secretary of State of the United States by the Acting Chairman of the United States Section, International Joint Commission.

Yours sincerely,

A.G.L. McNaughton
Chairman, Canadian Section,
International Joint Commission.

19 March 1959

Dear Sir:

1. Reference is made to my letter of 24 October 1958 reviewing the situation with respect to operation of the power facilities in the International Rapids Section of the St Lawrence River and transmitting for information of the Government of Canada a report on a plan of regulation known as Plan 1958-A. Reference is made also to my letter of 31 December 1958 concerning possible transitional arrangements for operation of the power facilities and indicating that, sometime during the period 1 February to 1 April 1959, the International Joint Commission would make further recommendations concerning the date for institution of Plan 1958-A.

2. As regards transitional arrangements:- In consequence of the accumulation of water on Lake Ontario by reason of restriction in river discharge due to ice condition and the increase in supplies to the lake, it is now evident that on 1 April the level of Lake Ontario will be at a satisfactory stage above 244.0, the minimum prescribed for this date by Criterion (j) of the Commission's Supplementary Order of 2 July, 1956. As a result, the reason which led the Commission to propose the special transitional arrangements to conserve water will then no longer apply.

3. The International Joint Commission has reviewed the situation in the International Rapids Section of the St Lawrence River and has concluded that, beginning 1 April, 1959, the project facilities should be operated in such a manner as to meet the criteria and other requirements set forth in the Commission's Orders of 29 October, 1952, and 2 July, 1956. As pointed out in my letter of 24 October, 1958, Plan 1958-A is a workable plan and the Commission believes it will meet this objective. However, due to adverse weather and other conditions, the excavation of the navigation channels above and below Barnhart has not been completed and the Commission is advised that this work will continue during the 1959 and 1960 navigation seasons. It may therefore prove necessary for a limited period to make minor variations from Plan 1958-A in order to insure satisfactory conditions for navigation in those parts of the St Lawrence River where channel excavations have not been completed.

4. The Commission's Order of Approval and its Supplementary Order set out the continuing duties of the Commission and of its International St Lawrence River Board of Control. Pursuant to paragraph

The Secretary of State
for External Affairs,
Ottawa

(h) of the Order of Approval, the Board of Control will continue to keep itself currently informed through the Joint Board of Engineers of the plans relating to channel excavations to ensure that the provisions of the Orders relating to levels and flows, including uses for navigation as required by paragraph (b) of the Order of Approval of 29 October 1952, are complied with.

5. It is recommended therefore that the Governments of the United States and Canada, as the Applicants who received approval for the construction and operation of the power project in the International Rapids Section of the St Lawrence River by designated power entities, take action to instruct the respective entities to commence the operation of the project facilities on 1 April 1959, or as soon as possible thereafter, in such a manner as to meet the criteria and other requirements set forth in the Commission's Orders above mentioned.

6. A similar letter is being sent to the Secretary of State for the United States by the Chairman of the United States Section of the Commission.

Yours sincerely,

A.G.L. McNaughton
Chairman, Canadian Section
International Joint Commission

W/10

P.C. 1959-506

PRIVY COUNCIL
CANADA

AT THE GOVERNMENT HOUSE AT OTTAWA
THURSDAY, the 23rd day of APRIL, 1959

PRESENT:

HIS EXCELLENCY

THE GOVERNOR GENERAL IN COUNCIL:

WHEREAS under Article VI of an Agreement (hereinafter referred to as the Canada-Ontario Agreement) made between the Government of Canada and the Government of the Province of Ontario on the 3rd day of December, 1951, the Province of Ontario engaged itself, to the full extent of its ability, concurrently with complementary operations by an appropriate authority in the United States of America, to construct, maintain and operate certain Works defined in Article II of the Canada-Ontario Agreement and in accordance with the terms of the Canada-Ontario Agreement, and, in that respect, to carry out and give full force and effect to all or any conditions, provisions or orders imposed or made by or under the authority of the International Joint Commission or by the Governor General in Council of Canada for the protection of navigation or to regulate and control the use of the water in the St Lawrence River for the said Works, and for the protection of others engaged in the production of power outside the Province of Ontario;

AND WHEREAS the Canada-Ontario Agreement was approved and made binding on the Government of Canada by the Parliament of Canada through the enactment of the International Rapids Power Development Act (1951 Statutes of Canada Chapter 13) and by the passing of Order in Council P.C. 1954-1088 dated 15th July, 1954, and was approved by the Ontario Legislature through the enactment of the International Rapids Agreement Act 1952 (1952 Statutes of Ontario First Session Chapter 42);

AND WHEREAS the Province of Ontario by an Act entitled "The St Lawrence Development Act No 2 (1952)" (1952 Statutes of Ontario Second Session Chapter 3 as amended by Chapter 81 of the 1955 Statutes of Ontario) delegated to The Hydro Electric Power Commission of Ontario the rights and obligations conferred on or assumed by the Province of Ontario under the Canada - Ontario Agreement;

AND WHEREAS the United States of America Federal Power

Commission has issued license dated July 15, 1953 to the Power Authority of the State of New York for Project No. 2000 which authorizes the said Authority to carry out the complementary operations referred to in the first clause of this Preamble;

AND WHEREAS the Chairman of the Canadian Section of the International Joint Commission in a letter to the Secretary of State for External Affairs, and the Chairman of the United States Section of the International Joint Commission in a letter to the Secretary of State for the United States, both letters being dated March 19, 1959, have recommended that instructions issue to the effect that the said works be operated on 1st April, 1959, or as soon as possible thereafter, to meet the criteria and other requirements set forth in the International Joint Commission's Orders of Approval of 29th October, 1952, and 2nd July, 1956;

AND WHEREAS a plan of regulation, hereinafter referred to as Plan 1958-A, which was developed by the International Joint Commission, was represented in the said letters as being a workable plan which the International Joint Commission believes will meet the criteria and other requirements set forth in the said Orders of Approval;

AND WHEREAS the United States of America Federal Power Commission has issued an Order on the 10th day of April, 1959, which has the effect of implementing the said recommendation of the International Joint Commission and the said Plan 1958-A;

THEREFORE, His Excellency the Governor General in Council, on the recommendation of the Minister of Transport, is pleased, under and by virtue of Article VI of the Canada-Ontario Agreement to order that

1. on and after the 25th day of April, 1959, the said works shall be operated so as to meet the criteria and other requirements set forth in the Orders of Approval of the International Joint Commission dated 29th October, 1952, and 2nd July, 1956, and in accordance with Plan 1958-A, a copy of which is attached as an annex to this Order and marked "Plan 1958-A", and
2. the said works shall be operated on the basis of any information that is available to and supplied by the Minister of Transport

or his duly authorized representative and that is required for the operation of the said works.

Certified to be a true copy.

(S) R.B. Bryce

Clerk of the Privy Council.

UNITED STATES OF AMERICA
FEDERAL POWER COMMISSION

Before Commissioners: Jerome K. Kuykendall, Chairman; Frederick Stueck,
Arthur Kline and John B. Hussey.

In the Matter of)	
)	Project No. 2000
Power Authority of the)	
State of New York)	

ORDER OF REHEARING

(Issued August 3, 1959)

On April 10, 1959, we issued an order prescribing a plan of regulation of project outflows for Project No. 2000 (located on the St Lawrence River and licensed under the Federal Power Act) and prescribing levels of Lake Ontario and St Lawrence River. At the Power Authority's request on May 28, 1959, we granted rehearing in this matter, allowing the licensee to file additional representations in support of its request for modification. On July 1, 1959, the licensee filed additional representations and seeks modification of the Order in limited particulars.

Article 19 of the license for Project No. 2000 provides that in the design, construction, maintenance and operation of the project covered by the license, the licensee shall comply with all applicable provisions and requirements of the Order of Approval issued October 29, 1952 by the International Joint Commission (I.J.C. Docket No. 68) to the Governments of the United States and Canada for the construction of certain works for the development of power in the International Rapids section of the St Lawrence River.

The "works" referred to in the Order of Approval are those constructed by The Hydro-Electric Power Commission of Ontario in Canada, and those constructed in the United States by the Power Authority of the State of New York under the license for Project No. 2000.

On July 2, 1956, the International Joint Commission amended its October 29, 1952 Order to incorporate a range of elevations for Lake Ontario and the criteria for the regulation of Lake Ontario and the St Lawrence River. The Orders of Approval provide in paragraph (i) that there may be temporary and permanent modifications or changes in a plan of regulation for Lake Ontario and the St Lawrence River.

In a letter dated March 19, 1959, the Chairman of the United States Section of the International Joint Commission recommended to the Secretary of State that, beginning April 1, 1959, the project facilities be operated in such a manner as to meet the criteria and other requirements set forth in the International Joint Commission Orders of October 29, 1952, and July 2, 1956, and stated that Regulation Plan 1958-A is a workable plan and that it is believed that Plan 1958-A will meet this objective. It was further noted that continuing excavation work on the Saint Lawrence River navigation channels above and below Barnhart Dam during the 1959 and 1960 navigation seasons may make necessary minor variations from Plan 1958-A for a limited period of time to ensure satisfactory navigation conditions. In this regard, the letter states that the International Saint Lawrence River Board of Control will keep itself currently informed of channel excavation plans to ensure compliance with the provisions of the Approval Orders relating to levels and flows.

By letter dated March 30, 1959, the Department of State requested us to take such action as we deem necessary and appropriate to assure operation of the St Lawrence project facilities in such a manner as to carry out the recommendations of the International Joint Commission as set forth in the letter of March 19, 1959.

Our order of April 10, 1959, prescribed the criteria to govern the regulation of the outflows and levels of Lake Ontario and the St Lawrence River as set forth in the International Joint Commission July 2, 1956 Order of Approval and prescribed a plan of regulation in detail to bring the operation of the project into conformity with Regulation Plan 1958-A.

The principal difficulty complained of by the licensee appears to be over the responsible official agency to which it can turn for guidance in carrying out the prescribed method of operation in regulating the outflows and levels of Lake Ontario and the St Lawrence River. However, it should be noted that under Section 10 (c) of the Federal Power Act the licensee must accept responsibility for all damages occasioned to the property of others by the construction, maintenance or operation of the project works or of the works appurtenant or accessory thereto, constructed under the license and in no event shall the United States be liable therefor.

The Commission finds:

(1) Recurring modifications or changes in the Plan of Regulation of the International Joint Commission even in minor respects would require recurring amendments of our Order.

(2) If our order, in general terms, requires compliance with a plan of regulation consistent with Article 19 of the license rather than in

detail as in our order of April 10, 1959, the rescission of our order of April 10, 1959, and an order requiring compliance by the licensee with the orders of the International Joint Commission would be in the public interest and tend to facilitate compliance by the licensee.

The Commission orders:

(A) In the maintenance and operation of the project covered by this license, the licensee shall comply with all applicable provisions and requirements of the Order of Approval (I.J.C. Docket No. 68) issued October 29, 1952, by the International Joint Commission to the Governments of the United States and Canada for the construction of certain works for the development of power in the International Rapids Section of the St Lawrence River, as amended by its Order of July 2, 1956. In complying with these requirements, the licensee shall be deemed to have accomplished such compliance if it follows Regulation Plan 1958-A or any supplementary or superseding plan of regulation approved by the International Joint Commission, under the supervision of the International Saint Lawrence River Board of Control in accordance with Paragraph (h) of the October 29, 1952 Order of Approval.

(B) The order issued April 10, 1959, herein is hereby rescinded.

By the Commission.

/S/ J.H. Gutride

Joseph H. Gutride,
Secretary.

International Joint Commission

Federal Trade Bldg. Rm. 786

April 8, 1960

Mr T.M. Patterson
Chairman, Canadian Section
International St Lawrence River
Board of Control
Department of Northern Affairs
and National Resources
Norlite Building
Ottawa, Canada

The International St Lawrence River Board of Control is hereby directed to notify the power entities to discontinue on 20 April 1960 operation of the St Lawrence power project works to conform to pre-project conditions and to commence operation on that date so as to meet the criteria and other requirements of the Commission's Orders of Approval dated 29 October 1952 and 2 July 1956. Plan 1958-A for regulation of Lake Ontario is the plan currently approved for use by the Board in consulting with the power entities on compliance with the criteria and other requirements of the Commission's Orders of Approval.

A copy of the Commission's letter to the two Governments on this subject is being furnished you.

A similar message is being sent to the Chairman, United States Section, International St Lawrence River Board of Control, by the Chairman, United States Section, IJC.

A. G. L. McNaughton
Chairman, Canadian Section
International Joint Commission

INTERNATIONAL JOINT COMMISSION

OTTAWA, CANADA

12 November, 1958.

Dear Dr Smith,

This refers to my letter of 24 October, 1958, setting forth the present situation in respect to arrangements for the power developments in the International Rapids Section at Barnhart, and the regulation of the levels on Lake Ontario and the flows in the International Section of the St Lawrence.

In the second paragraph in outlining the progress which had been made toward the completion of the installation in the New York State and Ontario powerhouses, I mentioned that "The remaining twenty units are scheduled to be brought into service by the end of the year 1960". I am now advised that the situation is that these installations will be completed by the end of the year 1959.

Yours sincerely,

A.G.L. McNaughton
Chairman, Canadian Section,
International Joint Commission.

The Honourable Sidney E. Smith,
Secretary of State for External Affairs,
Ottawa, Ontario.

INTERNATIONAL JOINT COMMISSION

17 March, 1955

Dear Sir,

In accordance with the intention expressed in the letters which it addressed on 23 February, 1955, to the Secretary of State of the United States and to the Secretary of State for External Affairs of Canada respectively, the International Joint Commission met in Montreal on 14, 15 and 16 March, 1955. The meeting was held to enable the Commission to reach tentative conclusions as to the range of stage of Lake Ontario which, on technical considerations, would be most appropriate in accordance with the purposes of the Lake Ontario Reference dated 25 June, 1952, submitted to the Commission by both Governments under the provisions of Article IX of the Boundary Waters Treaty of January 11, 1909.

At the meeting in Montreal, the Commission received technical information and advice from the International Lake Ontario Board of Engineers. It also had the benefit of the advice and views of the International St Lawrence River Board of Control, the St Lawrence River Joint Board of Engineers and Counsel for the Governments of the United States and Canada.

Written representations were received from lakeshore property owners and municipalities and from the St Lawrence power and seaway agencies of both countries.

As a result of its deliberation, the Commission is satisfied that measures can be taken, having due regard to the interests of all concerned, to regulate the level of Lake Ontario for the benefit of property owners on the shores of the lake in both countries, so as to reduce the extremes of stage which have been experienced in the past.

It is the Commission's tentative conclusion that the works for the development of power in the International Rapids Section of the St Lawrence River, which were approved by the Commission in its Order of Approval dated 29 October, 1952, should be operated in accordance with the criteria set forth below. These criteria are consistent with the basic, governing requirements of paragraphs (b), (c) and (d) of that Order of Approval. The elevations indicated in the criteria are referred to the Oswego gage and are based on the principal gages

Honourable L.B. Pearson,
Secretary of State of External Affairs,
Ottawa.

on Lake Ontario, adjusted to the Oswego gage, United States Lake Survey 1935 datum. As soon as a method of regulation, based on these criteria, has been worked out in detail and approved, the Commission proposes to substitute it for Method of Regulation No 5 mentioned in paragraph (i) and in paragraph (a) of Appendix A of that Order of Approval.

Proposed criteria for a method of regulation of outflows and levels of Lake Ontario applicable to the works in the International Rapids Section of the St Lawrence River:

(a) The regulated outflow from Lake Ontario from 1 April to 15 December shall be such as not to reduce the minimum level of Montreal Harbour below that which would have occurred in the past with the supplies to Lake Ontario since 1860 adjusted to a condition assuming a continuous diversion out of the Great Lakes Basin of 3100 c.f.s. at Chicago and a continuous diversion into the Great Lakes Basin of 5000 c.f.s. from the Albany River Basin (hereinafter called the "supplies of the past as adjusted").

(b) The regulated winter outflows from Lake Ontario from 15 December to 31 March shall be as large as feasible and shall be maintained so that the difficulties of winter power operation are minimized.

(c) The regulated outflow from Lake Ontario during the annual spring break-up in Montreal Harbour and in the river downstream shall not be greater than would have occurred assuming supplies of the past as adjusted.

(d) The regulated outflow from Lake Ontario during the annual flood discharge from the Ottawa River shall not be greater than would have occurred assuming supplies of the past as adjusted.

(e) Consistent with other requirements, the minimum regulated monthly outflow from Lake Ontario shall be such as to secure the maximum dependable flow for power.

(f) Consistent with other requirements, the maximum regulated outflow from Lake Ontario shall be maintained as low as possible to reduce channel excavations to a minimum.

(g) Consistent with other requirements, the levels of Lake Ontario shall be regulated for the benefit of property owners on the shores of Lake Ontario in the United States and Canada so as to reduce the extremes of stage which have been experienced.

(h) The regulated monthly mean level of Lake Ontario shall not exceed elevation 248.0 with the supplies of the past as adjusted.

(i) Under regulation, the frequency of occurrences of monthly mean elevations of approximately 247.0 and higher on Lake Ontario shall be less than would have occurred in the past with the supplies of the past as adjusted and with present channel conditions in the Galops Rapids Section of the St Lawrence River.

(j) The regulated level of Lake Ontario on 1 April shall not be lower than elevation 244.0. The regulated monthly mean level of the lake from 1 April to 30 November shall be maintained at or above elevation 244.0.

(k) In the event of supplies in excess of the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to the riparian owners upstream and downstream. In the event of supplies less than the supplies of the past as adjusted, the works in the International Rapids Section shall be operated to provide all possible relief to navigation and power interests.

The Commission will hold public hearings at Rochester, N.Y. and Toronto, Ont. on 12 and 14 April, 1955, respectively, at which all interested parties, including the property owners on the shores of Lake Ontario and the St Lawrence River, both upstream and downstream from the works in the International Rapids Section, will be given full opportunity to present their views upon the range of stage and the other criteria tentatively proposed.

After consideration of the views of all concerned, and as soon as possible after these public hearings, the Commission will present an interim report recommending, for the approval of the two Governments, a range of lake levels and criteria for acceptable duration of high stages of Lake Ontario.

If the two Governments approve the recommendations which will be contained in the interim report, the Commission will put the recommendations into effect by issuing an appropriate supplement to its Order of Approval, dated 29 October, 1952. The Commission hopes to be able to issue this supplement on or about 1 May, 1955.

Yours sincerely,

A.G.L. McNaughton
Chairman, Canadian Section,
International Joint Commission.

INTERNATIONAL JOINT COMMISSION

Ottawa, Canada

9 May, 1955

Dear Sir,

In my letter of March 17, 1955, I transmitted to you on behalf of the Commission criteria for a plan of regulation of Lake Ontario in connection with the St Lawrence Power Project, having regard to all interests affected. In that letter, I also informed you that after public hearings and a consideration of the views of all concerned, the Commission would present an interim report recommending, for the approval of the two Governments, a range of lake levels and criteria for acceptable duration of high stages of Lake Ontario.

Public hearings were held at Rochester, New York and at Toronto, Ontario on April 12 and 14. The Commission considered this matter fully at an executive session in Buffalo, New York on May 5, 1955.

As a result of these deliberations the Commission has reached agreement on a range of elevations, 244 (navigation season to 248.0 feet as nearly as may be. Further, a plan of regulation (No 12-A-9) has been developed within this range and three copies of it are enclosed. This plan, subject to minor adjustments that may result from further detailed study and evaluation, seems to offer the best possibility of achieving the optimum objective set forth in the Reference.

The Commission accordingly recommends to the Governments the adoption of the criteria, range of elevations and plan of regulation mentioned above. If the Governments concur in this recommendation the St Lawrence Seaway and Power entities should be advised that they may proceed with the determination of the critical profiles and the final design of channel excavations based on this range and plan of regulation 12-A-9, with the assurance that any adjustments required will be of a minor nature.

Secretary of State for External Affairs,

Ottawa.

Taking into account the downstream interests and on the basis of the past 95 years' experience, the recommended method of regulation will lower all stages in Lake Ontario above elevation 246 and thus provide substantial benefits to the lakeshore owners.

Yours sincerely,

(signed) A. McNaughton

A.G.L. McNaughton
Chairman, Canadian Section,
International Joint Commission.

THE SECRETARY OF STATE FOR EXTERNAL AFFAIRS
CANADA

Ottawa, December 3, 1955.

Dear General McNaughton:

I have for reply your letter of May 9, 1955, on the subject of Lake Ontario levels. I note that the International Joint Commission has reached agreement on a range of elevations for Lake Ontario, namely, 244 feet (navigation season) to 248 feet, as nearly as may be. I am pleased to inform you that this range of mean monthly elevations is approved by the Government of Canada.

In your letter of May 9, you also stated that the Commission recommended approval of the criteria for the operation of the regulatory works being built in the International Rapids section of the St Lawrence River, set out in your letter of March 17, 1955. I am pleased to inform you that the Government of Canada approves these criteria as recommended in your letter of May 9.

Copies of plan of regulation No 12-A-9, which had been developed within this range of elevations and according to these criteria, were enclosed with your letter of May 9. It is apparent that the plan of regulation will be modified in minor details from time to time, both during the construction stage and afterwards, particularly as the works in the other sections of the St Lawrence River are completed and come into operation. Accordingly, it is important to preserve the flexibility for adjustments and progressive improvements which, subject to specified requirements and procedure, is prescribed in paragraph (i) of the Commission's Order of Approval of October 29, 1952. It is important that the St Lawrence River Joint Board of Engineers and the power and seaway entities be provided with a plan of regulation in substitution for plan of regulation No 5 referred to in the Order of Approval, as the basis on which they may proceed with the determination of the critical profiles and the design for channel excavations, if the whole St Lawrence project is not to be delayed seriously. Therefore, the Government of Canada approves plan of regulation No 12-A-9 for the purpose of calculating critical profiles and the design of channel excavations.

The Government urges the Commission to continue its studies with

Gen. The Hon. A.G.L. McNaughton, C.M., C.B.,
Chairman, Canadian Section,
International Joint Commission,
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a view to perfecting the plan of regulation so as best to meet the requirements of all interests both upstream and downstream, within the range of elevations and criteria herein approved.

Yours sincerely,

(sgd.) L.B. Pearson

THE SECRETARY OF STATE FOR EXTERNAL AFFAIRS
CANADA

Ottawa, December 3, 1955

Dear General McNaughton,

I refer to my letter of today's date in which I informed you of the approval by the Government of Canada of the range of elevations, the criteria and, for the purpose of calculating critical profiles and the design of channel excavations in the International Rapids Section of the St Lawrence River, plan of regulation 12-A-9.

The Government of Canada is naturally much concerned about the effects which the regulation of Lake Ontario levels might have downstream in the exclusively Canadian section of the river. This concern relates more particularly to:

- (i) flows during the ice-forming period each year; and
- (ii) the flooding hazard in February and March each year in the Montreal area.

Studies which have recently been made in Canada indicate that, with the "supplies of the past as adjusted", referred to in the criteria, and within the range of elevations, criteria and design of channel excavations referred to in my letter of today's date, it is possible to adjust the plan of regulation in such a manner:

- (i) that the total outflow from Lake St Louis is maintained at or below 280,000 cubic feet per second during the ice-forming period each year in the Lake St Louis - Laprairie Basin area of the St Lawrence River; and
- (ii) that the danger of flooding in the Montreal area will not be aggravated.

The Government of Canada wishes to inform the Commission that arrangements have now been made for the redesign of a portion of the new 27-foot canal in the vicinity of Montreal which will allow a flow of 40,000 cubic feet per second to be by-passed from Lake St Louis to Laprairie Basin through the canal during the non-navigation season. This will not only provide more favourable ice-forming conditions in the narrows between Lake

Gen. The Hon. A.G.L. McNaughton, C.H., C.B.,
Chairman, Canadian Section,
International Joint Commission,
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St Louis and Laprairie Basin by reducing the flows in this critical section of the river as the occasion may require from 280,000 to 240,000 cubic feet per second, but should also be of benefit to upstream interests on the St Lawrence River and Lake Ontario.

Yours sincerely,

(Signed) L.B. Pearson