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Mines, Forests and Waters, H7
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CANADA. PARLIAMENT. HOUSE OF
COMMONS. STANDING COMMITTEE
ON MINES, FORESTS AND WATERS.

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HOUSE OF COMMONS

Standing Committee on
MINES, FORESTS AND WATERS

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1964

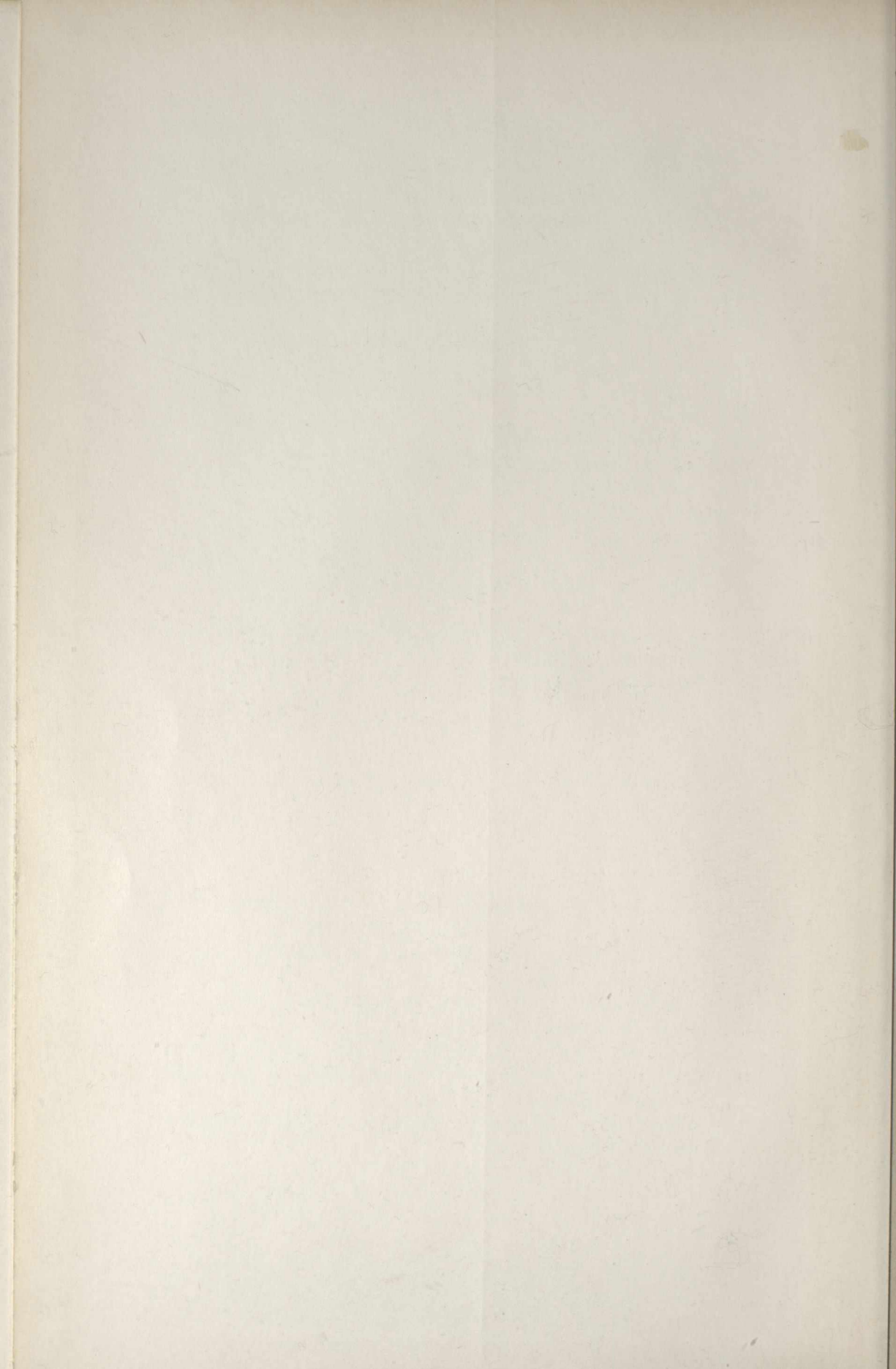
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HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 1

THURSDAY, APRIL 30, 1964

THURSDAY, OCTOBER 22, 1964

TUESDAY, OCTOBER 27, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

Statement by

The Honourable Arthur Laing, Minister of Northern Affairs and National Resources.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias Godin
Vice-Chairman: Mr. Ian Watson

Messrs.

Alkenbrack,
Asselin (*Richmond-
Wolfe*),
Barnett,
Berger,
Blouin,
Caouette,
Coates,
Cyr,
Deachman,
Dinsdale,
Fleming (*Okanagan-
Revelstoke*),
Gendron,

Godin,
Grafftey,
Gray,
Grégoire,
Habel,
Harley,
Herridge,
Leboe,
Leduc,
Loney,
Martin (*Timmins*),
Martineau,
McBain,
Mitchell,

Moreau,
Muir (*Cape Breton North
and Victoria*),
Rhéaume,
Rideout,
Roxburgh,
Simpson,
Stenson,
Turner,
Watson (*Châteauguay-
Huntingdon-
Laprairie*)—35.

(Quorum 10)

Mr. Roussin,
Clerk of the Committee

- On April 22, 1964, Mr. Granger replaced Mr. Gray
On April 22, 1964, Mr. Flemming (*Victoria-Carleton*) replaced Mr. Coates
On June 9, 1964, Mr. Davis replaced Mr. Rideout
On October 14, 1964, Mr. Aiken replaced Mr. Fleming (*Okanagan-Revel-
stoke*)
On October 14, 1964, Mr. Danforth replaced Mr. Grafftey
On October 14, 1964, Mr. Noble replaced Mr. Muir (*Cape Breton North and
Victoria*)
On October 14, 1964, Mr. Rynard replaced Mr. Rhéaume
On October 14, 1964, Mr. Smith replaced Mr. Simpson
On October 15, 1964, Mr. Peters replaced Mr. Martin (*Timmins*)
On October 15, 1964, Mr. Scott replaced Mr. Barnett
On October 20, 1964, Mr. Laprise replaced Mr. Caouette
On October 20, 1964, Mr. Legault replaced Mr. Cyr
On October 20, 1964, Mr. Rock replaced Mr. Deachman
On October 20, 1964, Mr. Ryan replaced Mr. Gendron
On October 20, 1964, Mr. Whelan replaced Mr. Blouin

REPORT TO THE HOUSE

MAY 1, 1964.

The Standing Committee on Mines, Forests and Waters has the honour to present the following as its

FIRST REPORT

Your Committee recommends:

1. That it be empowered to print such papers and evidence as may be ordered by the Committee, and that Standing Order 66 be suspended in relation thereto;
2. That it be given leave to sit while the House is sitting.

Respectfully submitted,

(Concurred in on Tuesday, May 5, 1964).

OSIAS J. GODIN,
Chairman

ORDERS OF REFERENCE

FRIDAY, April 10, 1964.

Resolved,—That the following Members do compose the Standing Committee on Mines, Forests and Waters:

Messrs.

Alkenbrack,	Godin,	Moreau,
Asselin (<i>Richmond-</i> <i>Wolfe</i>),	Grafftey,	Muir (<i>Cape Breton North</i> <i>and Victoria</i>),
Barnett,	Gray,	Rhéaume,
Berger,	Grégoire,	Rideout,
Blouin,	Habel,	Roxburgh,
Caouette,	Harley,	Simpson,
Coates,	Herridge,	Stenson,
Cyr,	Leboe,	Turner,
Deachman,	Leduc,	Watson (<i>Châteauguay-</i> <i>Huntingdon-</i> <i>Laprairie</i>)—35.
Dinsdale,	Loney,	
Fleming (<i>Okanagan-</i> <i>Revelstoke</i>),	Martin (<i>Timmins</i>),	
Gendron,	Martineau,	
	McBain,	
	Mitchell,	

(Quorum 10)

WEDNESDAY, March 11, 1964.

Ordered,—That the said Committee be empowered to examine and inquire into all such matters and things as may be referred to it by the House; and to report from time to time its observations and opinions thereon, with power to send for persons, papers and records.

WEDNESDAY, April 22, 1964.

Ordered,—That the names of Messrs, Granger and Flemming (*Victoria-Carleton*) be substituted for those of Messrs. Gray and Coates respectively on the Standing Committee on Mines, Forests and Waters.

TUESDAY, May 5, 1964.

Ordered,—That the Standing Committee on Mines, Forests and Waters be empowered to print such papers and evidence as may be ordered by the Committee, and that Standing Order 66 be suspended in relation thereto; and that it be given leave to sit while the House is sitting.

TUESDAY, June 9, 1964.

Ordered,—That the name of Mr. Davis be substituted for that of Mr. Rideout on the Standing Committee on Mines, Forests and Waters.

FRIDAY, October 2, 1964.

Ordered.—That the subject-matter of the water levels of the Great Lakes system be referred to the Standing Committee on Mines, Forests and Waters for their consideration and report and that the Committee be empowered to engage technical and clerical personnel as it may deem necessary.

WEDNESDAY, October 14, 1964.

Ordered.—That the names of Messrs. Aiken, Danforth, Noble, Rynard and Smith be substituted for those of Messrs. Fleming (Okanagan-Revelstoke), Grafftey, Muir (Cape Breton North and Victoria), Rhéaume and Simpson, respectively, on the Standing Committee on Mines, Forests and Waters.

THURSDAY, October 15, 1964.

Ordered.—That the names of Messrs. Peters and Scott be substituted for those of Messrs. Martin (Timmins) and Barnett on the Standing Committee on Mines, Forests and Waters.

TUESDAY, October 20, 1964.

Ordered.—That the names of Messrs. Laprise, Legault, Rock, Ryan and Whelan be substituted for those of Messrs. Blouin, Caouette, Cyr, Deachman and Gendron, respectively, on the Standing Committee on Mines, Forests and Waters.

Attest

LEON-J. RAYMOND,
The Clerk of the House.

MINUTES OF PROCEEDINGS

THURSDAY, April 30, 1964.

(1)

The Standing Committee on Mines, Forests and Waters met at 10:05 o'clock a.m. this day, for organization purposes.

Members present: Messrs. Alkenbrack, Berger, Cyr, Gendron, Godin, Granger, Harley, Leduc, Loney, Mitchell, Rhéaume, Rideout, Stenson. (13)

The Clerk of the Committee attended the election of the Chairman.

Mr. Granger moved, seconded by Mr. Leduc,

That Mr. Godin be Chairman of this Committee.

Thereupon, Mr. Cyr moved, seconded by Mr. Harley,

That the nominations do now close.

Mr. Godin was then declared duly elected Chairman of this Committee.

On taking the Chair, Mr. Godin thanked the Committee for the honour conferred on him.

Mr. Berger moved, seconded by Mr. Cyr,

That Mr. Watson (*Chateauguay-Huntingdon-Laprairie*), (*in absentia*), be Vice-Chairman of this Committee.

Thereon, Mr. Alkenbrack moved, seconded by Mr. Stenson,

That Mr. Rheaume be Vice-Chairman of this Committee.

Thereupon, Mr. Cyr moved, seconded by Mr. Mitchell,

That the nominations do now close.

And the question being put on the first motion, it was resolved, by a show of hands, in the affirmative; yeas: 8; nays: nil.

And the question being put on the second motion, it was resolved, by a show of hands, in the affirmative; yeas: 3; nays: nil.

Comparing the results of the votes on the two motions, Mr. Chairman declared Mr. Watson (*Chateauguay-Huntingdon-Laprairie*) duly elected, (*in absentia*), Vice-Chairman of this Committee.

On motion of Mr. Berger, seconded by Mr. Harley,

Resolved: That the Committee be empowered to print such papers and evidence as may be ordered by the Committee.

On motion of Mr. Mitchell, seconded by Mr. Rhéaume,

Resolved: That the Committee be empowered to print 1000 copies in English, and 500 copies in French of its Minutes of Proceedings and Evidence.

On motion of Mr. Rhéaume, seconded by Mr. Cyr,

Resolved: That the Committee seek permission to sit while the House is sitting.

On motion of Mr. Rhéaume, seconded by Mr. Berger,

Resolved: That the Steering Subcommittee comprised of the Chairman, the Vice-Chairman and five other members of the Committee named by the Chairman, after consultation with the respective whips of the parties, be appointed.

The Chairman asked the Clerk of the Committee to read a letter from the Fort Smith Chamber of Commerce.

There being no Order of Reference yet before the Committee, at 10:20 o'clock a.m.,

Mr. Leduc moved, seconded by Mr. Granger, and it was
Resolved,—That the Committee adjourn to the call of the Chair.

Maxime Guitard,
Acting Clerk of the Committee.

THURSDAY, October 22, 1964.

(2)

The Standing Committee on Mines, Forests and Waters met this day at 3:44 p.m. The Chairman, Mr. Godin, presided.

Members present: Messrs. Danforth, Herridge, Laprise, Leduc, Legault, Loney, McBain, Moreau, Noble, Peters, Rock, Ryan, Rynard and Watson (*Châteauguay-Huntingdon-Laprairie*)—14.

The Clerk of the Committee read the Order of Reference of October 2, 1964, in connection with the subject-matter of the water levels of the Great Lakes.

The Chairman read an extract of a letter from Mr. Albert J. Meserow, Chairman, Great Lakes Commission.

The Chairman read the First Report of the Sub-committee on Agenda and Procedure containing recommendations which were severally considered, amended, and adopted as amended.

That report, as amended and adopted, reads as follows:

The Sub-Committee on Agenda and Procedure has the honour to submit the following as its First Report:

The Sub-Committee on Agenda and Procedure met on Tuesday, October 20, 1964. The Chairman of the Committee, Mr. O. J. Godin, presided.

The following members were present: Messrs. Aiken, Laprise, Martineau, Peters and Watson. Mr. Leboe had asked to be excused.

After discussion, the Sub-Committee has agreed to recommend as follows:

1. That the number of printed copies of the minutes of proceedings and evidence of the Committee be increased from 1,000 to 1,500 in English and from 500 to 750 in French;

2. That the meetings of the Committee be held regularly on Tuesdays and Thursday, at 3:30 p.m. or after Orders of the Day in the House;

3. That, after hearing the Honourable Arthur Laing, Minister of Northern Affairs and National Resources on Tuesday, October 27, witnesses listed hereunder be called, in the following order:

- (a) Thursday, October 29: Mr. H. Wershof, Assistant Under-Secretary of State, Department of External Affairs and Mr. A. Heeney, Chairman, International Joint Commission
- (b) Tuesday, November 10: Mr. G. A. Scott, Assistant Deputy Minister, Economic Policy and Research, Department of Transport
- (c) Thursday, November 12: Mr. G. Millar, Chief Engineer, Harbours and Rivers Engineering Branch, Department of Public Works
- (d) Tuesday, November 17: Mr. N. G. Gray, Dominion Hydrographer, Department of Mines and Technical Surveys; and

(e) Mr. T. M. Patterson, Director, Water Resources Branch, Department of Northern Affairs and National Resources, and other witnesses to be called by the Committee on the recommendation of the Sub-Committee.

4. That all witnesses, except the Minister, be asked to send, a week in advance, 50 copies of their brief in English, and 50 copies in French if possible, on a confidential basis until the time of presentation.

5. That the members of the Committee having suggestions to make concerning witnesses to be heard, submit their names and qualifications to the Clerk of the Committee who will transmit them to the Sub-Committee for decision. The Committee being informed and consulted before the witnesses are called.

6. That all the correspondence be directed to and kept by the Clerk of the Committee for further reference to the Sub-Committee.

7. That, due to the necessary representation of all parties, the number of members of the Sub-Committee on Agenda and Procedure be increased from seven to eight, including the Chairman, the Vice-Chairman, and one other Liberal, two Progressive Conservatives, and one representative of the New Democratic Party, the Social Credit and the Ralliement des créditistes.

8. That all necessary steps be taken to insure that members of the Committee or witnesses be able to use one or the other of the two official languages and consequently:

That the services of an official French shorthand reporter be secured and paid for the Committee's sittings in relation to French proceedings.

9. That the witnesses who are professionals, experts and specialists, called by the Committee, be reimbursed for their actual travelling expenses, plus a per diem allowance of \$50.00, subject to the provisions of Standing Order 69.

10. That the consideration of the advisability of hiring technical and clerical personnel be postponed to a later date.

On motion of Mr. Ryan, seconded by Mr. McBain, the First Report of the Sub-Committee on Agenda and Procedure was adopted.

Members of the Committee expressed the wish that they be supplied with maps showing the geographic area in connection with the matters before the Committee.

At 4:36 p.m. the Committee adjourned until Tuesday, October 27 at 3:30 p.m.

TUESDAY, October 27, 1964.

(3)

The Standing Committee on Mines, Forests and Waters met at 3:46 p.m. The Chairman, Mr. Godin, presided.

Members present: Messrs. Danforth, Davis, Godin, Habel, Harley, Laprise, Leboe, Leduc, Legault, Loney, McBain, Peters, Rock, Roxburgh, Smith, Turner and Watson (*Châteauguay-Huntingdon-Laprairie*)—17.

In attendance: The Honourable Arthur Laing, Minister of Northern Affairs and National Resources; Mr. J. A. MacDonald, Assistant Deputy Minister and Mr. T. M. Patterson, Director, Water Resources Branch.

The Chairman introduced Mr. Laing, who read a prepared statement which had been distributed in English and in French to the members of the Committee.

The Minister was examined at length by the Committee.

On motion of Mr. Leboe, seconded by Mr. Davis,

Resolved,—That the two maps displayed before the Committee be printed as appendices to this day's proceedings. (*See appendices I and II*)

At 5:20 p.m. the Committee adjourned until Thursday, October 29 at 3:30 p.m.

Marcel Roussin,
Clerk of the Committee.

EVIDENCE

TUESDAY, October 27, 1964.

The CHAIRMAN: Gentlemen, I see a quorum. I would like to inform the members of the committee that Mr. Small, who is in charge of the arrangements for the committee, has indicated to me that there are complete facilities for a bilingual service this afternoon on a test basis. I do not know what the equipment is which is here this afternoon, but you will see some of it on your table. I am told this is a test whereby they are using some new equipment or a new means of complete English-French translation. Furthermore, we have a French reporter who will take down any remarks which anyone may wish to make in French.

I am sure you do not wish me to introduce to you the witness who is here this afternoon, the Hon. Arthur Laing, the Minister of Northern Affairs and National Resources.

I should indicate to you at this time that no correspondence has been received by the clerk of the committee since our meeting on Thursday last.

(Translation)

The CHAIRMAN: I would like to tell the members that we have here this afternoon all the equipment necessary for simultaneous interpretation and to record the comments of those who wish to speak French.

Mr. Small, Director of the Legislative Services, told me that those instruments used here today are being used for the first time.

I do not know if all the members will be able to use those facilities but, at the end of the meeting, I would like to have your comments in that respect.

(Text)

Gentlemen, at this time I would ask Mr. Laing to present to the committee the information which he has so kindly consented to present to us this afternoon.

Hon. ARTHUR LAING (*Minister of Northern Affairs and National Resources*): Mr. Chairman and gentlemen of the committee, first of all I would like to tell you I am very, very happy to be here to initiate the hearings which your committee will be holding in respect of a study of the level of the great lakes. I am quite certain you are dealing with an economic segment and a geographic segment of a problem which has primacy in Canada today. I am quite certain it can be proven that of all the resources Canada has the first resource is our water resource.

We have heard a great deal about this in history; indeed the history books of the world are filled with stories of civilizations which have risen and fallen because of a lack of a water resource. In the world, even at the present time, there are major disruptions which are related closely to water. In a nation very close to us, the United States, there are areas where a shortage of water is approaching crisis proportions.

The subject which you are studying, namely the level of the great lakes, is, to many people surrounding the great lakes, a matter of crisis, too. You are studying this problem in relation to the area in Canada which at the present time is most interested in water and its future.

I have a lovely book written by Dr. Harrison Brown entitled "The Challenge of Man's Future". At the risk of keeping you a moment or two longer, I would like to read from this book because it has so simply told, it seems to me, the great science for every man dealing with water. At page 168 he says:

Approximately 30 per cent of the energy which reaches the surface of the earth from the sun is used for the evaporation of water. Each year 400,000 billion tons of water are lifted from the oceans and the land areas of the world and fall again as rain. Each year, on the average, over one pound of water in the form of rain or snow falls on every square inch of the earth's surface.

Over the land areas of the world, more water falls to the ground than evaporates, and the difference is carried back into the oceans by rivers and streams. Each year about 40,000 billion tons of water flow down our rivers and streams into the ocean.

My gentlemen in the division tell me that Canada's portion of this 40,000 billion tons is somewhere between six and eight billion tons; so, we are more than ordinarily blessed in the amount of the total rainfall which we receive on Canada. This is reflected in the fact that about 7 per cent of the land mass of Canada is covered with water.

He goes on:

Flowing water can be harnessed to perform work—a fact that was appreciated by the ancients who constructed the first water wheels. To what extent can these thousands of billions of tons of flowing water be harnessed so that the energy can replace the energy we now derive from fossil fuels? Waterpower, unlike fossil fuels, will be available for use as long as the sun continues to radiate energy. As distinct from coal and oil, our rivers and streams constitute a 'permanent fuel' which will always be available for tapping.

I am not going to read any further, but Harrison Brown goes on to state the other multi uses of water.

I think this committee can become one of the most important committees which has ever sat in a Canadian parliament. Concerning this resource, water, I believe there is a measure of public understanding at the present time, by a public which is more interested and even better informed than it ever has been in the past.

It seems to me that our whole system of government depends upon acceptance by a preponderant majority of the people of the country. I think our economic future is dependant upon a preponderant understanding of the resources we have. The field which you are undertaking to study, namely, the great lakes, is a limited field, but is not limited by population, because your studies are going to affect a very large portion of the total Canadian population when you study not only the lakes but the St. Lawrence river as well.

I want Canadians to understand the value of this resource. I am a little concerned that other than Canadians are understanding it as well as we understand it and probably better than we understand it. There are indications today that some people would like to see this resource, which is a resource within Canada, considered as a continental resource. If we use the wisdom which I hope we have, we will make sure that this resource, which is a Canadian resource solely—but which could become a continental advantage—is exploited and used to the full by Canadians for the advantage of Canada first. You may have some discussion along this line in your proceedings, and I am quite certain that while you are discussing the great lakes you will have brought to your attention the very keen interest which other than Canadians have in resources which lie within Canada.

I have with me today my assistant deputy minister of natural resources, Mr. John A. MacDonald, Mr. T. M. Patterson, director of the water resources branch, and next to him, Mr. R. H. Clark, chief of the hydraulics division of the department. I do not wish to keep the members of the committee too long, but I would like to read the statement which has been prepared by the department setting out our views of the tasks of the committee in the days ahead. I wish you well. I am convinced that the work of your committee is going to attract a very great deal of public attention.

I hope it will give Canadians—and I am sure it will—a far better understanding of this resource and the way in which it can be managed with wisdom in the future to the advantage of all Canadians.

In introducing the subject of great lakes water levels before this Committee, I have in mind the unique properties of water which make it essential to the life and growth of civilization. Next to air, water is perhaps the most important single constituent required for human existence. Despite this fact, we too often fail to recognize the priceless nature of water and its vital role in our lives and in our expanding economy until we are faced with a critical lack or surplus of it.

Canadian history is written in terms of ample fresh water in the flat and fertile plains of Ontario and southern Quebec and in terms of the canoe highways which defeated the unknown of our vast frontier. Today, more than ever, water is the key resource in Canada's development. It continually opens up new fields for industrial and agricultural growth. Water provides renewable energy and ready access to materials. Water still transports the bulk of our vital export trade—wheat, pulp and paper, lumber and minerals on their way to the world markets. Water, in most parts of Canada, is a prime recreational factor.

Considered as a whole, Canada has no shortage of water. Problems of water supply would hardly exist if the hydrologic cycle were more uniform in space and time. In the great lakes basin, where yearly precipitation over the past century has averaged about 32 inches, the hydrologic cycle slows down and speeds up from time to time so that periods of damaging drought alternate with dangerous floods. We can think of the hydrologic cycle as nature's plumbing system, although the pipes may be erratically arranged and the valves capriciously managed. Man is slowly becoming more skilful at forecasting fluctuations in this system and is doing something to improve the system.

It bears repeating that the whole question of water levels in the great lakes basin is complex. An understanding of the causes and the development of realistic solutions cannot be achieved without the examination of extensive and complicated technical data. The present low water levels on the great lakes and their outlet rivers have caused many people to give serious thought to the mechanics of water level variations. I suggest that this committee, Mr. Chairman, will be examining this subject in some depth and will bring before it the various points of view of the agencies and people interested in this complicated problem. If you allow me, I will try to sketch the various federal programs relating to the great lakes so that, as these programs are presented to you, they will fit into a better framework of understanding.

First a few words about the gigantic great lakes resource itself. The great lakes basin constitutes the major part of the St. Lawrence river system and has a drainage area, above the outlet of lake Ontario, of about 295,000 square miles. The five great lakes—Superior, Michigan, Huron, Erie and Ontario and connecting waterways have a total water surface area of approximately 100,000 square miles, or about one-third of the total drainage area. With this vast storage capacity, the great lakes provide probably the finest natural regulatory systems of fresh water in the world and produce an unusually uniform flow in the St. Lawrence river. Indeed the minimum recorded flow is about one-half the maximum

recorded flow. By contrast, the minimum recorded flow of the Columbia river at Trail near the international boundary is one fortieth that of 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 by a dam and gates which are under the supervision of the International Joint Commission. The natural supply to lake Superior has been increased by diversions from the Albany river basin through Ontario Hydro's Long lake and Ogoki projects, which commenced operation in 1939 and 1943 respectively. Over the years, the sum of these two diversions has averaged about 5,000 cubic feet per second.

Lakes Michigan and Huron are connected by the straits of Mackinac, which are so wide and deep that there is no perceptible difference in water levels between these two lakes. They behave as one, and are treated as such in all hydraulic studies. The natural supply of these lakes has been decreased by diversions from lake Michigan at Chicago into the Mississippi river basin. (Lake Michigan, it should be remembered, is wholly within the United States of America). The original diversion was by way of the Illinois and Michigan canal and commenced in 1848 for navigation purposes but was increased for sanitary and domestic uses. This diversion was discontinued in 1910, at which time it had reached an amount of 700 cubic feet per second. It was replaced by the Chicago sanitary and ship canal, which commenced operation in 1900 with a diversion of approximately 3,000 cubic feet per second and which by 1928 had increased to about 10,000 cubic feet per second per annum. Under a 1930 decree of the United States supreme court, the diversion was decreased progressively to 1,500 cubic feet per second by 1938, plus domestic pumpage. At the present time domestic pumpage averages 1,700 cubic feet per second. Accordingly, the total diversion out of the system at Chicago now amounts to 3,200 cubic feet per second.

The natural outlet for the discharge from lake Michigan-Huron is through the St. Clair river, lake St. Clair and the Detroit river into lake Erie. Over the years, improvements to increase depths in the navigation channels of these rivers have increased their discharge capacity. In later years measures were, and are being, taken for the purpose of compensating for some of 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 the New York state Barge canal. As a result of the vast storage capacity of the upper great lakes, the flow in the Niagara river is quite uniform and coupled with the concentration of fall at Niagara, presents the well known scenic spectacle and a hydroelectric power source of great value to Canada and the United States.

Lake Ontario is the lowest in the great lakes chain and, except for lake St. Clair, is also the smallest. About 85 per cent of the inflow to lake Ontario comes from the upper lakes. The discharge from lake Ontario and hence its levels, are regulated by dams in the St. Lawrence river at Iroquois and Barnhart island which we refer to as the St. Lawrence power project, built in 1958 by the Hydro Electric Power Commission of Ontario and the Power Authority of the state of New York with the approval of the International Joint Commission.

Downstream from this project, the St. Lawrence enters lake St. Francis, whose levels are controlled by the great Beauharnois power plant of Hydro-Quebec and a series of dams at the lake's natural outlet near Coteau landing. Below the Beauharnois plant lies lake St. Louis, Montreal harbour and the lower St. Lawrence. The waters of lake St. Louis and below are wholly situated in Canada, the river and the international boundary having parted company in lake St. Francis at the 45th parallel.

This, then, is a thumbnail sketch of the geographical disposition of the great lakes and their relationship to one another. This relationship is clearly evident from the wall map of this region and the lakes and their hydraulic relationships will be more fully described in the evidence which will subsequently be laid before you.

One of the striking factors about these great lakes is that, with the exception of lake Michigan, they are international waters and solutions to the problems of great lakes water levels will require the co-operation of the United States. It speaks well for the friendly relationship between Canada and her southern neighbour that the International Joint Commission, established under the terms of the Boundary Waters Treaty of 1909, has been able to resolve most of the questions involved in the use of waters of common interest without the generation of excessive political heat. At the present time, the International Joint Commission's authority over lake levels and river flows in this region extends only to lake Superior, sections of the Niagara river, lake Ontario, and the international reach of the St. Lawrence river. I should also recall that on October 7th Canada and the United States jointly referred the matter of regulating great lakes water levels to the International Joint Commission. I understand that in his statement, the Chairman of the Canadian section of the commission will describe the Boundary Waters Treaty of 1909 and the operations of the International Joint Commission in connection with the regulation of lake Superior and lake Ontario.

Although there has been much public discussion over the water resources picture and the problems in the great lakes area, there have also been wide differences of opinion as to the nature of such problems and the best means of overcoming them. You will recall that in 1960 this committee examined in depth the activities of the water resources branch of my department and in so doing reviewed some of the important water resources developments and problems in the nation and, consequently, became aware of the many federal agencies which enable the federal authority to discharge these obligations. Today, in addition to my own department, the departments of mines and technical surveys, transport, public works, national health and welfare and fisheries, the St. Lawrence Seaway Authority and the national harbours board are vitally concerned and have direct responsibilities with some aspects of the use of waters of the great lakes or as regards water hydrology concerning these lakes. In addition, of course, there are several provinces and states whose well-being is intimately linked to the water supply of the great lakes basin.

There is a great deal of information available about great lakes water levels and a great number of engineering studies and investigations have been carried out which have led to a better understanding of the variations in water levels. We are indeed fortunate to have over 100 years of record of water levels and outflows from the great lakes. The Department of Mines and Technical Surveys operates and maintains the water level gauges on the great lakes and also carries out investigations of groundwater moving under the surface of the land. This department also produces the nautical charts and publications for this great navigational complex. The interest of the Department of Transport in great lakes water levels arises both as a data collecting agency and as the authority responsible for navigation operations. The meteorological branch of that department maintains a network of stations which measure rain and snowfall in the basin and carries out research on meteorological factors affecting great lakes water levels. The Department of Public Works is responsible for dredging the harbours and navigation channels which are basic to the economy of our nation as well as of the region.

One of the prime necessities in planning the use of a resource is an inventory of the quantity available for manipulation. Water, because of its dynamic property presents special problems in this regard since its supply

fluctuates from day to day and year to year. To plan properly, it is not enough to guess at the pattern of these fluctuations. Using water levels collected and published by the hydrographic service of the Department of Mines and Technical Surveys, the water resources branch of my department has had for many years the responsibility of compiling records of both inflow and outflow from the great lakes. These records and the water level data from which they are derived are essential for the planning to be done now. Many useful hydraulic and hydrologic studies and investigations on the great lakes have been carried out by the water resources branch. These have provided the International Joint Commission and all agencies, provincial and federal with much background for the actions which the governments of Canada and the United States have taken with respect to lake Superior and lake Ontario. The studies of this branch have been continuing with respect to lake Erie and lake Michigan-Huron.

Many of these studies have been co-ordinated not only with the other federal agencies which I have mentioned, but also with the appropriate federal agencies in the United States who have similar responsibilities. It was as a result of the extreme high waters on the great lakes in 1952 and the imminence of the St. Lawrence seaway power project that the federal agencies of the two countries agreed to form the co-ordinating committee on great lakes basic hydraulic and hydrologic data. This committee has done a vast amount of useful work in developing data which have been accepted by the agencies of both countries. For example, the co-ordinating committee instituted a single agreed water level datum to which past and present water levels along the waterway from the mouth of the St. Lawrence river to the lake-head are referred. This datum was adopted in 1961-62 by agencies in both countries responsible for the hydrographic studies and charting of the system. To the layman, this statement may sound as a small reality. But in a field where measurements of water levels varied, it is akin to establishing in the great lakes system a "gold standard" against which all measurements are made. These matters will be brought out more fully in presentations which will be made to you.

Important research programs on the great lakes are being conducted within the great lakes institute, university of Toronto, the meteorological branch and the water resources branch to mention a few. These scientific programs are oriented more to the study of the individual factors affecting lake levels and their variable fluctuations, and the currents in the lake which affect movement and dispersal of pollutants. The Department of Transport operates the great lakes research ship "Porte Dauphine" on behalf of the great lakes institute. In addition, the institute is supported by grants from the national research council. This research is co-ordinated, in Canada, by the great lakes working group of the Canadian committee on oceanography. This government has stimulated and promoted active co-operation between the Canadian agencies and Institutes involved in great lakes research and the United States agencies similarly engaged to ensure maximum effectiveness of the total research effort.

There has been a tremendous increase in public interest in water resources problems both in the United States and Canada in the last few years. There are great opportunities for improving the quantity, quality and use of water. But first, there must be achieved a better understanding of natural phenomena such as the interactions of vegetation, soils and water, and how to influence these interactions to improve water resources. Often slight improvement resulting from increased understanding of the behaviour of water on and under the ground can lead to large savings.

Finding solutions to these problems will become more and more urgent on this continent (and elsewhere) since with the growth of world population

the consumption of water is expected to triple by the end of this century not to speak of vegetation (forests and crops) which are so dependent on water and which, in turn, mounting populations will need in tremendous quantities. To improve our understanding of water resources so as to be prepared for the day when water in many parts of the world will be the limiting factor in the progress of our civilization, the United Nations educational, scientific and cultural organization is promoting international co-operation in hydrology and has set up an international hydrologic decade commencing in 1965. Scientists from many countries will work co-operatively to seek answers to many hydrologic questions so that future water planning will be more effective.

Water resource development and flood control programs in Canada are proceeding at a very rapid pace. It is estimated that more than \$3 billion will be spent in Canada during the next ten years on the development of water resources to serve our nation. It is imperative that the projects on which these moneys are spent be designed on the basis of the best hydrologic data that can be made available.

A large proportion of the world's fresh water supply lies within Canada's borders. The success of a global study requires Canada's active participation and the Canadian program will be designed to develop as much information of immediate value to water resource planners as possible. A wide range of problems will be covered, most of which must be dealt with on a long-term basis, since many hydrologic factors cannot be correctly analyzed unless hydrologic data stretching at least over five to ten years are available. In recognition of the importance of Canada's water resources and the efficient development of these resources to an expanding economy, my department intends, as do the departments of transport and mines and technical surveys and other agencies, to play an active and significant role in the hydrologic decade activities in Canada. Although these research activities will ultimately provide a better understanding of water resources, we will have to proceed now with the data which is available to us. At the same time we should increase our emphasis on research in the general field of water resources.

In this context, I am happy to say that we have recently embarked on a long-term plan to increase the engineering, technical and support staff of the department's water resources branch by approximately 150 positions over the next five years. This increase will effectively represent a doubling of the existing manpower and should go a long way in filling the needs of the present and of the years to come.

I should also like to mention the existence of the advisory committee on water use policy, established by my predecessor the Honourable Jean Lesage. It has a hidden but extremely important role to play in these matters. It provides the machinery to bring together the various government departments and agencies active in this sphere; from what I have said here today you can readily appreciate that well developed coordination is the highway to success when so many factors must be considered.

My remarks may leave you with the impression that the basic problem of how to "spend" our water resources wisely is mainly to be left with engineers and other water specialists. I want to emphasize that this is not the case. An eminent Canadian scientist speaking of the great lakes recently said "We still have to learn how to live with this unique resource." The crux of the matter is there, and members of this committee will be truly discharging their responsibilities when they apply their knowledge of human needs and their grasp of national goals to add this further dimension of reality to the scientific facts already gathered together. Here as elsewhere in the field of natural resource management the only question that really matters is "How can this resource best serve man."

There is still another element of complexity that should not be left aside. While the present object of this committee's consideration is primarily that of water levels, it must be remembered that the water problems of the great lakes basin are inter-related with a number of other significant areas of concern. These are agriculture, forestry, wildlife, fisheries, and recreation, to name the more important ones. None of these can be studied in a vacuum and as such water level discussions must be a language common to these areas of reality.

In the general picture of natural resources water occupies a key position, and in the general picture of Canadian affairs I submit that the wise use of natural resources is a consideration which has a direct bearing on national unity and the country's growth. Because my department must take upon itself the responsibility of attempting to co-ordinate to a large degree the federal government's involvement in natural resources policies, I find that my approach to the present water problem cannot be separated from the thought that solution lies partly in ensuring that the various groups interested in this matter work towards a common objective. Again this brings me to repeating why I find the committee's consideration of this matter so worthwhile, since it will expose for all to see the many-sided efforts that are already being expanded to find answers to the problems posed by fluctuating water levels.

Mr. Chairman, I want to express my appreciation for the opportunity to appear before this committee which is about to embark on a very important undertaking, one that concerns a drainage basin, that is so intimately linked with the nation's heartland. I hope that my broad opening remarks constitute a helpful approach to the technical and detailed information that you are about to receive and discuss with the various experts you are calling.

Finally I want to tell you, Mr. Chairman and gentlemen, that the members of my department, some of whom will be witnesses before you, stand ready to supply you at all times so far as we possibly can with the information that you want. Let me in closing say that I think you have within this body a committee capable of rendering as great a service to Canadians as any committee that has ever been appointed in the history of Canada. It is important that Canadians know the quality, magnitude, and value of the resources that you are considering in this region, geographically, and in this economic region. But I am quite certain that many of the papers which are presented to you, and much that will be said before your committee will have an application in a sphere wide enough to be brought home to all Canadians and to indicate to them that a great measure of their economic future is allied with the studies that you are making. Thank you very much.

The CHAIRMAN: Thank you, Mr. Laing. I am sure the members would want me to thank you for accepting our invitation to appear this afternoon, and first of all giving us such a broad outline of the problems which have been placed before the committee; and, second, undoubtedly, for your indication that all the members of your department will be pleased from time to time to present the members of the committee with all the information available which, of course, your department as well as others possess. I trust that some members have problems to suggest or questions to ask, and I now invite the members to place before the minister any questions which they may have.

Mr. SMITH: I have a question relating to page 2 of your statement, Mr. Laing, where the variation of flow in the St. Lawrence is compared very favourably to the Columbia river at Trail. Is it not a fact that the variation of flow in the St. Lawrence at or near Montreal is of much more importance than the variation of flow in the Columbia at Trail because of the vital necessity of navigation in the St. Lawrence?

Mr. LAING: I certainly agree. You are dealing in one instance with Canada's greatest port, I think, as against the other instance, of a mere waterway in a great river which rises in Canada but goes down to Astoria, Oregon, where

the port is located at the mouth of the river. It has been suggested that the water level of the lakes has placed a crisis upon Montreal shipping. We have heard statements made that it has had the effect of reducing cargoes by as much as from 1,200 to 1,500 tons a ship, and shippers are saying—and I have no reason to doubt that they are presenting their case accurately—that it means the difference between profit and loss.

Mr. SMITH: The water levels in the great lakes are of vital concern to the port of Montreal.

Mr. LAING: It is the only place they can get water, except from the Ottawa river, with which to float ships.

Mr. DAVIS: The minister on page 12, I think, quite properly says:

...it must be remembered that the water problems of the great lakes basin are inter-related with a number of other significant areas of concern. These are agriculture, forestry, wildlife, fisheries, and recreation, to name the more important ones.

No mention is made in this presentation of possible diversions of other watersheds into the watershed of the St. Lawrence. Are the terms of reference of this committee such as to permit questions of that character to be considered in our deliberations here?

The CHAIRMAN: Is your question addressed to me or to the minister?

Mr. DAVIS: I am not certain.

Mr. LAING: Let me read to you from page 2 as follows:

The present low water levels on the great lakes and their outlet rivers have caused many people to give serious thought to the mechanics of water level variations.

This came to my mind when I was reading the brief.

Mr. DAVIS: Does the recent reference to the International Joint Commission by both Canada and the United States give power to the International Joint Commission to look beyond the basin of the St. Lawrence, or is that inquiry specifically limited to that basin?

Mr. LAING: The International Joint Commission will not be investigating any matter which is purely Canadian.

Mr. DAVIS: Then, if we in Canada are prepared to contemplate possible diversions which may or may not be feasible this is a matter for us to sort out among ourselves, first, at the provincial level and then later at the federal level, and so on.

Mr. LAING: I would say the committee is its own master and can make its own decision in respect of calling witnesses. I would expect that some of those people who have made such representations would be witnesses.

Mr. DAVIS: To what extent should we as Canadians consider water to be, firstly, a provincial resource and only secondly a matter of federal concern?

Mr. LAING: I think constitutionally it is provincial when it is entirely within the province. Of course, that is limited by international rivers, when it then immediately becomes a matter for national consideration. Then also there is the matter of those rivers which flow across provincial boundaries which are of federal concern.

Mr. SMITH: There is also the matter of navigation.

Mr. LAING: Yes, that also enters into it. As to the three prairie provinces, at the present time they have joined together in a committee now headed by Mr. Strom, the Minister of Agriculture for Alberta. This committee is considering the water resources of the Saskatchewan basin and it will be making recommendations to us in respect of their studies of that basin. I am referring to the Saskatchewan, which eventually flows via the Nelson into Hudson Bay.

Mr. DAVIS: Well, federal interest in respect of the great lakes or St. Lawrence is obvious, because it is an international waterway. But diversions from a north flowing river which is exclusively in either Ontario or Quebec would have to be studied co-operatively with the provinces and would be initiated by the provinces.

Mr. LAING: We have approached the two provinces concerned in respect of their views. I am informed that we have had tentative replies from the two provinces, but we are waiting their final views in this connection.

The CHAIRMAN: Would you proceed now, Mr. Rock.

Mr. ROCK: Mr. Laing, notwithstanding any arrangements or agreements with the United States of America or with the provinces, what technical solution have officials of your department in mind at present to solve the low water level problem?

Mr. SMITH: That is why we are here.

Mr. ROCK: I would like to know if your technical men or engineers at this moment have a solution to apply at this time? In other words, are they contemplating diversion of the northern waters or, in the future, diverting the present waters.

Mr. LAING: I pray that some of these plans may be unveiled as your deliberations proceed.

Mr. SMITH: Mr. Chairman, I have two questions relating to the minister's statement.

At page 6 the minister referred to the many federal agencies which enable the federal authority to discharge its obligations, which to me seems a rather euphemistic term. Have any steps been taken to reduce and consolidate the number of agencies with which we are now dealing which would help the government to discharge its responsibilities?

Mr. LAING: Of course, what we are dealing with are a great number of interests which are seeking primacy to the same waters.

Mr. SMITH: And, sometimes one without regard to the other.

Mr. LAING: Well, this is understandable, and this is probably one of the contributing factors that makes the sittings of this committee that much more important. As you know, we were told last year that Ontario hydro as a result of low levels was forced to buy some \$9 million more of American coal for thermal plant operation solely because of water levels. I know we are all aware of what low water levels mean to the resort owners along the lakes, and we have heard from the people in Montreal who are very primarily concerned with floating ships.

Mr. SMITH: So, you would not mind receiving instructions with regard to a simplification of the control?

Mr. LAING: Well, it is a matter of efficacy. I would be glad to hear about it.

Mr. SMITH: I have one short final question for today, and I do not expect you will be able to answer it at the present time.

At page 11 you mention the advisory committee on water use policy, and I would like to know the members of that committee. Also, I would like to know how frequently this committee met in the last few years.

Mr. J. A. MACDONALD (*Assistant Deputy Minister, Department of Northern Affairs and National Resources*): The advisory committee on water use policy is chaired by our department, either the deputy minister or myself. This committee is made up of representatives from the Department of Transport, the Department of Mines and Technical Surveys, the Department of External Affairs, the Department of Public Works, the Department of Finance, and the International Joint Commission as an observer, if it pleases to be present. I

am unable to give off the top of my head the number of times it has met but in the latter months, far more frequently than that.

Mr. SMITH: Am I correct in stating that it is an interdepartmental committee?

Mr. MACDONALD: It is an interdepartmental committee composed of—

Mr. SMITH: Composed of civil servants.

Mr. MACDONALD: Yes. The only purpose of it is to co-ordinate the advice given to the government.

Mr. ROCK: There are no provincial officials invited to this committee?

Mr. LAING: No. This is a committee of official advisors to the federal government and, as such, it gives advice to the federal ministers and the cabinet.

Mr. ROXBURGH: Mr. Davis put some questions to you, Mr. Laing, and I do not know just what to think about this matter of provincial rights. I note from your statement there is a good possibility that even though the great lakes water system is of national importance they could be controlled, at least to some extent, by the provinces; in other words, I suppose provinces could opt out—if you care to use that word. This causes me some concern. Am I correct in assuming that even though it may be of great national importance to change a river which runs north to south the provincial jurisdiction could say no.

Mr. LAING: The water resources resident within the province is a resource of that particular province. I think I could give an example in respect of the matter you are now raising. This might have been the attitude of the government of the day in respect of the Columbia river, where a tentative agreement in 1955 was undertaken by the province with an agency in the United States. That was qualified immediately by the entry of the International Rivers Improvement Act, which, in respect of an international river specified that permission would be required of the national government to put impediments on that part of the river in Canada. I would say that act instituted a new relation between the provinces and the federal government in respect of international waters.

Now, then, so far as resources confined within separate provinces are concerned—and I am dealing now with rivers that might traverse interprovincial boundaries—I would have to assure you there is a great consciousness today among the various provinces that it is conceivable the action of one province could have a deleterious effect upon its neighbour, as a result of which we find there is a very good intent.

Mr. ROXBURGH: The same that existed between California and Arizona in respect of the Colorado river?

Mr. LAING: Yes, and this is particularly pronounced in respect of the three prairie provinces. We find there is a consciousness which did not exist before. But, nevertheless, the point which Mr. Davis made with respect to waters within a particular province, that they have the proprietary right to them, so long as they are wholly within the areas of the province concerned, would not be contested by us with regard to such rights.

Mr. ROXBURGH: As you have stated so well, ordinary persons like ourselves are very much interested in the watershed of the great lakes. I had this brought to my attention recently when we had engineers come to my own area of lake Erie, which is one of the worst of all the lakes in respect of the low water level problem. We have come to realize that it is a terrific problem and deserves our greatest consideration. But, as you say, in respect of the heart of our country and our present water system, there will have to be some type of an agreement between provinces.

It seems to me we are having our own difficulties in other matters within our provinces at the present time. Is there anything being done towards bringing

about not only an understanding but an agreement between our provinces on waters that are running through the provinces and going to the great lakes?

Mr. LAING: I would think that one of the great merits of this committee will be to make it perfectly obvious to Canadians everywhere that while provinces may be jealous about those resources within their boundaries—and this is understandable because their revenues are obtained from their resources—they would understand that if these jealousies were carried too far, then everyone in Canada would suffer. I am quite certain that that feeling exists in Canada today and I am quite certain that the consequences of a purely jealous policy would be more manifest when your committee has concluded its hearings.

Mr. WATSON (*Chateauguay-Huntingdon-Laprairie*): Mr. Laing, has it been the experience of your department that there is now a lack of co-ordination between the various agencies that are involved with the great lakes water levels and the problems of research?

Mr. LAING: We would not agree that this seeming lack of co-ordination is any greater than might be expected from the multitude and value of the varied interests concerned.

Mr. WATSON (*Chateauguay-Huntingdon-Laprairie*): Does your department feel at the moment that there is a need for an over-all coordinating water resources board for Canada or some similar type of agency, or else an international type of organization?

Mr. LAING: There is a great deal to be said for the largest possible number of studies in various spheres being made, and a great many studies are made today independently of one another. It seems to me that here is a field where the more study is made, even in local problems or local situations, the better for us, so long as those studies are brought to a central point and that out of the multitude of findings the best plans must be devised.

Mr. PETERS: I wanted to ask the minister whether there has been any deterioration in the water level owing to the seaway. If so, how much? What change has been brought about by deepening and widening the seaway? Is part of the problem of the great lakes stemming from the fact that we did deepen the seaway and we did increase its size, and is the federal government contemplating some control to maintain the original level that was in existence before the deepening of the seaway?

Mr. LAING: I do not want to anticipate any of the briefs that will be put before you, and I am quite certain that this will be dealt with in full by the witnesses.

Mr. PETERS: This must have been considered before Canada and the United States agreed on enlarging and deepening the seaway. Obviously a survey must have been done and an estimate carried out of how much change there would be. Has this change been greater than was anticipated?

Mr. T. M. PATTERSON (*Director, Water Resources Branch, Department of Northern Affairs and National Resources*): Mr. Chairman, it was recognized that the dredging of the seaway channel through the St. Clair river would increase the outflow of lake Huron and tend to draw the level of the lake down. The dredging was undertaken on the understanding that compensating works would be placed in the river either through the deposit of the material dredged or through the construction of dikes or sills on the bottom of the St. Clair river. These dikes or sills have not been placed there as yet. They are under study in hydraulic models to determine the proper place to put them to do the job that they are supposed to do so as to compensate for any lowering. They are to be placed in there by the United States government which did the dredging.

Mr. LAING: This matter will be before the committee, I take it. Will it not, Mr. Patterson?

Mr. PATTERSON: It will be included in the material that will be presented to the committee in due course.

Mr. LEOE: As I looked at the list of the departments it seemed to me that while this is a provincial resource we do have a Department of Forestry which has to do with the forest cover. Would not the Department of Forestry be very vitally interested in the matter of the forest cover?

Mr. LAING: I am told they are members of the committee.

Mr. MACDONALD: Yes, both in the forestry aspect and our aspect.

Mr. SMITH: When you mentioned the Chicago diversion I noted that it is a very popular subject of comment by all speakers on it. Is there any policing or measurement or check done by the United States federal authority or by the international authority regarding the diversion and if so how does that check operate.

Mr. LAING: Could I ask Mr. Patterson to reply?

Mr. PATTERSON: Mr. Chairman, the diversion is allowed under an order of the supreme court of the United States. The court ordered that Strom could divert 1,500 second feet through the canal plus the requirement for the domestic pumpage. At the present time domestic pumpage amounts to approximately 1,700 cubic feet per second, so the total diversion at Chicago is 13,200 cubic feet per second. This is measured at Lockport below Chicago by the United States corps of engineers. They report to the United States supreme court as to the amount Chicago is actually diverting. We in the department get copies of the records that they obtain in their measurements.

Mr. DANFORTH: I would like to direct a question to the minister. As I understand it, in our terms of reference we deal specifically with the water levels of the great lakes, and there is no mention of pollution. Will we not, as a committee, of necessity get into this field? I am thinking primarily of the fact that it is stated in the report here that the water was diverted at Chicago for sanitation. We in Ontario are all aware that pipe lines are being constructed to draw water out of the lakes for strictly domestic use. Does the minister not feel that we will of necessity have to get into this field?

Mr. LAING: I would certainly think that you will be studying this matter because it affects the levels of the lakes.

Mr. DAVIS: I would like to address one or two additional brief questions to the minister. At the bottom of page three several figures are given in relation to diversion out of the great lakes and out of lake Michigan to the Mississippi system through the Chicago sanitary and ship canal. The figures, as I interpret them, suggest that today the amount of that diversion in total is roughly a third of what it was in the late 1920's. Is that correct?

Mr. PATTERSON: As I said a moment ago, Mr. Chairman, the present diversion at Chicago is 3,200 cubic feet per second. At one time, approximately in 1928, this was as much as 10,000 cubic feet per second over a year, and in certain months it was much greater than 10,000 cubic feet per second. It is therefore about a third of the maximum annual rate.

Mr. DAVIS: So that the United States withdrawal at that point for this purpose, the purpose of this canal, has been substantially reduced?

Mr. PATTERSON: Under order of the United States supreme court.

Mr. DAVIS: How does the amount of the present withdrawal compare with the total flow of the St. Lawrence at Niagara? Is it a minute percentage? Could you give us some idea of how big that withdrawal is?

Mr. PATTERSON: In the order of 1½ per cent.

Mr. SMITH: I notice in reading the minister's statement that the Chicago diversion is just about equal or slightly larger than the Ontario hydro diversion in lake Superior. Have I read the statement correctly? I saw that there were 3,000 cubic feet per second diverted into lake Superior.

Mr. PATTERSON: I think the total diversion in lake Superior by Ontario hydro averages about 5,000 cubic feet per second. So, it is 1,800 cubic feet per second greater than the Chicago diversion.

Mr. DAVIS: Perhaps this question cannot be answered now, but will it be possible for this committee to obtain some measure of current withdrawals from the great lakes system for municipal, industrial and other purposes, (a) by Canada, and (b) by the United States side, and what is the trend?

Mr. LAING: Mr. Patterson, will we have this information available?

Mr. PATTERSON: Mr. Chairman, no study has been made having to do with the current withdrawals by cities, towns and industry along the shores of the great lakes. It has been recognized by engineers who have looked into this matter that diversions for such domestic purposes are returned to the great lakes system; that is, there is very little loss in water through diverting it to cities.

Now, with the introduction of modern thermal plants where water is diverted for cooling purposes, the return from those plants is not anything like 100 per cent, because a great deal of this water in cooling is given off in evaporation. This is a subject which we must start to look at more closely, because in present day industrial uses trends are toward the utilization of water and dissipation of water that is in the great lakes system. Currently I do not think the amounts that are lost are very measurable, but the trend is becoming greater.

Mr. LAING: May I ask you a question. The province of Ontario has indicated it is going into wholesaling of water; we have heard some mention in the house—and I think Mr. Danforth raised it—about a contemplated 72 inch pipe going to London, Ontario, 42 miles inland. Could you give us some idea of how much water that will take out, what proportion of it will be returned to the lake, and what indication there is that Ontario is going to develop this scheme of wholesaling water? Also, would you indicate to us what effect you think this might have on the lake levels?

Mr. PATTERSON: The ultimate capacity of the proposed pipe line out of lake Huron for London and other municipalities along the route may by the year 2,000 reach as much as 1,000 cubic feet per second. Their current plan up to 1975 for the city of London is a matter of a few hundred cubic feet per second. This water is to be used domestically and returned to the sewers and the ground in the area of London; it will then reach the Thames river, and a very great percentage of it will return through the Thames river to lake St. Clair and back to lake Erie. It is true that some additional evaporation will take place and that some of the water will be lost, but the bulk of it will be returned to the great lakes system. It is not a diversion from the system such as at Chicago.

Mr. DAVIS: Is information in respect of water tables or ground water surveys and that type of thing collected by the water resources branch of northern affairs, or by the Department of Mines and Technical Surveys; is it all under one department or under several?

Mr. PATTERSON: The water resources branch of the minister's department collects the ground water data; that is the surface flow. In the Department of Mines and Technical Surveys, in the geological survey branch, they have a service which makes records of the water table beneath the ground. So, the two are collected in separate departments; the Department of Mines and Tech-

nical Surveys collects what we call the ground water data, and the water resources branch collects the surface water data.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Have any representations been made to your department by any government agency in the United States suggesting the creation of a North American water resources agency; have you received any representations or suggestions to this effect?

Mr. LAING: The answer is no. However, I think this is an appropriate time to tell you they have been around; but there have been no proposals. There is no government proposal. The proposers of schemes have been around, but they have made no proposals either.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Is the federal government participating in the meetings of this interstate group that was set up a few months ago and which acquired a fair amount of publicity?

Mr. LAING: We have had a letter from a group of states. I believe there are eight states involved. When they heard about this committee being established they wrote us asking whether they would have an opportunity to appear before the committee. So, the interest is there. This, of course, is a matter for the committee and not for me to decide.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): To date we have not been participating in any of their deliberations.

Mr. MACDONALD: Presumably you are referring to the Great Lakes Commission which is a body of United States states bordering on the great lakes. This spring I believe they invited representatives from the province of Ontario and the province of Quebec, but it is not a matter in which the federal government per se is involved.

The CHAIRMAN: Probably you will recall that at our meeting last Thursday I read a paragraph from a letter addressed to the minister from Mr. Meserow, chairman of the Great Lakes Commission, stating he was very pleased that parliament was making a study of the great lakes level and would appreciate the opportunity of testifying.

Mr. SMITH: My question is directed to Mr. Patterson. Have any studies been made with relation to the evaporation of water from open lakes compared to evaporation of marsh land water?

Mr. PATTERSON: Mr. Chairman, the study of evaporation is a very involved one. The comparison of evaporation from land surfaces and from water surfaces is a very difficult one to make, because it is difficult to obtain evaporation data from a water surface; it is difficult to maintain evaporation pans on large surfaces of water. However, attempts have been made; many evaporation studies have been made, and if the committee desires some information on this we can endeavour to put together the results of studies which have been made and give this to the committee.

Mr. SMITH: With reference to a lake such as lake Huron or lake St. Clair where there is no artificial barricade to the water flow, if the water in lake Huron is relatively high, then the flow into lake St. Clair increases at a more rapid rate; is that right?

Mr. PATTERSON: That is true. The outflow from lake Huron through the St. Clair river increases by 17,000 cubic feet per second for each foot of rise.

Mr. SMITH: So that conceivably if the inflow of water into lake Huron from the tributary rivers and tributary marshes and streams were controlled it would have a stabilizing effect on the level of lake Huron?

Mr. PATTERSON: If the supply to lake Huron—

Mr. SMITH: The inflow.

Mr. PATTERSON: Yes, the inflow or the supply. If that were curtailed the level of lake Huron would fall.

Mr. SMITH: And that would mean what?

Mr. PATTERSON: That would reduce the flow on the St. Clair river and lake Erie would fall, and that would reduce the flow of the Niagara river.

Mr. SMITH: It would have the effect of stabilizing the whole, of cutting out some of the highs and lows?

Mr. PATTERSON: I do not think you could cut out the lows; you would exaggerate the low if you cut off the supply.

Mr. SMITH: I am thinking of storing before it goes into lake Huron. If you stored and the inflow was regulated to lake Huron, would that not help to alleviate the lows by increasing the inflow to lake Huron at times when it was low?

Mr. PATTERSON: If you could find a capacity in which to store the water which is now stored in lake Huron—which is an enormous body of water—you would have to flood out most of Ontario to hold that water.

Mr. SMITH: If you were to have a lot of small inflow controls and a lot of small storages—comparatively small—and if for instance the spring run-off in all the rivers and all the inflows to lake Huron were controlled and you were to have some storage capacity, in a conservation sense, would it not then help to control the upflow and the downflow of lake Huron?

Mr. PATTERSON: It would help to control it; I will not deny that. It would be an enormous undertaking.

Mr. SMITH: It may be one that we may have to look at one of these days.

Mr. ROXBURGH: But do not make lake Erie any shallower than it is now. If you were to do that we would be walking across or going across on horseback. It is the shallowest lake in the great lakes chain.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): May I ask a supplementary question, Mr. Chairman?

The CHAIRMAN: Mr. Watson.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Mr. Patterson, what is the percentage relationship between the water that comes into Huron from Superior and the water which flows into Huron from the various rivers about which Mr. Smith is talking? Have you any figures on that?

Mr. PATTERSON: The presentation that I hope to make to this committee if I am called upon to do so will contain the relationships between the different sources of supply.

Mr. ROCK: May I ask a supplementary question, Mr. Chairman?

The CHAIRMAN: Mr. Rock.

Mr. ROCK: I am considering the hydroelectric installations in the region down to the St. Lawrence region. Is there more free flow of water during winter and springtime than during summertime? I am referring to the dams that hold back water. Are they more freely open during this time than they would be if the water were to go through the power plants to develop power? Do you have that information?

In asking that question I am reverting to what Mr. Smith asked previously with regard to holding back water during the spring thaw. Is there any complication with regard to hydro development during that period?

Mr. PATTERSON: A major complication which might arise with the flow of water as between summer months and winter months would arise from the condition of the ice which forms in the rivers and cuts off the flow out of lake Huron. We have no definite figures on this but it varies between winters and between days in the winter owing to the formation of ice, which is greatly affected by weather conditions.

While lake Huron might be at the same level in two different months, one summer and one winter, the outflow in the winter months may be greatly curtailed owing to the ice clogging in the winter and cutting off the channel and, in effect, forming a dam.

The amount of water that flows through the Niagara river that can be utilized by the power companies and the power commissions is settled by the Niagara treaty, which requires that in the winter months 5,000 c.f.s. must go to the falls and during tourist time, the summer months, 1,000 c.f.s. must go over the falls. The remainder of the water can be diverted for power purposes and is diverted under present conditions for power purposes.

Mr. LEBOE: On a point of order, Mr. Chairman, I think we are going to run into a great deal of duplication here if we do not get organized. Let us hear some of the evidence which these people have to present to the committee so that we can properly analyze that evidence and then ask pertinent questions to the briefs or projects with which they specifically deal.

Mr. ROCK: I agree.

Mr. LEBOE: I am sure I sense an uneasiness around the committee in connection with the way in which this is going.

The CHAIRMAN: Yes, we may run far afield if we continue in this manner. The brief of the minister has been presented and I see no other members of the committee who have questions to put.

Mr. PETERS: I have a question, Mr. Chairman.

The CHAIRMAN: Mr. Peters.

Mr. PETERS: I would like to ask a question of the minister.

Are any new works contemplated in the immediate future that will have an effect on water levels in the great lakes basin? Is there any such development now under active consideration of which we should be informed?

Mr. LAING: I think, specifically, this will be the responsibility of the International Joint Commission study. We now have the levels of two lakes controlled, namely Superior and Ontario. There have been suggestions made that control by sills and so on could be extended to other lakes, as Mr. Patterson has explained, and I think this will be the particular nature of their study. They have been asked to do that.

Mr. PETERS: Is this in the agreement that was made with the United States at the time of the deepening and increasing in size of the great lakes, the seaway, the locks and control dams? Was this part of their agreement?

Mr. LAING: I would ask Mr. Patterson to reply to that.

Mr. PATTERSON: Yes, Mr. Chairman, when Canada agreed to the deepening of the St. Clair river part of the agreement between the two countries was that the United States would place compensatory works in the form of the dredged material or sills at the bottom of the St. Clair river which would compensate for the effect that otherwise would result from the deepened navigation channel. These studies are continuing, and they do intend to put these in.

Mr. LAING: I am indebted to Mr. Leboe for his observation on the complexity of this matter. I invited that by the wide scope of my remarks this afternoon.

I would like to say that while the provincial interests in the water resources within the province is paramount, nevertheless we have taken the stand that we are prepared to take—and we think we must take—national leadership. We are prepared to use national government funds to assist that for the widest possible value to all Canadians.

Mr. PETERS: I have one last question.

What is the policy of your department in relation to the works that are being undertaken by authorities in terms of flood control? Is there any change? When we are looking at this will we be able to look at it as it has been for a number of years, or have there recently been any changes in the work being done through authorities to control small rivers and things of that nature?

Mr. LAING: Mr. Patterson, have you any comment on that?

Mr. PATTERSON: I do not know that I follow the full significance of Mr. Peters' question, but I do not think there is any difference in policy as it affects the study that this committee will give to the problem.

Mr. LAING: There has been an increasing interest through the Canada Water Conservation Assistance Act, with which you are familiar.

We find that primarily the benefits of the act have been used rather regionally, and particularly in the Toronto area where there seems to be great awareness of its benefits since the federal government pays 37½ per cent. There is now an interest in British Columbia in one or two places, and we have had discussions with the minister of lands and forests in British Columbia in respect of the report of the Fraser river board.

There is an increasing interest in this field.

Mr. SMITH: It was hurricane "Hazel" that brought it home to all the authorities in the Toronto area that there was a necessity for conservation.

Mr. LAING: They have taken very great advantage of it and for the very large city of Toronto it seems to me to embrace a set of advantages that are fantastic.

Mr. DAVIS: Is it your intention or is it the intention of the committee to include these two very useful illustrations which I see behind you, Mr. Chairman, in the proceedings of this committee?

The CHAIRMAN: I do not know exactly why they are there, but it gives me something to look at with great interest. Usually members will make a request if they would like a map which is shown. We sometimes have prints made of them and add them as an appendix to our minutes. Is that the wish of the committee?

Mr. LAING: The department will co-operate in every respect. It has been suggested that certain models may be produced as time goes on, and made available, or cuts of models, or any material we possibly have. It has even been suggested that the committee might benefit from a tour of the location, but I do not offer safaris at this early date.

Mr. SMITH: You mean to let us see some of the Chicago diversion?

The CHAIRMAN: At the bottom of the lake?

Mr. LAING: At least to see some of the more important measures which are presently being taken in respect of controls.

Mr. DAVIS: My other question deals with a reference on page ten, to the international hydrological decade commencing in 1965. This is a project of the United Nations to improve our understanding of water resources. Is there any information being generated in this connection which might be useful to the committee?

Mr. LAING: We have already set up a national committee under General Young. Mr. Clark who is here with Mr. Patterson, is secretary of the committee. Again, it might be advantageous if the committee were interested, to call them. But again, the committee is the master of its own destiny in this respect.

Mr. DAVIS: Thank you.

The CHAIRMAN: Might I have a motion, if the members are interested, to have copies of these two maps?

Mr. LEBOE: I so move.

Mr. DAVIS: I second the motion.

The CHAIRMAN: It has been moved by Mr. Leboe and seconded by Mr. Davis.

Motion agreed to.

I see no more hands up except those holding cigars. I presume that does not mean questions. But I have a question of the minister to help the functions of the committee. Mr. Danforth in a question earlier asked if pollution would be a matter of study, and the answer was that our study relates to waters taken from the great lakes but not necessarily to pollution. You will recall that your steering committee decided that it would not study pollution as such at the same time as it studied great lakes levels.

I realize that one part of the question has to do with the taking out of water. This is most pertinent to our study, but it would become confused with much municipal evidence we would have to receive through a study of pollution. So I wonder if the minister could enlighten us as to this situation? It was felt that we would not study pollution of waters of the great lakes. It could be mentioned. I realize that the committee should know all the data about the taking out of the water. But in many municipalities, especially in Canada, to my knowledge from reading reports of conservation authorities the lagoon system is implemented in great numbers throughout the province. I realize that when water is taken out, the same amount may not be returned to the great lakes. And in that light, as Mr. Patterson has stated, a study could be made. There is no readily available data, if I interpret the information that Mr. Patterson has suggested, as to what amount is taken out. Apparently data has not been accumulated. But he said that a study might be made with evidence presented to the committee. I think we should do it. Possibly the minister might tell us about the problem of pollution itself, and whether we should take it under consideration.

Mr. LAING: I would rather hope not for two reasons principally. I am informed that there is a separate reference to the International Joint Commission in respect of the pollution of the great lakes, which are said to be seriously polluted at the present time. So the International Joint Commission will be considering the pollution problem within the great lakes. Second, one of the means by which we are endeavouring to advance the concept of national resources in this whole sphere is the arrangement we have with the provinces for the resource ministers conference. Only a couple of months ago they decided that in 1965 there should be a national conference to deal with the pollution of soil, air, and water, involving all three levels of government. It will be a thorough study of pollution, which is an enormous sphere by itself. I would think that your committee would be fully occupied with the matter of water in general rather than the matter of pollution studies which in any case with respect to the great lakes will be undertaken by the International Joint Commission.

Mr. ROCK: On that same subject, I believe you must realize certain facts, namely, that when we have a low water level in the flow of rivers, this adds to pollution. But where the flow is proper, there would not be too much contamination. Since the water levels are very low at certain times of the year, because of the low water situation which develops, it will cause contamination within this area. So possibly in this case pollution could come into the picture because of the low water level in certain areas.

Mr. LAING: I think that the question of pollution would no doubt enter some of the discussions and some of the briefs, but I think it should be regarded as being an item outside the scope of the committee, because we have it in

the matter of the resource minister's conference, and it is a fantastically large thing by itself.

Mr. ROXBURGH: And it has to do with water levels.

Mr. ROCK: We cannot make any hard and fast decision on it at this moment.

Mr. DANFORTH: I think it would serve the purpose of the committee if we used the words "sanitation and water for domestic use"; we might thereby circumvent the difficulty, or arrive at the very principle we would wish to establish.

The CHAIRMAN: Is your question addressed to me?

Mr. ROCK: Why not make it "water intakes to municipalities"? I think that is very important.

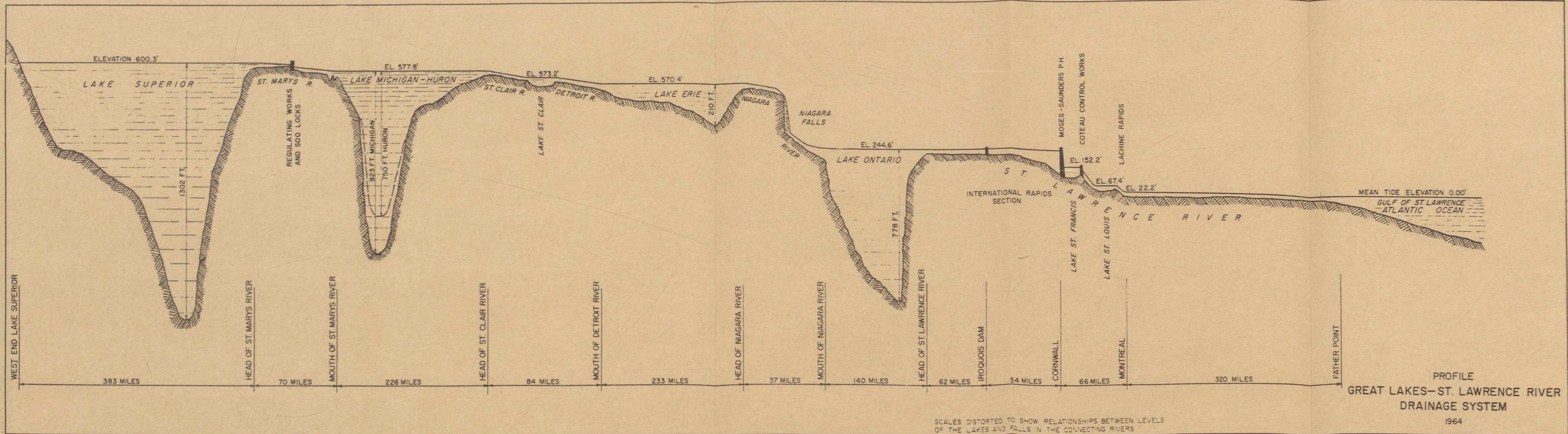
Mr. LAING: There is a great deal of comment nowadays with hands being held up in high horror about water being polluted. The fact of the matter is that water is the chief means by which we carry away waste. This is another way of looking at it. Without it, I do not know what we would use. To that extent the use of water for that purpose is right within the hands of the committee.

Mr. ROCK: Why not say "intakes and water supplies to the municipalities"? When the lakes are low, they do not get the same grade of water that they would get when the lakes are high, and I think this is important. I believe it will come in, in any event.

The CHAIRMAN: No great accumulation of information has been obtained as yet on the taking of water from the great lakes. I believe our committee would want to obtain this information and would require the department to make a statement on water taken out; in other words, the quantity of water in the great lakes and what may be taken out as a pertinent quantity of water. But the quality of the water in the great lakes is not pertinent to a complete study by this committee, and it may be brought in through some information or other, but it is not pertinent to the order of reference to this committee. I trust I have made myself clear.

I have one last question which has interested me greatly. I do not know what page of your brief it is on, but it had to do with the question of whether the great lakes water system should be considered as a Canadian asset first of all, or as a continental advantage. I believe you made reference to our neighbours. I trust that members in making requests for evidence to be heard will keep that in mind. I think we should make a study first of all as to the scope of the water levels of the great lakes, and second, as to the rapport which it might have on our neighbours in the United States. Are there any other questions? We already have passed the motion for the maps.

We shall meet on Thursday at 3.30 o'clock or after the orders of the day, when our witnesses will be Mr. H. Wershof, assistant undersecretary of state, Department of External Affairs, and Mr. Arnold Heeney, chairman of the Canadian section of the International Joint Commission. The meeting now stands adjourned.



HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 2

THURSDAY, OCTOBER 29, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

WITNESSES:

Mr. Max Wershof, Q.C., Assistant Under Secretary of State, Legal Adviser,
Department of External Affairs, and Mr. Arnold Heeney, Chairman,
International Joint Commission.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

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Vice-Chairman: Mr. Ian Watson

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Alkenbrack,
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Carleton*),
Granger,
Grégoire,

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Herridge,
Laprise,
Leboe,
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Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,

Noble,
Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

Marcel Roussin,
Clerk of the Committee.

MINUTES OF PROCEEDINGS

THURSDAY, October 29, 1964.

(4)

The Standing Committee on Mines, Forests and Waters met at 5:18 o'clock p.m. The Chairman, Mr. Godin, presided.

Members present: Messrs. Aiken, Godin, Laprise, Leboe, Leduc, Legault, Loney, McBain, Rock, Roxburgh, Ryan, Stenson and Watson (13).

In attendance: Mr. Max Wershof, Q.C., Assistant Under Secretary of State, Legal Adviser, Department of External Affairs, and Mr. Arnold Heeney, Chairman, International Joint Commission.

Mr. Wershof was questioned by the Committee in connection with some international aspects of Great Lakes levels. He suggested that the synopsis he was using be distributed later on, in English and in French, to the members of the Committee.

Mr. Heeney read a prepared statement on *The Great Lakes Basin Water Levels*, which had been distributed to the members of the Committee along with other documents and papers respecting the International Joint Commission.

Both witnesses were permitted to retire, subject to recall.

At 6:22 p.m. the meeting adjourned until Tuesday, November 10, at 3:30 p.m.

Marcel Roussin,
Clerk of the Committee.

EVIDENCE

THURSDAY, October 29, 1964.

The CHAIRMAN: Gentlemen, I see a quorum and I am very pleased.

I have actually no correspondence to report to the committee other than a letter I received from Mr. Gray of Montreal, who has requested the reports of our proceedings. Mr. Gray also has asked permission to sit with us as an observer. On behalf of the committee I advised him we would be very satisfied to have him sit in on our meetings.

We have two witnesses with us this afternoon. Mr. Wershof and Mr. Heeney. Mr. Wershof is assistant under secretary of state of the Department of External Affairs and Mr. Heeney is the Canadian chairman of the International Joint Commission. Now, I do not want to start a battle between these two witnesses but my list shows that Mr. Wershof will proceed first followed by Mr. Heeney. However, you gentlemen may have made arrangements between yourselves in respect of your schedule.

Mr. M. H. WERSHOF (*Assistant Under Secretary of State, Department of External Affairs*): Mr. Chairman, my statement will be short.

Mr. ROCK: Mr. Chairman, that is not the right time showing on the clock, is it?

The CHAIRMAN: No. We have nearly 45 minutes until we adjourn for dinner.

Would you proceed, Mr. Wershof.

Mr. WERSHOF: Mr. Chairman, thank you very much. My name is Wershof and I am the legal adviser of the Department of External Affairs.

I am appearing today on behalf of the department to outline some of the international aspects of the question of great lakes levels with the exception of the role of the International Joint Commission which will, of course, be explained by Mr. Heeney, the Canadian chairman of the commission.

With your permission, my intention is simply to give some of the factual background against which the committee will be looking at this problem and I will not attempt to deal with the substance or to advance any solutions.

I am going to refer to the treaties, agreements or other international legal principles which have a bearing on great lakes levels. I will also refer to the diversion of water at Chicago, which is one of the international aspects of the problem.

I have available a brief synopsis prepared in our department of the agreements between the United States and Canada relating to great lakes water levels or, at least, having any bearing on the subject. I apologize for the fact that that synopsis is not ready today for distribution in French and English to members of the committee. However, it will be available within a few days and, consequently, unless the committee wanted me to read it at this moment I will simply refer to it, and then distribute it to the committee within a few days.

The CHAIRMAN: Thank you. Would the committee be agreeable to Mr. Wershof making only references to it today as he proceeds and then we all will receive copies within a few days.

Some hon. MEMBERS: Agreed.

Mr. WERSHOF: Therefore, without reading the statement at this time I might mention that clearly the most important of the international agreements

is the Boundary Waters Treaty of 1909 between Canada and the United States, which is a comprehensive treaty and sets out the terms and conditions under which the levels of Canada-United States boundary waters may be altered.

The synopsis also makes reference to the exchange of notes between Canada and the United States in 1940 concerning the Long Lac-Ogoki diversion into the great lakes water system and the synopsis also will refer to various Canada-United States agreements concerned with the great lakes connecting channels, as well as a miscellaneous group of agreements relating to dredging operations in the great lakes. When the synopsis has been circulated I hope it will be helpful to the committee, and I will not try to go further on that point at the present time.

May I refer briefly to the Chicago diversion. Since shortly after the turn of the century, the Chicago diversion has been a subject of representations by Canada to the United States because of the unilateral withdrawal of water from the great lakes basin which the Chicago diversion involves. At the present time, Chicago is authorized—and when I say “authorized” I mean authorized under United States law and not by the Canadian government—to take 1,500 cubic feet of water per second from lake Michigan. This water is used for navigation purposes and for dilution of sewage effluent in the Chicago sanitary canal. The water thus diverted is not restored to lake Michigan.

In addition to the 1,500 cubic feet per second mentioned above, Chicago is also permitted to draw an unlimited amount of water for domestic purposes. The diversion for domestic purposes presently amounts to 1,700 c.f.s., bringing the total diversion to 3,200 c.f.s.

In 1959, the dispute which had arisen in the United States between Illinois and other great lakes states over the Chicago diversion came before the United States Supreme Court. The legal cases involved include, on the one hand, an action to enjoin the sanitary district of Chicago to restore the domestic pumpage taken from lake Michigan and, on the other hand, an action which, if successful, would authorize a suburb of Chicago to withdraw water from lake Michigan over and above the amount which the city itself is already authorized to withdraw.

A Special Master was appointed by the court to hear evidence on both sides of the dispute and to make a report to the United States Supreme Court. In 1961 and again in 1964, the Canadian government, through its ambassador in Washington—in 1961 Mr. Heeney was the ambassador—conveyed to the United States government its opposition to diversions such as that at Chicago. With the agreement of the Canadian government the State Department transmitted the 1961 note to the Special Master who accepted it in evidence, in the court case. The second note of the Canadian government in 1964 was also transmitted to the Special Master.

I might interject that the Special Master has not made his report yet to the supreme court so, therefore, we really do not know what is going to happen next in this great law suit.

Lastly, Mr. Chairman, may I make a brief reference to the Long Lac-Ogoki diversions. Works which divert 1,300 cubic feet of water per second from Long Lac—which normally flows into James bay through the Kenogami and Albany rivers—into lake Superior were completed in 1941.

Similar works diverting 3,700 c.f.s. from the Ogoki river, also in the Albany river basin, into lake Superior were completed in 1943. The Long Lac and Ogoki diversions have added 5,000 c.f.s. of water to the great lakes basin from a watershed lying wholly within the province of Ontario.

This diversion is the subject of an exchange of notes dated October 14 and 31, and November 7, 1940, between Canada and the United States which

provide for utilization for power at Niagara Falls by the province of Ontario of additional water equivalent to the amount of the diversion.

In the Niagara Treaty of 1950, dealing with the diversion of the Niagara river, reference is made to the waters added to the great lakes basin through the Long Lac-Ogoki diversion. This treaty contains a provision agreeing that these additional waters shall continue "to be governed by the notes exchanged between Canada and the United States on October 14 and 31, and November 7, 1940."

I realize that without the synopsis of agreements in front of members of the committee, perhaps some of these statements I have made are not as clear as they might be. But within a few days we shall submit to the committee for distribution the synopsis of agreements, and if after the committee has seen it, it would like more details about any agreement, we would be glad to provide them for you.

The CHAIRMAN: Thank you, Mr. Wershof. Would you like to receive some questions at this time?

Mr. WERSHOF: Yes, so far as I am concerned, but not having yet tabled the synopsis, perhaps it would not be quite fair to the Committee. So if at a later stage you wish to recall me, after the material has been distributed, I shall be very glad and happy to respond.

The CHAIRMAN: I am sure the committee will find this to be beneficial and worth while. We shall certainly advise you concerning the matter. Thank you very much. Now, Mr. Heeney.

Mr. A. D. P. HEENEY (*Chairman, Canadian Section, International Joint Commission*): My situation is that we have just completed the statement from which I propose to speak, and the copies are complete in English, but they could not be made available to the committee at once. I shall not promise to follow the text precisely, but I shall deal with the substance of what I proposed to say, if it is the wish of the committee, and there is also some additional material which I shall not actually utter.

Mr. AIKEN: Mr. Chairman, on a question of order, I wonder if it would be permissible, in view of the fact that we are running against a time limitation, and that we might even be called from the committee at any moment—

The CHAIRMAN: Yes.

Mr. AIKEN: I have two or three rather direct questions which I would like to ask Mr. Heeney. I think he could answer them very quickly, and I would like to get them on the record, because they go to the essence of what we are considering. Might I be permitted to do that now?

The CHAIRMAN: Well, I suppose so, if they are not too lengthy, and having regard to what may evolve from the questions of other members, who of course have the same privilege. I am not too sure whether Mr. Heeney, having in mind certain opinions he may wish to give the committee now would prefer to follow that procedure. Personally I would have no objection to it myself, but it depends on the wishes of the members.

Mr. LEOBE: I wonder if Mr. Heeney could tell us how long it will take him to go through the report which he is thinking about. We have 30 minutes left before six o'clock.

Mr. HEENEY: In 15 or 20 minutes I could make my major points, leaving the paper to speak for itself. I am of course in the hands of the committee and will do precisely what the committee wishes. But I think it might be more useful if I could make my points and then within the framework of them receive the questions.

Mr. ROCK: I think it would be preferable to permit Mr. Heeney to continue, if it will only take 20 minutes, and it may be that your points will be covered in his remarks.

The CHAIRMAN: Yes, I think we might as well follow the general procedure and not depart from it for the moment. The floor is yours, Mr. Heeney.

Mr. HEENEY: I am glad to have the opportunity to say something about the International Joint Commission's relationship to this important and difficult question of great lake levels. I am really following Mr. Wershof in an exposition of the international aspects rather than on the national aspects, although necessarily one impinges upon the other. Members of the committee will be familiar with the main features of the great lakes basin and generally aware of the multiplicity of interests affected by variations in their water levels. You will no doubt be hearing from spokesmen for the several departments of the Canadian government and others who are officially or otherwise concerned in the current situation or are actively engaged in studies or operations related to the problem of water levels in the great lakes.

In addition to the interests of the government of Canada, there are involved as well those of the provinces of Ontario and Quebec and of the several millions of Canadians who live on the shores of the great lakes or in one way or another use the waters of the lakes.

Furthermore, as we are all very much aware, we share this basin with the people of the United States and their interests, governmental and private, are, of course, very great.

Indeed, anything that affects the levels of the great lakes affects the interests of both countries and the people of both countries. The lakes, as we have learned from experience, have a great potential for conflict as well as for co-operation between the United States and Canada. This was recognized in the Boundary Waters Treaty which was signed in 1909 and which provided for the creation of the International Joint Commission as a means of protecting and reconciling the interests of both countries in the use of these waters.

On October 7 last, the Government of Canada and the Government of the United States referred the problem of water levels in the great lakes to the International Joint Commission for investigation and report. The text of the letters from the two governments appears in *Hansard* of October 8 and they have no doubt come to your attention. However, the actual wording is important to the committee's deliberations and, for that reason, I propose to read the text into the record.

I would like the text, if it is your pleasure, to appear in my statement, since its terms are of some considerable importance in relation to the International Joint Commission's functions in this investigation.

The CHAIRMAN: Is it agreed that the text in question shall be introduced at this point?

Agreed.

Mr. HEENEY: Thank you.

REFERENCES TO INTERNATIONAL JOINT COMMISSION ON WATER LEVELS AND WATER POLLUTION

The Secretary of State for External Affairs, Canada

Ottawa, October 7, 1964.

Mr. D. G. Chance, Secretary,
International Joint Commission,
75 Albert Street,
Ottawa.

Dear Mr. Chance,

In order to determine whether measures within the great lakes basin can be taken in the public interest to regulate further the levels of the great lakes or

any of them and their connecting waters so as to reduce the extremes of stage which have been experienced, and for the beneficial effects in these waters described hereunder the governments of Canada and the United States have agreed to refer the matter to the international joint commission for investigation and report pursuant to article IX of the boundary water treaty of 1909.

It is desired that the commission study the various factors which affect the fluctuations of these water levels and determine whether in its judgment action would be practicable and in the public interest from the points of view of both governments for the purposes of bringing about a more beneficial range of stage for, and improvement in:

- (a) domestic water supply and sanitation,
- (b) navigation,
- (c) water for power and industry,
- (d) flood control,
- (e) agriculture,
- (f) fish and wildlife,
- (g) recreation, and
- (h) other beneficial public purposes.

In the event that the commission should find that changes in existing works or that other measures would be practicable and in the public interest in light of the foregoing purposes, it should indicate how the various 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 and the cost of any remedial works that might be found to be necessary and make an appraisal of the value to the two countries, jointly and separately, of such measures. For the purpose of assisting the commission in its investigations and otherwise in the performance of its duties under this reference the two governments will upon request make available to the commission the services of engineers and other specially qualified personnel of their governmental agencies and such information and technical data as may have been acquired or as may be acquired by them during the course of the investigation.

The two governments have agreed that when the commission's report is received they will consider whether any examination of further measures which might alleviate the problem should be carried out, including extending the scope of the present reference.

The commission is requested to submit its report to the two governments as soon as may be practicable.

Yours sincerely,
Paul Martin.

The Secretary of State for External Affairs, Canada

Ottawa, October 7, 1964.

Mr. D. G. Chance, Secretary,
International Joint Commission,
75 Albert Street,
Ottawa.

Dear Mr. Chance,

I have the honour to inform you that the governments of the United States and Canada have been informed that the waters of lake Erie, lake Ontario and the international section of the St. Lawrence river are being polluted by sewage and industrial waste discharged into these waters. Having in mind the provision of article IV of the boundary waters treaty signed January 11, 1909, that

boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other side, the two governments have agreed upon a joint reference of the matter to the international joint commission, pursuant to the provisions of article IX of said treaty. The commission is requested to inquire into and to report to the two governments upon the following questions:

(1) Are the waters of lake Erie, lake Ontario, and the international section of the St. Lawrence river being polluted on either side of the boundary to an extent which is causing or is likely to cause injury to health or property on the other side of the boundary?

(2) If the foregoing question is answered in the affirmative, to what extent by what causes, and in what localities is such pollution taking place?

(3) If the commission should find that pollution of the character just referred to is taking place, what remedial measures would, in its judgment, be most practicable from the economic, sanitary and other points of view and what would be the probable cost thereof?

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 so far as possible make use of information and technical data heretofore asquired or which may become available during the course of the investigation.

The two governments are also agreed on the desirability of extending this reference to other boundary waters of the great lakes basin at an appropriate time. The commission is requested to advise the governments when, in its opinion, such action is desirable.

The commission should submit its report and recommendations to the two governments as soon as practicable.

Yours sincerely,
Paul Martin.

I draw your attention to the kind of measures which the commission has been asked to consider—"measures within the great lakes basin," which would be "practicable" and "in the public interest, from the points of view of both governments",—to regulate further the levels of the lakes and their connecting waters. The objective of such further regulation is clearly spelled out: to reduce the extremes of stage (or levels) which have been experienced in the past and to bring about a range that would be "more beneficial" for the various important interests listed in the letter—Canadian and American.

If, from its investigation, the commission finds that any such measures would be practicable, it is to report the effects they would have, good and bad, on each side of the boundary, make an appraisal of their value to each country, and give an estimate of the costs involved.

This is truly a vast assignment. When one considers that the great lakes basin, above the outlet to the St. Lawrence river, has an area of about 295,000 square miles and that about one third of this is actual water surface, one can appreciate that to devise a regulatory scheme that will be at once practicable and beneficial, in the terms of our reference to the many interests affected will require one of the most extensive hydrological studies ever undertaken—anywhere. The problems involved are both numerous and complex. There will be no quick or easy solutions and our investigations will necessarily require time and the very best expert assistance that can be brought to bear, in both countries. Nevertheless, as the commission's search for means of permanent, long range improvements proceeds, the feasibility of temporary, short range

measures to provide some interim relief may emerge. I emphasize "may", because it is not at all clear at this moment as I am giving my evidence. Of course, we shall be constantly alert to such possibilities.

The International Joint Commission has lost no time in initiating action and the investigation will be pressed forward just as quickly as possible. It happened that the reference from the two governments was received while the commission was holding a regular meeting in Ottawa so it was possible to take some immediate decisions as to the means of organizing the investigation.

Empowered to do so, as has been customary under other references, the commission has already selected appropriate experts in the employ of the two governments—and this is the normal method by which the commission proceeds; by engaging and retaining principal experts within the two federal systems—to assist in the investigation, pending formal appointment of an international board to direct and co-ordinate various phases of the task. This is the first step we have taken. All existing information related to the problem of lake levels available on either side of the boundary is now being gathered together for analysis and consideration under our joint Canadian-United States auspices.

An informal reconnaissance of areas that have been especially hard hit this past season is now under way. I should say that my colleague, Dr. Dupuis, was invited by the whole commission, both the United States and the Canadian sections acting as a commission, to go to the area affected with the two principal advisers on the Canadian and United States side to see for himself and to see for us some of the physical evidence, and to talk to some of the people concerned. He already has been at a number of Canadian points. He came back to the office yesterday, and, with Mr. Patterson of the water resources branch, will be going out with a senior official of the United States corps of engineers to have a look at the situation around the shores of lake Erie next week. As soon as arrangements can be made, preliminary consultations will be held with the principal public authorities and others affected around the lakes.

We anticipate having a meeting probably early in December to look at the preliminary program devised for us, and soon after the turn of the year we hope to have meetings on the two sides of the border at which the joint interests concerned can give us, in a preliminary way, their views and the information they have. These will not be public hearings, but rather will be informal preliminary discussions. So, in the early stages of our investigation we may have the views which count from those who know and who have experience.

The next stage will be for the commission to hold public hearings at several locations in both Canada and the United States—it is our normal practice to go to the area affected and hold public hearings—to give interested persons opportunity to present their considered views in a more deliberate and formal way. I would expect that, during the later course of the commission's investigation, it may well be advisable to schedule additional public hearings from time to time so as to ensure that all concerned will be able to have their opinions and suggestions taken fully into account.

I have said that this is a vast assignment, and so it is. Yet I am tempted to believe that the draftsmen of the Boundary Waters Treaty must have foreseen such large possibilities when they provided for the creation of the International Joint Commission and clothed it with the broad, investigatory powers contained in article IX of this rather remarkable treaty. Under this article, the two governments bound themselves to refer to the commission, from time to time, questions or matters of difference arising between them along the common frontier. Such questions or matters are referred for examination and report

on the facts and surrounding circumstances, and for such conclusions, and recommendations, as may be appropriate. It is to be noted that, under this procedure, the commission does not make decisions or awards. It makes recommendations to the two governments. These are the same recommendations, of course, which pass from the commission acting as a single body to both Ottawa and Washington. It is under this article IX of the treaty that the commission has carried out investigations such as those related to the Columbia river development, the levels of the lake of the Woods, the Passamequoddy tidal power project, the levels of lake Ontario, pollution in the connecting channels of the great lakes and many matters of important concern to the United States and Canada. And it is under this article that the commission has now been requested by the two governments to investigate this critical problem of the great lakes water levels. I should also mention at this stage that on October 7 the two governments gave us a second reference concerning the great lakes. This involved the problem of pollution of the waters of lake Erie, lake Ontario and the international section of the St. Lawrence river. I propose, however, to postpone any description of this pollution reference until later in my statement.

Reverting to the major problem of great lakes levels, it is relevant to point out that the International Joint Commission has already had considerable experience in regulation, namely in respect of lake Superior and lake Ontario and to that is added the rest of the system. I think it might be helpful to the committee to have a brief description of the authority and activities of the I.J.C. in this area prior to the reference of October 7.

The international boundary meets the St. Lawrence river first in lake St. Francis and from there follows the St. Lawrence upstream, through lake Ontario, the Niagara river, lake Erie, the Detroit river, lake St. Clair, St. Clair river, lake Huron, St. Mary's river, and lake Superior to the Pigeon river. With the exception of lake Michigan, the great lakes and their connecting channels are "boundary waters" as defined in the boundary waters treaty of 1909:

The following is the text. This is the text of this very interesting definition of boundary waters which I commend to your attention.

the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the dominion of Canada passes, including all bays, arms and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers and waterways, or waters flowing from such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary.

It was the boundary waters treaty which gave the I.J.C. its jurisdiction and responsibilities and laid down general rules for the exercise of its functions. The text of the 1909 treaty is in the material that has been provided to members of the committee. I should like, however, to refer briefly to certain of its provisions that are pertinent to the matter now before us.

Turning to Article III of the treaty, you will note that, except for uses, obstructions, and diversions provided for by special agreement between the governments, any further uses and so on of boundary waters, affecting the natural level or flow of boundary waters on the other side of the boundary require not only the authority of the government within whose jurisdiction the use, and so on is made, but also the approval of the commission.

Article VIII confers jurisdiction on the I.J.C. to pass upon cases requiring its approval and lays down agreed rules or principles to govern it: each country to have equal and similar rights in the use of boundary waters; an order of precedence for the use of such waters—(1) domestic and sanitary purposes, (2) navigation and (3) power and irrigation purposes—"and no use

shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it in this order of precedence"; approval may be made conditional upon construction of remedial or protective works; the commission "may" and in certain cases "shall" require as a condition of its approval, that "suitable and adequate provision, approved by it, be made for the protection and indemnity of all interests on the other side of the boundary which may be injured by a proposed dam or other obstruction."

I draw your attention to the fact that, in regard to applications for the approval of works in boundary waters which affect the natural level or flow of such waters in the other country, the commission has jurisdiction to approve the application, and in doing so may—indeed in certain circumstances it shall—impose conditions aimed at the protection and indemnity of interests in the other country.

I have taken this time to explain the nature of this authority under Articles III and VIII because it is a different type of responsibility and jurisdiction than that under which our present investigation is being conducted. Those are Articles III and VI under which the jurisdiction is a quasi judicial function in which we make orders of approval upon application of the person concerned. Article IX provides that the two governments may refer, as they have in this case of lake levels, to this joint international body an investigatory and recommendatory function.

I have already described the effect of Article IX, which covers investigations and reports to the two governments.

The commission first became involved in the regulation of water levels in the great lakes in 1914. In that year it issued an order under Article III of the treaty, approving applications by a Canadian company and a United States company to obstruct the waters of the St. Mary's river at Sault Ste. Marie and divert some of the water for power purposes on each side of the boundary. In granting its approval, the commission imposed several conditions with respect to the control and operation of the works, in order to protect the various interests in both countries.

An international board of control was created, comprised of an engineer appointed by each government, and operation of the works approved was placed under the direct control of the board. The order also required operation of the works so as to maintain the level of lake Superior as near as may be between the levels of 600.3 and 601.8, a range of $1\frac{1}{2}$ feet, and in a manner that would not interfere with navigation. In the previous 54 years of record, the range of levels of lake Superior had been about $3\frac{1}{2}$ feet, so this was a very substantial reduction in the previous range. The board of control was given the duty of formulating operating rules to achieve this result and of seeing that such rules were obeyed. Provisions were included also to protect the levels in the lower St. Mary's river. Any disagreement within the board was to be referred to the commission for decision. The cost of construction, maintenance and operation of the works was to be borne by the applicant companies. Incidentally, this was the first occasion on which the commission provided in an order of approval for the appointment of an international board of control to ensure that the terms of its order were complied with. The device has been remarkably effective and the precedent has been followed in most of the orders of approval issued since 1914 covering obstructions in boundary waters.

The lake Superior board of control formulated operating rules to maintain the level of the lake within the limits prescribed by the order of approval. The committee will be interested to know that this spring the board, while still complying with the order of approval, was able to release some additional flow from lake Superior, to alleviate low water conditions in the lower St. Mary's river. Since that time, with the commission's approval, flows in excess

of those called for by the operating rules have been released to improve the low levels in lake Huron. At present these flows are about 10,000 c.f.s. more than the flow which would have occurred if we had adhered to the prescribed rule curve.

There are no dams or other works at the outlet of lake Huron by which the levels of the lake can be controlled. The same is true with regard to lake Erie. The International Joint Commission did, however, at the request of the two governments pursuant to the Niagara diversion treaty of 1950, make recommendations as to the nature and design of remedial works necessary above Niagara Falls to reduce erosion and maintain their scenic beauty, while permitting additional diversions for hydroelectric power production.

After the commission's recommendations were accepted by the governments in 1953, the commission established the international Niagara board of control to supervise construction of the remedial works and operation of the control structure to ensure accomplishment of its intended purposes, without affecting in any way the levels of lake Erie. In approving additional works and excavation in the Niagara river since 1953, the commission has been careful to ensure in each case that there would be no effect, on the levels of lake Erie; and the Niagara board of control is charged with the responsibility of ensuring that this continues to be so.

Next we come to lake Ontario and the international section of the St. Lawrence river.

In July 1952 the governments of Canada and the United States applied to the International Joint Commission for approval of the construction, maintenance and operation, by entities to be designated later, of works for the development of power in the international section of the St. Lawrence river. This involved a dam and power house extending across the river at Barnhart island, a spillway dam wholly in the United States—the Long Sault dam—and a dam crossing the river at Iroquois Point to regulate the discharge from lake Ontario. It was a tremendous undertaking, estimated to cost some \$600,000,000. After a series of public hearings in both countries and the most intensive study, the commission issued its order of approval on 29 October 1952, subject to appropriate conditions for the protection and indemnity of all interests in either country which might be injured. The project involved removing the natural sill in the river which theretofore controlled the outflow from lake Ontario and replacing it with artificial works. The international St. Lawrence river board of control was created to ensure compliance with the terms of the order of approval and, with the approval of the commission, to carry out tests or experiments to determine desirable improvements in the regulation of levels and flows. Operation initially was to be in accordance with a carefully worked out plan, designated method of regulation No. 5, but the commission retained jurisdiction to make further orders in the light of the control board's recommendations. This built-in flexibility in the commission's order of approval has proved to be of immense value in the subsequent "management" of the flows of the St. Lawrence.

In due course, the government of Canada designated the Hydro-Electric Power Commission of Ontario and the government of the United States designated the Power Authority of the state of New York as the entities to construct, operate and maintain the works in accordance with the International Joint Commission order of approval.

Just a few days before the commission received the applications for approval of the St. Lawrence power works under article III of the boundary waters treaty, the governments of Canada and the United States submitted a joint reference to the commission under article IX of the treaty. The stated purpose of the reference was "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 commission was asked to study the various factors which affect the fluctuations of water level on lake Ontario and determine whether in its judgment, action could be taken by either or both governments to bring about a more beneficial range of stage, having regard to the proposed power and navigation improvements in the international section of the St. Lawrence. If it found that measures would be practical and in the public interest from the points of view of the two governments, the commission was to indicate how the interests on either side of the boundary would be benefited or adversely affected and provide an estimate of the costs of any measures recommended.

Members of the committee will recall that in 1951 and 1952 the level of lake Ontario was very high. The highest mean monthly stage on record is June 1952—248.06 feet—which is 6.61 feet higher than the lowest month of record November 1934. Complaints of shore erosion, flooding and other substantial damage to shore properties came from all sides. Damage was particularly severe along the low-lying United States shore in the vicinity of Rochester, but our own shores also suffered extensive damage from erosion and flooding.

The commission lost no time in launching its studies under the lake Ontario reference. It held a series of public hearings in both countries and inspected many of the areas where damage had occurred. It appointed the international lake Ontario board of engineers, with one member from each country. This 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 and engineering matters which it would have to consider in making its report to the two governments. The studies under the reference were so scheduled as not to delay the construction of the St. Lawrence power works that I referred to earlier.

By March, 1955, the commission had concluded that measures could be taken, having regard to all interests, to regulate the level of lake Ontario so as to reduce the extremes of stage which had been experienced in the past, and so advised the governments. Two months later the commission recommended that the two governments adopt:

- (i) A range of mean monthly elevations for lake Ontario of 242.77 feet (navigation season) to 246.77 feet "as nearly as may be" (this contrasted with a range in nature of 241.45 to 248.06).
- (ii) Eleven criteria for a method of regulation of outflows and levels of lake Ontario, applicable to the power works being built in the international section of the St. Lawrence; and
- (iii) A plan of regulation, No. 12-A-9, subject to minor adjustments that might result from further detailed study.

The two governments accepted the first two recommendations and approved the range of elevations and the criteria. Plan 12-A-9 was also approved, but only for the limited purpose of calculating critical profiles and the design of channel excavations in the St. Lawrence. This would enable construction to proceed without delay. But 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." The government of Canada was naturally concerned about the effects which the regulation of lake Ontario levels might have downstream in the exclusively Canadian section of the St. Lawrence and wished to leave no stone unturned in the search for the best possible method of regulation.

Having obtained the approval of both governments to the range of elevations for lake Ontario and the criteria applicable to operation of the St. Lawrence works, the commission on 2 July 1956 issued a supplementary order to its order of approval of 29 October 1952. Reference to a specific method of regulation was deleted and the approved criteria and range of elevations for lake Ontario were substituted. Provision was made for the commission to indicate in an appropriate fashion, as the occasion may require, the interrelationship of the range of elevations, the criteria and the other requirements of the order of approval. The supplementary order thus clarified the legal status of the works being constructed and the operational responsibilities of the two power entities and the commission's board of control.

The next step was for the commission to transfer responsibility for the continuing studies on lake Ontario regulation from its lake Ontario board of engineers to its St. Lawrence river board of control. This in response to the governments' request that we continue our studies with a view to perfecting the plan of regulation so as best to meet the requirements of all interests, both upstream and downstream. The board of control carried on with the regulation studies and prepared a revised plan of regulation designated 1958-A which the commission recommended to the governments in October of 1958. Plan 1958-A was actually put into effect at the St. Lawrence works on April 20, 1960. Since that time, the plan of regulation has been modified and refined in the light of experience. The plan currently being followed is known as plan 1958-D. We are still striving for perfection in the regulation of levels and flows. This is fully in accord with the terms of the commission's order of approval in 1952, in which we retained the right to modify and change the flows on a test basis, in order to arrive at the most satisfactory plan for all concerned.

I believe it might be in order for me to say a few words now, Mr. Chairman, regarding the mechanisms and procedure by which the day to day regulation of St. Lawrence flows—and lake Ontario levels—is carried out. It is quite an involved arrangement, I can assure you, affecting as it does vital interests in both countries, both upstream and downstream from the regulating works. These are the interests of navigation, power and riparian owners. There are two provinces and one state involved. And there are also the national interests of the governments of Canada and the United States. A formidable undertaking, but possibly representative of the multiplicity of interests, political and economic, that would be involved in any attempt at co-ordinated regulation of the levels of all of the great lakes.

First we have the international St. Lawrence river board of control, which the commission provided for in its order of approval, back in 1952. It has eight members, four from each country, who were chosen for their varied and special competence. They are required to use their particular knowledge, not to further special interests but to ensure observance of the order as near as possible to the spirit in which it was issued.

The board reports to and advises the commission. Any disagreement among the members of the board must be referred to the commission for decision. The board is responsible for the continuing studies to perfect the plan of regulation and, with the commission's approval, carries out tests to determine what modifications or changes would be desirable. The commission has given it discretionary authority to vary the flows under emergency and winter conditions and also—and this is most important—to provide beneficial effects, or relief from adverse effects, to one interest when this can be done without appreciable adverse effects to others. Due to this flexibility, it has been possible on a number of occasions to provide additional flows for Montreal harbour to relieve low water conditions there, without harm to either riparian or power interests.

Naturally, the board cannot perform miracles. It can no more create water in the absence of precipitation that it can later indefinitely retain water surplus when the precipitation cycle returns to what it was in the fifties, when everybody was complaining about high water.

This international board naturally has no jurisdiction over the flow of the Ottawa river, which is a regional or national matter. Moreover, the Ottawa, with its erratic flow, cannot subject the flow of the St. Lawrence to its whims.

In this connection, Mr. Chairman, members of the committee will be interested in the fact that the commission, at a meeting held in New York in January, 1963, decided formally, in requesting the board of control to proceed with studies and the formulation of recommendations concerning the plan of regulation, to provide therein, among other possible benefits, for improvement of the levels of Montreal harbour to the extent consistent with all requirements of the order of approval.

It was as a result of those studies that the board of control recommended a revised plan of regulation, 1958-D, which was put into effect early in October of last year.

The Canadian section of the board of control has a full-time operations representative at Cornwall. He receives data on water supply conditions, levels and flows from many sources in both countries and on the basis of these data, calculates the outflow from lake Ontario for the following week which would be in accordance with the current plan of regulation and the other terms of the commission's order of approval. He also meets each week with an operations advisory group, comprised of representatives of interests on the river which are affected by regulation, such as Ontario hydro, power authority of the state of New York, St. Lawrence Seaway Development Corporation, the Department of Transport and hydro Quebec. This ensures that the board of control is currently informed of actual conditions existing in the St. Lawrence, the Ottawa river, Montreal harbour and lake Ontario, so that the regulation is based not only on long term theoretical considerations, but also immediate, practical factors. This characteristic was one which my predecessor, General McNaughton, put great importance on and he underlined the necessity of having a practical operating approach to this important business of controlling the flow from the outlet of lake Ontario and controlling the flow of the St. Lawrence river. The reason I have taken the committee's time in describing the method of regulation and control in the St. Lawrence and the releases from lake Ontario is that clearly this is the kind of thing which the two governments have had in mind as possibly applicable to these other lakes which are now put before us for investigation and report. If a variation from the strict requirements of the plan of regulation appears desirable to meet local conditions, the operations advisory group recommends accordingly.

The representative at Cornwall of the Canadian section of the board of control then reconciles his calculations and recommendations with the conclusions reached by the representative of the United States section of the board of control. Joint recommendations are then put forward to the board of control. If they are accepted by the board, they are then passed along to the two power entities in the form of advice as to the flows which they should discharge during the following week in order to comply with the plan of regulation and the requirements of the commission's order of approval which, of course, is the governing document.

These arrangements, as I describe them in detail, may sound complicated and cumbersome, but, in actual experience, the machinery works with great informality and very rapidly. In practice, all concerned have their say; at the same time we have achieved the flexibility of operation which is so desirable, indeed necessary.

My purpose in outlining the procedure actually followed each week in regulating the outflow from lake Ontario is to illustrate the nature of the problems in effective regulation of any large bodies of water such as the great lakes, where so many vital interests are at stake, and to emphasize the fact which the commission has verified from experience, namely, that results cannot be achieved by adhering blindly to a fixed set of charts and rules drawn up in advance. Such are, of course, an essential element in regulation, but no less essential is the constant surveillance of actual conditions and the exercise of professional judgment and discretion by competent people. I have no doubt that we shall encounter this same situation as we seek to devise means of regulation for the large bodies of water involved in the new reference to the commission.

Now, Mr. Chairman, I would like to return to the second great lakes reference sent to the commission by the two governments on October 7. I mentioned this briefly at the beginning of this statement. It relates to the increasingly serious problem and is directed to investigations, from this point of view, of lake Erie, lake Ontario and the international section of the St. Lawrence river.

The committee will note that the commission is here directed to concern itself with one particular kind of pollution, namely, pollution originating on one side of the boundary which is causing or is likely to cause injury to health or property on the other side of the boundary. Article IV of the Boundary Waters Treaty forbids such spoiling of the water to the injury of health or property on the other side. Any pollution within the great lakes basin is of course a matter of concern for the individual governments where it occurs. If the effects are confined to the country where the pollution originates, then appropriate corrective action is a matter for the national and local authorities concerned and there is no call for international action, through the International Joint Commission or otherwise. It is with trans-border pollution only that I.J.C. is involved.

One feature of this reference is somewhat unusual, for the governments have here recorded their agreement to extend its scope to other boundary waters of the great lakes basin at an appropriate time and have asked the commission to advise them when in its opinion that time occurs. Consequently the commission will need to establish and maintain a general surveillance over the quality of waters in the great lakes so as to be in a position to recommend to governments when conditions warrant extension of the investigation.

The commission has been active in the field of pollution abatement in parts of the great lakes basin for quite a number of years. In 1946 and 1948 the governments of Canada and the United States submitted references to the commission covering the connecting channels of the great lakes system—St. Mary's river, St. Clair river, Lake St. Clair, Detroit river and Niagara river.

This investigation resulted in the commission's report of 11 October 1950 setting forth "objectives for boundary waters quality control" and recommending that the governments adopt those objectives as the criteria to be met in maintaining these waters in satisfactory condition as contemplated in article IV of the treaty. In this report, the commission also recommended that all measures necessary to meet the stated objectives be put into effect. The two governments accepted these recommendations and authorized it to establish and maintain continuing supervision over the waters involved, through advisory boards appointed for the purpose. In complying with this direction, the commission notifies those responsible for any pollution found objectionable in the light of the approved objectives and, if assurance is not received that such pollution will be corrected within a reasonable time, the commission makes recommendations to the appropriate authority as to the further action deemed advisable.

I am pleased to be in a position to report to the committee that, in the intervening years, substantial progress has been made in cleaning up the waters in question. There has been good cooperation from most of the industries involved, at a cost to them of many millions of dollars. More recently there has been marked improvement in the treatment of sewage and waste discharged by municipalities, as a result of the enactment of more stringent laws by provincial and state legislatures. In carrying out our role of surveillance over these waters, we have worked very closely with the Ontario Water Resources Commission and the corresponding authorities in the states of Michigan and New York. Their officials are members of the advisory boards appointed by the commission, an arrangement that ensures the closest liaison and cooperation between the commission and the several authorities in each country having actual jurisdiction.

With regard to the new reference extending the scope of the commission's responsibility, we have already been in consultation with officials of the Canadian Department of National Health and Welfare and the U.S. Department of Health, Education and Welfare concerning organization of the programme of investigation. Within a short time a technical advisory board to assist the commission will be formally appointed and detailed instructions given to it. The conduct of this pollution investigation will of course be coordinated with the lake levels investigation under the other reference.

Mr. Chairman, my estimate of time was not very good. I apologize for being so hurried in order to meet your requirements.

The CHAIRMAN: Thank you, Mr. Heeney. Would the members care to detain Mr. Heeney for questioning? I recognize first, Mr. Aiken.

Mr. AIKEN: Mr. Heeney, we certainly appreciate your statement and we are very glad that the international joint commission has undertaken to look into this great problem.

We are here to consider the question of water levels in the great lakes; the International Joint Commission now is doing the same thing and it occurred to me that perhaps there is a good deal of duplication, in fact more duplication than is called for in both inquiries. My question is this. Are there areas which the International Joint Commission does not cover and which this committee could cover? To put it another way, are there any matters that the International Joint Commission cannot deal with that perhaps this committee could study?

Mr. HEENEY: Well, that is an interesting question, Mr. Chairman, and to make an immediate response off the top of my head, as they say, the first thing that occurs to me is that the International Joint Commission's reference is limited to the possibilities of regulation of the existing great lakes basin; that is to say, we are limited to the waters within this basin itself. I understand, sir, you are going to consider these great schemes, such as the Grand (Great Lakes Replenishment and Northern Development) canal possibility and that kind of thing. But, you presumably are not so limited, and it may be that this is one watershed, if I may use that word, between our work and yours.

Mr. Chairman, for my own part, of course, I would be very happy to have a close relationship between the Canadian section and the house committee on this subject, and I will keep in close touch with your proceedings as they go on. However, it is to be remembered that we are an international body and, I suppose, I am appearing here as an international official rather than a Canadian civil servant, as a result of which there may be difficulty in any formal relationship between the two.

All I can say further is that I will be very happy to consider the relationship between the work of the two bodies and we will see if we can avoid duplicating any studies that may be undertaken.

Mr. AIKEN: Well, following along in that same vein, Mr. Heeneey, I assume that, in effect, as you mention in your statement, you will not be considering any matters that come within the jurisdiction of the provinces or the states—and as an example, I am thinking of the outflow of waters from within provinces or within states into the great lakes. You particularly mentioned the Ottawa river as an example. While you cannot control this may I assume you will be taking into account the situation with regard to the Ottawa river.

Mr. HEENEY: Well, first of all, in respect of the question at the end of your statement, we certainly will take that into account. However, I do not think, with respect, Mr. Chairman, that the first part of the statement is precisely accurate because although the resources in the boundary waters are owned by the province on the one side and the state on the other nevertheless under the treaty of 1909 we certainly have authority to investigate just such matters as you are referring to within the international section. Of course, the Ottawa river is away out of the ball park because no boundary water is involved. It is boundary waters that give us our jurisdiction. However, we will expect to proceed in our studies with the closest possible co-operation with the authorities of the province of Ontario. This has been our tradition. We have a long and good working relationship with the provinces on our side of the boundary and the same is true of the United States section, with the state authorities on the other side.

Mr. AIKEN: I have another question to put along the same lines. I have been very interested in this and have attended various conferences, and throughout it has seemed to me that a great many of the problems have been jurisdictional ones; that is, we have the two federal governments involved, the provinces and the states, also the great lakes institute and great lakes commission in the United States and various other bodies. Do you propose to make use of the facilities of all these bodies?

Mr. HEENEY: Well, we certainly do seek to obtain from them both their information and their views partly through these private meetings I was referring to which will be taking place early in the new year, and certainly some of the bodies that you have mentioned would be among the candidates for invitations to such meetings. Although the great lakes institute is rather out, the great lakes commission is closer on the American side. It is an inter-state co-operative body for the advancement of their common interests. Certainly we would expect to receive information and views from bodies of that sort, whether the official like the governments concerned, the provincial and state governments, and from those bodies which are semi-official or, indeed, private.

Mr. AIKEN: I have one more question but it is on a slightly different subject. Naturally we are concerned about the possibility of short term measures and I understood you to say that after the commission has made a preliminary inquiry into this matter you are hoping early in the year to consider short term problems. I assume from this that one of the problems that will be considered is any ability to immediately cut down the outflow from lake Huron, if this is feasible.

Is this the type of interim question which the International Joint Commission will be considering?

Mr. HEENEY: I would not want to commit myself as to the nature of any possible interim measures to alleviate the difficulties which have arisen at this stage. It would be a mistake for me to attempt to do so. I know various suggestions have been made, but I think Mr. Aiken will recognize that while many suggestions made would alleviate a situation for some, they would worsen the situation for others. This is something to be borne in mind. My reference to the possibility of interim measures was rather this way: as we go into this

fairly long term exercise, we shall be certainly conscious of and shall search the possibilities of doing something in the short run, while not losing sight of the objective which has been given to us of a longer term regulatory scheme which would go along with a general cycle of water supply.

Mr. AIKEN: May I suggest that you might have in mind an interim report, if we could call it that, fairly well along in the game to which you might give some consideration and direction?

Mr. HEENEY: We shall certainly do this. Our practice has been that in (every) investigations we frequently find it valuable to make interim reports to the two governments, and it may well be that in the time required for this investigation preliminary reports would be of value.

Mr. AIKEN: Your only concern is with water levels and control of those levels? The question of compensation or similar matters would not be within your terms of reference at all?

Mr. HEENEY: The reference we have is to take account of and to assess the effect of any regulatory measures, be they adverse or beneficial, and to cost them. This is normal practice for the International Joint Commission. We do it, and we attempt to make assessments of what the effects will be, both beneficial as well as detrimental.

Mr. AIKEN: I was particularly referring to the two laws. Is that all right?

Mr. HEENEY: No, this would be a domestic matter within the two countries, I would expect, would it not?

Mr. AIKEN: Thank you.

Mr. RYAN: I was wondering if we might have been a bit hasty in excluding the pollution problem from our consideration, as being irrelevant in our terms of reference. I would like to hear Mr. Heeney's opinion on whether or not pollution itself in future is likely to affect lake levels?

Mr. LEOBE: On a point of order, it is almost 6.15 p.m., and this is a very large field that we might be branching into. I move that we adjourn and meet again rather than to deal with something like this at this time.

The CHAIRMAN: Yes, I was thinking that we might detain Mr. Heeney for a few minutes and possibly complete his presentation. But if it is felt that there are many more questions, we might have to put off hearing Mr. Heeney further until some other time. I only have two persons who wish to ask questions.

Mr. ROXBURGH: I have a question or two as well.

The CHAIRMAN: You are not free tonight?

Mr. HEENEY: I am afraid I am not.

The CHAIRMAN: Mr. Heeney is not free tonight at eight o'clock.

Mr. AIKEN: Maybe we could proceed, and if there are only one or two questions, we might conclude them.

Mr. LEOBE: I doubt it. We do not have enough background here. Some of these people may live right alongside the lakes, and they have been waiting for years. There are others of us who are interested in this question from a national point of view, but we do not have enough background yet really to ask searching and intelligent questions and to get answers which might be of some use to us. Therefore, I suggest that the committee rise and meet again at a later date at the call of the Chair.

Mr. HEENEY: Might I make a suggestion in the hope of being helpful. I would be happy to be recalled because I am very interested in making an explanation of the situation that the International Joint Commission is in, in respect of this matter. I wonder if it might be better for the committee to consider recalling me after it has heard some of the evidence from the experts?

Mr. LEBOE: I think so.

Mr. HEENEY: Because then you could see where we fit in and where we do not. We have limits because of our international character and because of the restrictions imposed upon us by references of the two governments. I am not seeking to avoid being questioned immediately. If it is the will of the committee, I would be happy to be recalled immediately. But I think it would probably be more profitable if you first heard from some of the federal government experts at any rate who have the national situation very much in mind.

Mr. LEBOE: I agree. We held 50 sittings on the Columbia river treaty and we did get a lot of duplication because we started right in to ask questions before we knew where we were going. I was hoping that we might be able to avoid the same type of duplication here as being premature.

Mr. ROCK: I would like to know whether Mr. Heeney's group will be making any recommendations after we hear all the witnesses? In other words, their concern is with great lake levels. We are going to be asking questions of all these witnesses. We will have to make up our minds in respect of watersheds up north and we would like to have the opinion from your group, after we have had the recommendations of other engineers on which road we should take. Whether or not you agree with them, will you take a stand in the future?

Mr. HEENEY: No, sir. These other possibilities are well beyond the jurisdiction of the International Joint Commission. By our terms we are confined to the letters from Ottawa and Washington asking us to examine the feasibility of extending the regulation of the water presently within the basin.

The CHAIRMAN: There is no connection whatsoever between whatever report the commission, for whom Mr. Heeney is testifying, may have and whatever reports we may make. There is a connection between the knowledge both bodies are acquiring, but we may go far beyond what they are called upon to study. However, because both groups are in the same field of endeavour we have called Mr. Heeney to find out what enlightenment he or the commission could give us at this time. We have something very deep to go into and it may be that we will not know exactly where the starting point for us is.

As has been explained very well by Mr. Heeney, I think before we receive technical information and data information, the committee, with the help of the steering committee, will be able to formulate the direction we will take in our study. The commission has been functioning and will continue, and we will function and arrive at a point some day; but the two not necessarily will have to agree with the findings of each other.

Mr. ROCK: This is quite all right, but I do not agree with Mr. Heeney when he says he will not have much to do with making a decision. There are representatives on the commission from both sides of the border, and if in our report we should come up with a recommendation in respect of a watershed, say, at James by, and the diverting of the water to the great lakes, then there is the matter of the cost and whether it will be borne all by Canada or part by Canada and part by the United States. The United States members of the commission will be asked by their government for their recommendations on this matter. Who else could be doing it if not them?

Mr. HEENEY: If I may say so, with respect, that is not precisely accurate. No one really can foretell what reference may be made in the future to the International Joint Commission with regard to these possibilities of the introduction of water from other watersheds. The point I am attempting to underline now is that a limited task has been set for us; it is a big task, but it is limited to the resources within the basin. It would be quite improper for me to express any opinions as only one member of an international body upon

something which is outside our present terms of reference. This may happen in the future; I don't know.

The reason I had the temerity to suggest I be called later is that I think at that time you can set our function in its proper setting better when you have heard the national witnesses; when that takes place, then you can call me back and see what is the relationship of what you are doing to what the national undertaking is and what the work of the commission is.

Mr. ROCK: That is the kind of an answer I wanted.

The CHAIRMAN: I believe we are all in accord that we will recall Mr. Heeney at some future time.

Thank you very much, Mr. Heeney and gentlemen. Our next meeting will be on Tuesday, November 10.

HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 3

TUESDAY, NOVEMBER 10, 1964

THURSDAY, NOVEMBER 12, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

WITNESSES:

From the Department of Transport: Mr. J. R. Baldwin, Deputy Minister;
Mr. D. M. Ripley, Chief, Special Projects Branch.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias Godin

Vice-Chairman: Mr. Ian Watson

and Messrs:

Aiken,
Alkenbrack,
Asselin (*Richmond-
Wolfe*),
Berger,
Danforth,
Davis,
Dinsdale,
Flemming (*Victoria-
Carleton*),
Granger,
Grégoire,

Habel,
Harley,
Herridge,
Laprise,
Leboe,
Leduc,
Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,

Noble,
Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

Marcel Roussin,
Clerk of the Committee.

MINUTES OF PROCEEDINGS

TUESDAY, November 10, 1964.

(5)

The Standing Committee on Mines, Forests and Waters met at 3:30 p.m. this day. The Chairman, Mr. Godin, presided.

Members present: Messrs. Aiken, Alkenbrack, Danforth, Dinsdale, Godin, Laprise, Legault, Loney, Peters, Rock, Roxburgh, Ryan, Rynard, Scott, Smith, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*) and Whelan—(18).

In attendance: Mr. J. R. Baldwin, Deputy Minister, Department of Transport; Mr. D. M. Ripley, Chief, Special Projects Branch; and Mr. Lloyd Richards, Meteorological Branch, Toronto.

The Chairman introduced Mr. Baldwin, the Deputy Minister, who read a prepared statement which had been distributed to the members of the Committee in English and in French.

The witness was examined at length by the Committee.

At 6:05 p.m. the Committee adjourned until Thursday, November 12th at 3:30 p.m.

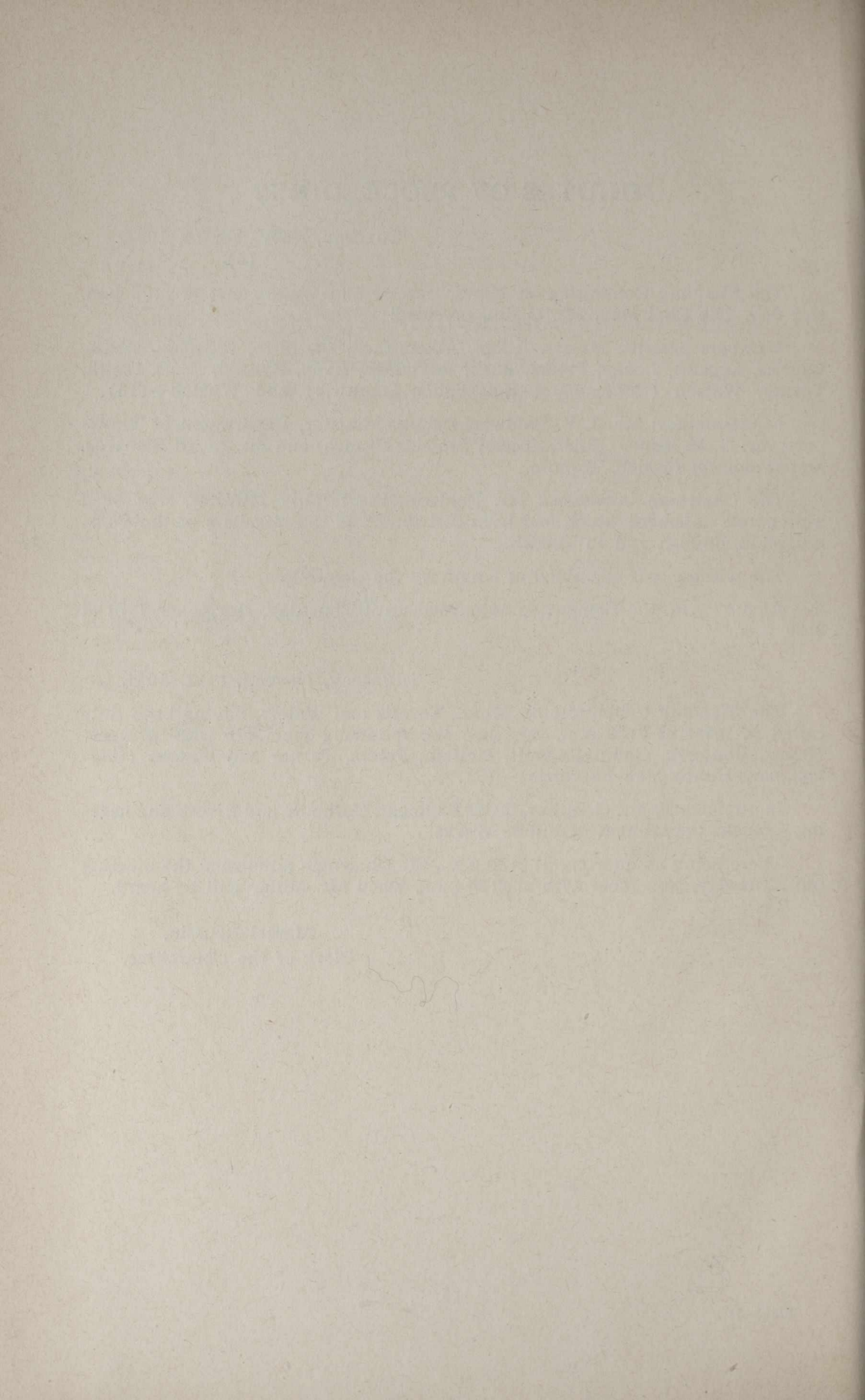
THURSDAY, November 12, 1964.

The Standing Committee on Mines, Forests and Waters, having been duly called to meet at 3:30 p.m. this day, the following members were present: Messrs. Danforth, Godin, Legault, McBain, Peters, Turner and Watson (*Châteauguay-Huntingdon-Laprairie*)—(7).

In attendance: Mr. G. Millar, Chief Engineer, Harbours and Rivers Engineering Branch, Department of Public Works.

There being no quorum, at 3:50 p.m., the Chairman adjourned the meeting until Tuesday, November 17th at 3:30 p.m., when Mr. Millar will be heard.

Marcel Roussin,
Clerk of the Committee.



EVIDENCE

TUESDAY, November 10, 1964.

The CHAIRMAN: Gentlemen, I see a quorum. I would ask Mr. Baldwin and Mr. Ripley to take their places at the head table.

Now that the question period is over I trust we will have the privilege of hearing our witnesses. Would you please come to order.

Mr. ROCK: Was this report sent to us?

The CHAIRMAN: Yes. I received my copy at noon.

Mr. ROCK: I am referring to this report.

The CHAIRMAN: The report to which you make reference does not necessarily have anything to do with our meeting today. The white paper refers to today's meeting.

Gentlemen, I have received three or four letters from people who either wanted to receive our reports or wanted to testify before our committee. I intend to call a steering committee meeting very shortly to arrange for further witnesses to be heard and to discuss the witnesses who have stated they would like to appear before our committee. Beyond that there is no further correspondence.

Before we commence I know that some of you at least recall that a Mr. Scott from the Department of Transport was supposed to give testimony today. We were informed that Mr. Scott has been transferred and, therefore, Mr. Baldwin the deputy minister of transport is in attendance to testify. Mr. Baldwin is on my immediate right and, beyond him, is Mr. Ripley, who is chief of the special projects division of the Department of Transport.

I am very happy to call upon Mr. Baldwin to make any statement he wishes to the committee.

Mr. J. R. BALDWIN (*Deputy Minister, Department of Transport*): Thank you, Mr. Chairman and hon. members, I have with me, as the Chairman indicated, Mr. Ripley, who is our senior hydraulics expert. Since that letter was received, Mr. Chairman, the reorganization consequent upon the transfer of Mr. Scott has proceeded further and Mr. Ripley's title now is chief of the hydraulics branch. Also in attendance is Mr. Richards of the meteorological branch of the department, who is in his own way quite an expert on meteorological problems connected with the great lakes basin. Mr. Richards will field any questions in regard to that phase of our operations.

We have sent forward to you—and I believe it has been distributed—a brief which sets out in some detail the reasons the Department of Transport is interested in the problem of water levels in the great lakes basin, the particular activities that we carry on within that general idea, and some of the implications with regard to the problems which this committee has been reviewing.

Mr. Chairman, I am not quite sure how you would like me to proceed, but if it would be helpful I could give a brief summary of the highlights of the brief which has been circulated.

The CHAIRMAN: Is that agreeable to the members of the committee?

Some hon. MEMBERS: Agreed.

The CHAIRMAN: We appreciate your suggestion. Would you proceed, Mr. Baldwin.

Mr. BALDWIN: The Department of Transport maintains and operates in the great lakes system something over 300 miles of river channels designed to accommodate all sorts of shipping, ocean going and lake shipping, large and small. It is also responsible for the operation and maintenance of certain secondary canal systems which relate to the same basin area primarily the Trent, Rideau, Ottawa and Richelieu rivers system. Within this area the department is responsible for a substantial number of great lakes and St. Lawrence river ports and harbours, and in addition to the responsibility of the department itself in that connection there are also reporting to the Minister of Transport two agencies, which carry on related works, namely the St. Lawrence seaway authority and the national harbours board, which are both responsible for the administration of a number of extensive revenue producing facilities which are essential for commercial shipping.

Now, the interest and concern of the Department of Transport in respect of the water levels of the great lakes system arises because the capacity and efficiency of all these facilities that I have mentioned are substantially affected by the changes in water levels. Of course, the department is interested in what can be done about this problem of changes in water levels and, particularly, what remedial action can be taken in respect of extremely low or extremely high water levels.

Since the existing facilities and operating procedures may have to be changed to accord with the new hydraulic regime which may be established, I will give you an indication of how important it is. In the department of commercial shipping generally and the Canadian economy the investment by the federal government in navigation works in the great lakes-St. Lawrence river basin is in excess of \$1 billion while the investment in related water side developments dependant upon shipping is several times this amount.

Now, the great lakes-St. Lawrence river system is a single hydraulic entity and water level conditions in the great lakes system produces corresponding conditions in the St. Lawrence river, and it is expected the continued low water duration in the great lakes would be followed up by further declines in the levels of the St. Lawrence river. As you know, serious problems already have been experienced over the last three years.

It is important in any remarks that I make, even though these remarks may duplicate information given by previous witnesses at earlier meetings, to remember these characteristic behaviour problems along with the problem of regulation of the great lakes system itself. As an indication of the deteriorating water supplies I should mention that the water depths in the St. Lawrence river at Montreal fell below the 35 foot level, which is the normal datum level. Levels below that 35 foot figure were experienced through 108 days of the 1963 shipping season, whereas this year water depths below that 35 foot level already have been measurable in terms of 148 days. There is no doubt that the frequency of low water levels in the St. Lawrence river and the lake Ontario area would have been much greater than this had it not been possible to have control of the levels at different places in lake Ontario consequent upon the orders of the International Joint Commission.

I might add a further substantial measure of relief was obtained this year in the St. Lawrence itself by accelerating the 1964 maintenance dredging program of the shipping channel branch of the department, the result being that it was possible for the department to announce in August that the river channels of Montreal downstream had been deepened an additional six inches. This may not sound very great but it is quite material in its relationship to commercial shipping benefits. At the time this problem arose we were confronted by the fact that there had been a great increase in the size, tonnage and draft of vessels using the St. Lawrence and great lakes waterways, and no doubt

this trend will continue and create problems for ship movement irrespective of the water supply or the water level circumstances. This in itself is a further reason, of course, for the intensification of the continued investigation of navigation matters in the whole St. Lawrence river-great lakes basin which we consider so essential.

Now, you may have been informed previously by earlier witnesses from other agencies of transport of the various control measures which now go on and take place, but perhaps I should go over them again because it does concern water problems from the point of view of shipping. We have been closely associated in the department with the regulation of lake Ontario, and a senior official of the department is a member of the St. Lawrence river board of control, which was set up by the International Joint Commission to supervise regulation procedures. The department also has members on various advisory groups and committees arising out of its association with the lake Ontario regulations and, as a consequence, has been in a position to recommend necessary and desirable changes which may be required or are required by the interests of navigation. Therefore, there is a familiarity with the rather complex problems of flow regulation and we are very appreciative for the need for and desirous of seeing the study proceed of the whole great lakes problem in this regard while, at the same time, recognizing it will be an extremely difficult one and that careful management will be necessary to ensure that beneficial results are achieved from any plan of regulation which may ultimately be implemented. In addition, in respect of the question of regulation of the flow within lake Ontario the Department of Transport already has been concerned with the development of basic hydraulic data for the great lakes basin and, in this regard, is working through the Canada-United States coordinating committee, which has been functioning for some ten years or more. This work will have to be intensified as one of the steps necessary to deal with the problem which now exists.

I do not know that I need to say any more on the navigational side other than to summarize that our interest in transport from the marine point of view lies in the close relationship between water levels and the successful continuation of commercial shipping activities.

The problem has been made more acute by the fact that the present low water situation is coinciding with time and the situation in which there is a general trend toward the use of larger ships, and that quite apart from the measures which will be taken as a result of a recent reference to the International Joint Commission, we have been actively engaged in these areas where we have direct responsibility, and that is particularly the St. Lawrence ship channel from Montreal to deep water below Quebec city, with remedial measures designed to do what we can do to help in that particular area, with both dredging and model studies, with a view to long term remedial works.

I would mention as well one other branch of the department which we think capable of considerable assistance, and which will be of considerable and real help in any study of this problem, I mean the meteorological branch of the department, the weather services, in short. Frankly, I think we have to admit that basic meteorological data is definite in terms of any progressive great lakes study, and yet if the study is to be effective, this data must be obtained and analysed. The meteorological branch of the department has done quite a lot already with the studies it will have to make if there is to be a full coverage of this subject. They have done the basic research in the lake Ontario area primarily in co-operation with the Great Lakes Institute at the University of Toronto, and I might mention in this connection that to facilitate

these joint studies the Department of Transport, through the coastguard services has provided a research vessel, the *Port Dauphine*, is the first marine research vessel of its type ever to operate on the great lakes. More recently, the United States has put one into service as well.

It has been suggested from various sources that there has been a loss of revenue resulting from the low water levels in the channels and harbours of the great lakes. We are certainly inclined to agree with the suggestion, and to believe that this is the case. But we find it exceedingly difficult to make any assessment of such losses. They would result I suppose from light loading of ships, or diversion of traffic away from the St. Lawrence river and great lakes ports. Full information of what in effect has happened in this regard so far is extremely difficult to obtain. To come up with any accurate figure it would require quite a lot of further survey work, analyses of studies, and operational analyses.

Here again information of this nature that is, economic losses they have been suffered by commercial ships as a result of low water levels, is essential to any progressive study of water used in the great lakes basin; and subject to the usual availability of funds we hope to be able to contribute some further information on this point as well.

But in the absence of complete data, it is considered that any estimate of economic losses occurring to shipping would be too unreliable at the present time for practical use.

Now, I spoke about economic losses suffered by commercial shipping because of low water levels. At the same time, I must agree that so far as the St. Lawrence seaway is concerned there has been quite a marked increase in traffic this year, and the revenues have increased accordingly. In fact, there has been no draft restrictions in the seaway so far as seasonal or low water levels are concerned. Therefore we cannot say there have been any revenue losses in this connection. The water level problem has existed in other areas, and primarily in connection with ports.

To sum up briefly our extensive memoranda which has been distributed to you, I would read the concluding points in it as follows:

1. Transport is interested in great lakes levels as they are at present or as they may be controlled in the future, because of the extensive navigation facilities administered and operated by the department, National Harbours Board and seaway authority.

2. The present low water conditions have necessitated an accelerated maintenance programming in the St. Lawrence ship channel and additional studies and data relating to the problem of low water in the St. Lawrence ship channel are being obtained.

3. Major national harbours, particularly the port of Montreal, are being affected by low water conditions. Further detailed study is needed to determine the impact on the economy of port operations arising because of low water conditions.

4. It has not been necessary so far to reduce permissible drafts of vessels using the St. Lawrence seaway below 25.5 feet because of the low water conditions now prevailing. Consequently, there has been no loss of revenue from tolls. It has been calculated that a reduction in permissible draft of one foot would result in a loss of toll revenue of approximately \$600,000 annually.

The cost to commercial shipping would be many times that, of course.

5. Meteorological data essential to any comprehensive study of the causes and possible remedies of the fluctuations in the water levels of the

great lakes is presently insufficient and a more extensive coverage is required.

6. A comprehensive study of the causes and possible remedies of the low water problem would be desirable, although it is evident that any plan for regulation of all the lakes would take considerable time to develop and would necessitate careful management to insure beneficial results.

We need to obtain a great deal more information concerning the cross relationship between precipitation, and evaporation, and in turn the relationship of these two factors to flow. This is extremely important.

We have a great deal of climatological data which relates to Canadian areas surrounding the basin itself, but over the water, the data is less complete.

The great water areas of the basin amount to one third of the total basin. Meteorological information and information as to what happens over the waters themselves is extremely important. We expect to have to do a great deal more work in this field over the next two or three years. However we are very happy with the reference that has been made to the International Joint Commission which proposes or initiates a most extensive and intensive study of this whole program, and we in the department are looking forward most anxiously to do what we can to help in this regard. I do not think I have anything more to say except to repeat that Mr. Ripley, from the marine point of view, and Mr. Richards from the meteorological point of view would be very happy to assist the committee in any way that they can.

The CHAIRMAN: Thank you indeed, Mr. Baldwin. I see several hands raised.

Mr. WHELAN: Mr. Chairman, I would like to ask one question which might not have too much to do with the brief we have just gone through. How many federal departments could Mr. Baldwin tell us have anything to do with the great lakes levels, or is it just a matter for the Department of Transport?

Mr. BALDWIN: Oh, no, there is more than the Department of Transport.

Mr. SMITH: They are all listed on page 42 of the book that we were given this morning.

Mr. WHELAN: I am aware that there are several. That is why I asked the question. Do you not think this is possibly one of the reasons why, when we consider a program of study, there seems undue delay? Even the little beaver knows when he has to conserve water, and he goes to work about it. I believe from all the different briefs that I have read that there is a certain amount of knowledge available to us now that could answer a lot of these questions. It alarms me when I hear that we are recommending studies of all these different things before we proceed with a crash program, if I might put it that way.

Mr. BALDWIN: I am not sure that I am competent to answer your question in full. I can only say that this is an area in which we in the department have direct responsibility. I say they are matters of responsibility in the Department of Transport because they are related to other transportation such as air services corporations; and that on the marine side and on the meteorological side we have already been doing what work we can within our own area of direct responsibility to improve this situation. I refer to the work we have been doing in the St. Lawrence ship channel and to increase the activities of the meteorological branch in the last few years.

I think probably when you talk about too many agencies, you still have to have various responsibilities divided between individual departments in relation to the actual job or the role of that particular department; and a problem such as this always requires a co-ordinated approach. Now, whether it should have been taken this year, last year, five years ago, or two years from now is not really mine to decide.

Mr. WHELAN: Maybe I am taking the wrong attitude about this, but I feel we have something where everybody wants to get into the act. They all seem to be aware of the political advantages of extending the facilities of great lakes water, when we have so many authorities, federal, provincial, state, and international who are all talking about doing something great. I happen to live on the busiest waterway in the world, that is, the Detroit river. I have been aware of a great amount of work being done in that area, but I have been more aware of the shortage of the water when we think of the importance of that river. I still think there should be some way in which we can shorten this up so that it is in the hands of one over-all body, through some mutual agreement. Maybe that is just a comment.

Mr. SMITH: I have a supplementary question.

The CHAIRMAN: Mr. Rock is next.

Mr. SMITH: Why, for example, does the Department of Public Works look after the dredging in harbours and rivers and the erosion of shores and beaches, and yet the Department of Transport looks after the dredging in the St. Lawrence ship canal; why not have a single unified body of those particular authorities?

Mr. BALDWIN: I think the reason for that is the long standing single approach to the St. Lawrence ship channel problem from Montreal to below Quebec, which is a problem not just of dredging, but also of hydraulics, and other factors as well. I would be the first to admit, I think, both departments have considerable competency in the technical knowledge of dredging, per se, but the St. Lawrence ship channel is more than a dredging entity.

Mr. SMITH: Did the validity of the separation not lose some of its power with the opening of the St. Lawrence seaway?

Mr. BALDWIN: Not really. The St. Lawrence ship channel authority, I believe, is doing some work on this now.

Mr. SMITH: But certainly in the legitimate sense it lost some of the separation?

Mr. BALDWIN: Yes.

Mr. ROCK: Is there any co-ordination between your department and the provincial hydro bodies, say, of Quebec and Ontario, and other, say, federal and provincial agencies in respect of problems of low water levels within the great lakes region and the St. Lawrence region?

Mr. BALDWIN: Yes; in the sense that the whole pattern of regulation of the amount of flow coming out of lake Ontario is an extremely complex, if you will, formula that has been laid down and which is carried out on a co-operative basis between the two federal authorities in monitoring the system on a continuing basis and assessing the changes which take place, and Ontario hydro sits in on the various advisory bodies with the provincial people who are actually performing the regulatory process. This I think is the key point.

Mr. D. M. RIPLEY (*Chief of Special Projects Division, Department of Transport*): Quebec, of course, co-operates with the department in the operation at Beauharnois which, of course, as you know, is a major hydroelectric development which is also utilized for navigation purposes. There must be a joint operation there to make sure that both interests get the maximum efficiency out of that facility.

Mr. ROCK: Have you ever tried to find other solutions? You people always have known in advance that there would be low water levels; at these times have you tried to find some solution to the problem and make recommendations of some kind to somebody or to the minister at this time? I notice you have this graph which shows when different water levels take place. This is not

something which has happened just lately; it has happened quite often previously. Have you not suggested anything to ministers in the past or to the present minister indicating what should be done? At this moment have you any views with respect to the solution to control the low water levels; have you any idea of your own? We are here to try to find ideas and solutions to problems. We would also like to know from people like you what are your answers to these problems, or what are your ideas. In other words, do you think we should have this big watershed development away up in the Grand canal, or do you think we should have watersheds holding back water all along the great lakes basin and the St. Lawrence basin?

Mr. BALDWIN: I think the position I would take on that—and this brings me back to Mr. Whelan's point—is that in those areas where we have a direct operational responsibility we have done our best to introduce measures that will be helpful in this regard, and to make appropriate recommendations to the Minister of Transport or the government. I would like to come back primarily to the St. Lawrence ship channel. Here there has been a great deal of developmental work which has gone forward. In our meteorological branch, with our available manpower and funds, we have been intensifying our meteorological work in the great lakes area for several years, but we have not been able to do as much as we would like to do if we had more manpower or money. The manpower is a greater difficulty in the meteorological field than funds.

Then, in the final analysis, the question of water levels in the great lakes is not a Department of Transport responsibility alone. Many interests come into it, both federal and provincial. To come back to Mr. Whelan's point, this is why we feel that possibly the only reasonable and fair approach which can be made at this stage is the approach which is to be made through the International Joint Commission on a co-ordinated basis. In respect of the long term continuing aspect, this is something I would not like to comment on. I would again repeat the point which I think is made in our brief; that is, I am a little loathe to propose individual solutions, because this is such a huge complicated problem that it requires people with a much greater depth of knowledge than I have. You have to look at this over a pretty lengthy period of time before you get adequate answers.

Mr. ROCK: This is the type of answer I wanted to hear, so that we know whether it is a serious problem or a local problem in different areas. Your department in a piecemeal way has solved the problem only for transport.

Mr. BALDWIN: Where we could.

Mr. ROCK: While you were trying to solve this problem in a piecemeal manner, such as dredging some area where you suspected a low level and wanted to make sure the area had proper depth for shipping, did you not by any chance consider this might release a more rapid outflow of water which would possibly create a more specific problem in respect of lower water levels?

Mr. BALDWIN: This is a difficult hydraulic question to answer. I do not believe we have any indication so far that any dredging we have performed in the ship channel has had that result; but the model tests, I believe, are designed to bring out this factor.

Mr. RIPLEY: That is correct.

Mr. ROCK: There have been some reports about the study of ice flows on lake St. Louis and the basin towards the Montreal harbour. I believe the Department of Public Works is to build a dam. Also, there was supposed to be a study. I do not know whether or not this study is going on. This had to do with the building on lake St. Louis across a very wide part of it—and this was surprising to me—sort of booms to hold back ice. At that time I had

written letters to three departments, including yours. I feel this is a waste of money if they are going to study any problem of ice control on lake St. Louis. For the same cost they could build a dam to hold back water and also help the old Lachine canal and the sea canal. I did not get anywhere with anyone in your department or in any of the departments. I would like to know who gives the directions to these engineers who are hired to do this work. It seems to me there is no co-ordination between members of parliament, in particular, who are in the district and who know the problem. We have people from outside who come in to solve our problem.

The CHAIRMAN: I am sorry, Mr. Rock—

Mr. ROCK: I am trying to solve the problem of water levels in this area. I believe in that area a dam would be proper and would offer a solution.

The CHAIRMAN: Ask Mr. Baldwin for his opinion, but—

Mr. ROCK: We are the representatives of the people who are demanding proper water levels and we are here to represent them. This is the place to ask questions; there is no other place.

The CHAIRMAN: I am prepared to agree that you may ask Mr. Baldwin what he thinks of a suggestion of yours.

Mr. ROCK: I am not blaming Mr. Baldwin. Who should one try to convince in your department, or in the seaway department? No one will give me the answer whether this is the solution or not. You do not get answers.

The CHAIRMAN: I wish to be fair to you.

Mr. ROCK: This is not a political affair but a situation in the whole of Canada.

Mr. PETERS: The member of parliament meeting the establishment.

The CHAIRMAN: Would you pose your question to Mr. Baldwin?

Mr. ROCK: Do you not think enough has been said so that I can get an answer in some way as to lake St. Louis? I would like to know what type of co-ordination there is between members of parliament, the ministers and the departments. I asked my question more or less in general but now I have to come to a specific case.

The CHAIRMAN: Would you do that?

Mr. ROCK: This is what I am doing. I have asked specific questions.

Mr. BALDWIN: I will do my best to answer them but I am not sure the answer will satisfy you.

Mr. ROCK: I would not be surprised.

Mr. BALDWIN: Quite frankly I cannot remember the technical details, the pros and cons in regard to the proposal that you have mentioned, although I do remember that such a proposal was in existence. It is my recollection, subject to confirmation, that when this matter came up the Minister of Public Works assumed the responsibility for dealing with this and established an interdepartmental committee to advise him on the various measures which included consideration of any proposals that any individual, including yourself, had put in. However, I am not in a position to indicate the exact results of that without either going back to our own files or possibly, better still, referring the matter for public works to deal with because it was dealt with, if I remember rightly, under the aegis of Mr. Deschatelets. Mr. Ripley, can you recall if this is correct?

Mr. RIPLEY: Perhaps the only thing I might add, sir, is that the facts are that only the ice control dam was built, and the structure which you referred to at the outlet of lake St. Louis was not dealt with. Whether it is intended to be built, frankly I do not know.

Mr. ROCK: This is what I want to know, whether there is any intention to build, so that I can at least bring in my submission on this problem.

Mr. RIPLEY: I think, to be quite frank about it, that your suggestions would receive every consideration in so far as the Department of Transport is concerned because they certainly have merit.

Mr. ROCK: You see, Mr. Baldwin, what surprises me is the fact that Hydro Quebec have built, just a little above the canal, two dams for the conservation of water only. I do not know exactly how many millions of dollars those dams cost but they were not too expensive. One of those dams could be built right below the lake St. Louis, between Caughnawaga and the city of La Salle, which is about the same distance. This would solve two problems, the low water level and also the problem of ice flowing through the rapids into the other basin. I was surprised that the department did not take my suggestion into consideration at all. I think it would be just as cheap as building this ice control dam to build these two dams at the widest part of the lake, from Dorval island to Caughnawaga, which is the very wide part of the lake. I could not understand who had suggested such a fantastic type of project.

Mr. SMITH: Supplementary to what Mr. Rock has said—perhaps it should be the minister to which this question should be directed—this applies to the matter of technical reports that are prepared for departments of government and then are treated as confidential and referred to interdepartmental committees of officials. They are never made public or never permitted to come to the hands of the members of parliament, and more particularly they are never made public. It seems to me that that very often prevents proper balanced consideration of those reports, that perhaps the department to which a report is made might not like the report and might apply its prejudices. We all have prejudices, even engineers have them. If those technical reports were made public, as they generally are in other governments, particularly in the U.S. government, we would get a lot of problems that Mr. Rock now finds and that most of us as members of parliament have found. We feel that sometimes these reports have not had proper and unbiased consideration.

Mr. ROCK: I have not finished my questioning.

The CHAIRMAN: The Chair feels on this point that witnesses are not here to testify on how the process of government controls should be implemented.

Mr. ROCK: Mr. Chairman, I would like to summarize in a sense, if I may. I never blame a minister because the minister gets advice from people such as these gentlemen here, and the only opportunity we have of talking to these people is in situations such as this. Therefore, I think we are completely in order in asking such questions. I never blame any minister because he relies on the advice of his advisors.

The CHAIRMAN: The Chair is simply trying to indicate that it feels that these witnesses cannot assist in finding out new ways for government control, such control as suggested by Mr. Smith and particularly by you. You can ask them all the questions you want about what they know in the department, and they will answer those up to the point where they feel they cannot. The Chair's remarks pertain to the situation where it was indicated those questions dealt with a situation of government control which was lacking. I do not think these gentlemen are here to help us in that way.

Mr. DANFORTH: Mr. Chairman, I would like to ask Mr. Baldwin some questions pertaining to the brief he gave us. It is my understanding, Mr. Baldwin, you said in your remarks that there were three ways in which your department could control the navigation in the Montreal harbour area in view of the low water. One was, if I am correct in this, by the regulation of water from Lake Ontario. The second alternative was by further dredging, and the third alternative was by advocating less depth in the construction of the boats. If I understand, this is the picture.

Mr. BALDWIN: The last is not so much of control as a result if nothing happens.

Mr. DANFORTH: Am I correct in this assumption?

Mr. BALDWIN: I think I would add to the two points you mentioned—the control of water flow from higher up and dredging—what I might call remedial or protective work as a third method by which you can affect water level. This also is part of the model test studies we have been carrying on with regard to the St. Lawrence ship channel.

Mr. DANFORTH: I was very interested to read in the information provided for us that it is expected there is a distinct possibility that there will be less water available next year. In your brief you stated that to provide another foot in the St. Lawrence from Montreal down river would be a tremendously expensive proposition. What I am wondering is whether you have any indication of how much buffer you have as far as Lake Ontario is concerned. Were you this year using the maximum amount of water that was available for this or have we still some buffer that we can expect?

Mr. BALDWIN: Mr. Ripley was active in devising the present scheme of control, and perhaps he could better answer this than I could.

Mr. DANFORTH: I would be happy to hear his remarks.

Mr. RIPLEY: I am sure some of the remarks I might make have been made by others. However, I will take a chance that I will not bore you with repetition. The plan of regulation for Lake Ontario was designed to circumstances similar to those which happened in 100 years of record. To test the plan of regulation it was run through the past experience going back 100 years and it was found to be satisfactory. However, at the moment, owing to the extremely severe condition whereby the supply of water through the whole of the great lakes has been smaller and continues to be smaller than in the historical record, Lake Ontario is now at its minimum or danger point, and hence this has some bearing on our feeling that the situation next year will continue to deteriorate. That of course is, you might say, an educated guess because it depends entirely on climatic conditions. If we get an increase or even an average run or supply of water from snow melting or precipitation generally the situation would not be so critical, but the trend at the moment unfortunately is rather grim and hence our conclusions that we should be thinking in terms of a worsening situation.

Mr. DANFORTH: I would be very interested, Mr. Chairman, to find out how one arrives at a decision in this matter because of the fact that we have a tremendous number of ports on all the lakes, both United States and Canada. They will be directly affected by any water that is channelled out of any one of the lakes. Does the International Joint Commission work very closely on this entire situation?

Mr. RIPLEY: Yes, indeed they do, sir. When one gets into this type of area with regard to the regulation of the water that is available, consideration must be given to all interests. Certainly from the point of view of the Department of Transport there is the problem of deciding what sort of advice we should give because we have to moderate the views which relate to lake Ontario requirements while considering the requirements of the seaway and the down river area. The two are not always compatible and one cannot always hold water in lake Ontario and hold water in the down river area because you may need water in one area and not in the other.

It is our problem to advise the International Joint Commission adequately on this, and we are certainly well aware of the requirements. We are doing everything we can to give them the best possible advice.

Mr. DANFORTH: I can appreciate that as the water gets lower there may be a greater conflict of interest between, say, a port such as Toronto and a port such as Montreal, Certainly one must have some yardstick whereby one can resolve this conflict of interest. Would this be an entirely Canadian problem?

Mr. RIPLEY: To the extent that we will formulate our own attitudes on this, yes. We certainly get our views together on the Canadian side in the first instance, and the advice conveyed to the International Joint Commission and the control facilities and the control organizations would be a Canadian viewpoint.

Mr. BALDWIN: The final decision, however, has to be an international one.

Mr. DANFORTH: Yes, because there has to be agreement on both sides of the lake.

Mr. BALDWIN: That is right.

Mr. DANFORTH: What I am getting at is that there has to be someone who says when to stop, and this is the International Joint Commission which provides a minimum level to which you can artificially allow lake Ontario to drop by drainage. Is that true?

Mr. RIPLEY: When the International Joint Commission gave its order it established certain criteria within which the board of control was obliged to operate and, as I said previously, this would work if we had nothing worse than we had in the last 100 years. Now we are fringing on the point where we go beyond that, and in those circumstances it will require undoubtedly a rather close and rather special look at the problem in order to satisfy everybody and perhaps achieve the optimum regulation procedure.

Mr. BALDWIN: Perhaps I could meet your point by saying that the International Joint Commission on an international basis defined the objectives and the principles that were to govern the water level situation and the flow in relation thereto, and approved in a broad fashion a scheme of regulation within which there remains some day to day flexibility to be applied, and approved machinery to do this day to day job. It is all done on an international basis.

Mr. DANFORTH: Thank you.

In other words, then, the condition of shipping, right from the head of the lakes through to the St. Lawrence outlet, would be taken into absolute consideration in any adjustment of water levels?

Mr. BALDWIN: This is right.

Mr. DANFORTH: What I am trying to ascertain to my own satisfaction is that no downstream port would be given consideration to the disadvantage of upstream ports?

Mr. BALDWIN: An attempt is made to achieve a reasonable balance, and this is the best one can do, I think.

Mr. DANFORTH: Thank you.

The CHAIRMAN: Mr. Scott.

Mr. SCOTT: You indicated there was a lack of meteorological data. I was wondering what might be the reason for that.

Mr. BALDWIN: Perhaps Mr. Richards of the meteorological branch could comment on that briefly.

Mr. LLOYD RICHARDS (*Lake Research Unit, Met. Branch*): Our first approach to this is: Let's get a rigid accounting of our gains and losses from meteorological factors. In the area of precipitation and rainfall, we have a pretty good idea of what is coming down and we can give this to you. In the area of losses, evaporation is something we are just starting to get accustomed to. In a very general way we know average evaporation from, say, lake Ontario and

the other lakes, but we cannot at the end of October, for example, tell you what the water loss by evaporation was for that month. This is one thing that I think we must aim for. This is an area in which we need more information. We need radiation observations of lake water temperature to get at this.

We have done considerable research work in this area in the last two or three years, thanks to the Great Lakes Institute, "Port Dauphine" and the Meteorological Branch, and we think we are getting to the point at which very shortly we will be able to give this area of evaporation some concrete and meaningful figures.

Mr. SCOTT: Is the insufficiency in any way caused by lack of staff?

Mr. RICHARDS: This is certainly part of it. We are going ahead as fast as we can. I might say we are going ahead as fast as new instruments are available. It has been very difficult to obtain water temperatures in the same way as we could obtain daily air temperatures; it is more difficult to measure the water temperatures. Within the last two months we have acquired an airborne radiation thermometer. This is a type of instrument we can use from aircraft. We can fly over the water and this thermometer gives us surface water temperatures. This is a big step forward.

Mr. SCOTT: How long have you been making this type of study?

Mr. RICHARDS: My particular unit, which is lakes research, is three years old. Some work was going on prior to that.

Mr. ROCK: I have a supplementary question, Mr. Chairman.

I would like to know why there is so much emphasis placed upon the study of evaporation. Even if one knew all about evaporation one could not stop it. I therefore do not see why it comes into the picture except for the fact that you want to know that there is a certain amount of water missing.

Mr. BALDWIN: One has to know what one's loss figure is before one can establish any remedial measures.

Mr. PETERS: I have another supplementary question.

Is it possible to relate the evaporation to the great lakes watershed? Does this form precipitation again and re-occur in the water basin of a predetermined size? Do you know this yet?

Mr. RICHARDS: I would think only a small portion comes back as precipitation in the water. Most of this is lost. Most of our precipitation is picked up over the Gulf of Mexico, so we are getting into a worldwide situation.

Mr. SCOTT: I would like to ask you about economic losses.

You said you did not have full information on the economic losses of these water levels. Again, what is the reason for that? Is that some part of your responsibility? Are you in a position in which you are unable to give us the full information on economic losses?

Mr. BALDWIN: Economic losses in an over-all sense would have to be considered in relation to many factors—industry, natural resources and so on, not just transportation. The only feature in which I would have a direct role, I think, would be in relation to transportation, primarily the shipping aspect. But again we just do not have enough statistical data there on the extent to which ships may have light-loaded or diverted, and I do not know whether we could ever have obtained information on ships that did not come for this reason.

I was merely making the point that we were of the opinion that economic loss has taken place, but I am not in any position to give anything in the way of even a reasonable "guesstimate" of the extent of that economic loss in relation to commercial shipping.

Mr. SCOTT: Is the Department of Transport making any efforts to ascertain that type of information, to your knowledge?

Mr. BALDWIN: We have been concentrating our efforts in the belief—and again I tried to bring this out earlier—that the only proper solution to this is a co-ordinated over-all approach and intensive study. This is what is contemplated in the International Joint Commission, and information that is relevant will be put into the pot in that connection.

Information on economic loss I imagine would be one of the things that could be sought by the International Joint Commission in whatever study it is set up, but I would expect they would want to have that study go far beyond the role of commercial shipping.

Mr. SCOTT: This may not be within your sphere, but what other government departments than the Department of Transport are involved in the water problem?

Mr. BALDWIN: I am not sure I could name them all but I understand from the Chairman that a list is contained in a brief that was circulated.

Mr. LEGAULT: Is there an over-all authority which has responsibility for the control of the watershed system?

The reason I am asking this is that I was referred to your department a few weeks ago concerning the level of one lake in comparison with another which was holding the water back where the water was higher than in the normal situation.

The CHAIRMAN: Will you specify?

Mr. LEGAULT: It concerned lake Champlain near Ottawa. The only answer I obtained was that the control of the waters above that lake was under the jurisdiction of the Ontario Hydro and a private company. I could refer back perhaps to seven or eight years ago when the problem was that there was too much water instead of too little water and the private companies were letting down waters faster than the lower system could take them in. The department did not have any control over that.

Are we trying to establish one complete over-all authority?

Mr. BALDWIN: There is not a complete over-all authority in the great lakes basin now. There are many different factors coming into it. I think the point you have taken is a reasonable one.

Mr. LEGAULT: Do you not think it would perhaps be advantageous to have that over-all authority so that some control can be imposed when there is too much water or when there is insufficient water?

Mr. BALDWIN: May I answer that by reversing the question and saying that within the Trent and Rideau systems we have found to be a substantial benefit the fact that we ourselves do have over-all control in those systems.

Mr. LEGAULT: But not in the watershed system itself?

Mr. BALDWIN: There are many watersheds in the great lakes basin and I am not sure to which one you refer, but I believe the one to which you referred is part of the Ottawa system.

Mr. LEGAULT: That is part of the Ottawa and the other is part of the Trent and Georgian bay system.

Mr. BALDWIN: On the Rideau and Trent canal systems the department does have virtually complete control in this regard and we have found that to be of great benefit in an over-all sense.

Mr. LEGAULT: What I am trying to bring out is that they are working toward one complete over-all system throughout the whole watershed.

Mr. BALDWIN: This is getting beyond the normal role of transport.

Mr. LEGAULT: But, if we do not have the control there is no use in discussing the matter. If everyone is going to get into the act and no one can give an intelligent answer we are not going to get very far.

Mr. BALDWIN: I agree in theory that an integrated approach is a desirable thing.

The CHAIRMAN: The witnesses can testify only as it pertains to transportation.

Mr. LEGAULT: If the Department of Transport has no control over that they cannot be held responsible for a lot of the questions that are being put or the allegations that are being made here today.

Mr. BALDWIN: I think I am right, Mr. Patterson, in saying that there is a diversified control system on the Ottawa.

Mr. PATTERSON: Yes.

Mr. LEGAULT: But, not throughout the whole watershed.

Mr. BALDWIN: No. There is not a single control system on the Ottawa.

Mr. LEGAULT: Then that would throw all your calculations out.

Mr. BALDWIN: Yes.

Mr. LEGAULT: And it would be useless to continue any of these things unless you do have that control?

Mr. BALDWIN: Yes.

(Translation)

Mr. LAPRISE: Mr. Baldwin, in your report you mentioned, on pages eleven and twelve—

The CHAIRMAN: Just a moment, gentlemen, if you do not mind—Mr. Laprise—

Mr. LAPRISE: On page twelve of your report you mentioned that the Department of Transport has been doing research on the physical properties of clouds and sowing them in order to get precipitation. Could you tell us when those studies were started and when they were completed? In what areas, for example?

(Text)

Mr. BALDWIN: The cloud seeding experiment was a limited one. It was carried out in northern Ontario. With your permission, I would ask Mr. Richards to give a little more detail on this matter.

Mr. RICHARDS: In respect of cloud seeding, a five year experiment has just been completed but the results have not been completely assessed. I expect to see the results before the end of this year.

(Translation)

Mr. LAPRISE: One other question. Did you—those experiments were carried out at the start—were they carried out precisely for that purpose, for the purpose of getting more precipitation, in the Ottawa area, for example, or on the Great Lakes to get an increased supply of water?

(Text)

Mr. BALDWIN: We know the activities of Weather Engineering Corporation of Canada. The position I would like to take in this respect is this. Our scientists in the meteorological branch are concerned that this still is something that is not a perfect technique. It is really something that needs to be studied subject to more experimentation and analysis before one could say definitely whether it has any potential or whether it has no potential, and if it has potential, in what circumstances. So far, the results are far from conclusive in this regard. Suffice it to say that commercial firms engaged in selling this service would not agree with us. But, I can only repeat to you the view of our scientific staff that this is not a proven field yet.

(Translation)

Mr. LAPRISE: Now, were those experiments carried out on the ground or by aircraft?

Mr. BALDWIN: By aircraft.

Mr. LAPRISE: Now, regarding the Department of Transport, have you done anything about the Abitibi, the Abitibi area, or the Lake St. John projects?

(Text)

Mr. BALDWIN: We selected an area in northern Ontario in consultation with certain of the forest industries as a typical area where forest growth takes place and where you might say that typical conditions existed in the general eastern region, and we carried on a five year experiment to see what would happen in a part of this area if no cloud seeding took place and, in another, if it did take place, in varying weather conditions. Only now after five years are we trying to analyse the results of that to see whether any pattern emerged. But, we do not know yet.

(Translation)

Mr. LAPRISE: Have you done any other research work such as the Grand Canal project? Have you studied those projects?

Mr. BALDWIN: Not yet.

Mr. LAPRISE: Are you aware that the Quebec Department of Forests recently stated that they intended to harness the Oritage river? They mentioned that federal assistance would be required for the project. They did not say what it would be for, whether the dam would be for power or something else. Are you aware of this?

(Text)

Mr. BALDWIN: I am sorry, sir, but I have not seen this statement, and I do not feel competent to comment upon it without looking at it a little more carefully.

The CHAIRMAN: Would you proceed, Mr. Alkenbrack.

Mr. ALKENBRACK: I have a few questions to put. May I first say that I am impressed with the ability of the representatives of this department who are appearing today. I think their answers in time will get us somewhere. I, personally, have not any faith in these rain making devices about which someone was speaking but I have had some experience in the conservation of water where we had put more water in a river.

Mr. Baldwin, your problem here is to get more water into these great lakes. It occurred to me that we talked about suppositions and propositions but as yet we have taken no action. Now, we, as members of this committee, are responsible for this and you, in turn, as a department, bear your share of that responsibility, and we must do something, and do it soon. Mention has been made of more than one authority in charge of the whole great lakes basin, containing five or six lakes altogether. Do you not agree that we should have an authority federally guided—that is, by this government and the republic to the south jointly—and provincially and internationally assisted, and that because of the peculiarities of the basin there should be an authority for everything above the St. Marys river, another one from there to Niagara and then a separate one again for lake Ontario as far as the Iroquois control dam. Do you not agree that they are three separate entities because of geographical and hydrographic peculiarities?

Mr. BALDWIN: There is a natural geographic division of the sort you mention. I would like to go back one stage farther, in answering your question, if

I can, and relate it to something that I think was raised by one of the other questioners earlier about the delays in getting at this difficult problem.

I know I speak for the officials of the Department of Transport and, I am sure, for the officials of the various other departments who have a close interest in this, when I say the officials of all these departments for some time have been most concerned with getting at this problem. They recognize that it does require a co-ordinated approach and they all have been very happy with the action which has been taken leading up to the present reference to the International Joint Commission. We are all going to concentrate our efforts in making that successful. I do not think there is any sudden overnight awareness of this problem. We have been anxious to see it take place for some time.

Now, when you come to the question of continued long term machinery that may emerge I can express a personal view and say, as an individual, I favour the more integrated approach to this problem, but whether it should take the particular form you suggest or some other form is not something I would like to comment upon. I think perhaps we will know better when a study, which the International Joint Commission is now making is completed.

Mr. ALKENBRACK: For example, you cannot raise the water in lake Superior by doing anything with lake Ontario.

My next question concerns a different matter and I would like to direct it to Mr. Ripley. The dam at Iroquois is the only control for the level upstream. Do you think it is high enough to have any effect on lake Ontario?

Mr. RIPLEY: Well, actually I do not want to confuse you, but the Iroquois control dam at the moment and for some time, in fact, has been fully open.

It is not at the moment exercising any control whatsoever on the levels or the outflows of lake Ontario. But there is an equally effective or more effective facility at the power houses downstream near Cornwall where the flow is actually measured as it passes through the hydraulic generating station. And it is at that point, notwithstanding that it is at some distance from lake Ontario, where there is the most effective control, and that is the point where full control is being organized.

Mr. ALKENBRACK: You are just using the Barnhart dam for your control?

Mr. RIPLEY: That is correct.

Mr. ALKENBRACK: And it is effective on the main demand for water by these generators?

Mr. RIPLEY: No. As a matter of fact the water is released in accordance with International Joint Commission rules, and they utilize the water as it passes.

Mr. ALKENBRACK: But if you did have an Iroquois control dam close to a viable degree, you could raise the water appreciably?

Mr. RIPLEY: Oh, indeed, if you shut off the flow of the St. Lawrence river, you could store water in lake Ontario and thereby raise the level.

Mr. ALKENBRACK: Via an Iroquois dam?

Mr. RIPLEY: Or the power house.

Mr. ALKENBRACK: Which is the higher? Are they both the same height?

Mr. RIPLEY: For all practical purposes they are, yes.

Mr. ALKENBRACK: Was there not a submarine weir somewhere between Gananoque and Brockville at one time before the seaway engineering began in order to help control the water of lake Ontario?

Mr. RIPLEY: No, sir, there was nothing in that area.

Mr. ALKENBRACK: Did you not remove something from there?

Mr. RIPLEY: No, nothing in that area that had any large measure of control on the outflows. There was a works known as the Gut dam downstream from Prescott which was a very small feature, actually.

Mr. ALKENBRACK: Was it not a type of weir?

Mr. RIPLEY: Yes, that is what it was.

Mr. ALKENBRACK: I am only asking questions as a layman. Thank you for correcting me. That is probably the one I had reference to. People in my area blamed the removal of it for the lowering of the water. I live near the entrance of lake Ontario and we are hard hit now, the same as the rest of the people along the lakes, with the problem of low water. Did it have any effect on the level?

Mr. RIPLEY: Not the removal of it; at the time it was removed it was actually replaced almost immediately by other control works which you and I have mentioned.

Mr. ALKENBRACK: Could we not now build another one somewhere upstream which would alleviate some of our troubles?

Mr. RIPLEY: In my opinion it would not be of any particular advantage. You can do the same thing with the works which are already there, if it was considered to be possible. You could raise the level and shut off the flow, but you must remember that there are other people to be considered, and that is where the problem arises.

Mr. ALKENBRACK: Could you not build another control dam above the water which is not a submarine weir, but a control dam upstream further which would raise the level of lake Ontario, and thus make use of the spring precipitation, conserve the run-off in spring, to get lake Ontario back to something like its old level, its proper level, and then have the use of these waters, when there would be a certain amount of interruption?

Mr. RIPLEY: First I might answer you this way. There is presently a control system in effect for lake Ontario which is intended to do the things which you are suggesting it is impossible to do, or, in other words, if the water is available and it goes to the lake, even if it comes in small amounts or large amounts, there is quite a major control there now. It is actually under a very positive and effective measure of control.

Mr. ALKENBRACK: But it would only benefit lake Ontario.

Mr. RIPLEY: Oh, no; on the contrary it is beneficial to all the people who utilize the water, not only the people of lake Ontario. It meters the water out to the best advantage for the people downstream as well.

Mr. ALKENBRACK: It could not benefit lake Erie, because of the Niagara escarpment.

Mr. RIPLEY: I quite agree.

Mr. ALKENBRACK: I have one more question which is for Mr. Richards. You told me that we would not have any time to discuss pollution here, and I am not going to bring it up other than to ask one question about it, which I think is closely allied; and although people like myself are just as ready to blame pollution on the lake, just as they blame it for the nuisance of low water levels, Mr. Richards, might I ask if low water does not increase the degree of pollution of a lake, such as lake Ontario?

Mr. RICHARDS: I am sorry, but I am just not in a position to answer your question. I do work with people who are interested in pollution, and I am sure they could give you the answer to it.

Mr. ALKENBRACK: I thought you were a meteorologist and you would have some knowledge of it. You take temperature readings, and surely you must take biological data as well.

Mr. RICHARDS: The research people certainly do, and such a program is carried on, although the data is funnelled in a different direction, and I do not see it.

Mr. ALKENBRACK: As a scientist would you not agree that pollution is in direct adverse ratio with the lower level of water in a lake such as lake Ontario? With the greater degree of pollution that would be present in it, there is not a chance for dilution of those bodies which are destroying our fish and so on?

Mr. RICHARDS: Again I am not an expert. I think possibly if we go into the actual volume of water, we would find that the lowering of the lake by one or two feet may not decrease the volume percentagewise, but I am no authority on it.

Mr. ALKENBRACK: All right. Thank you.

The CHAIRMAN: May I apologize for the fact that Mr. Baldwin had to leave the room in response to a phone call. I suspect that he will be returning shortly.

Mr. ROXBURGH: Referring to what Mr. Legault brought up about an over-all body, we are thinking about putting a dam across the top of Niagara for the benefit of lake Erie so that we could "twist" the water back, and the people of lake Ontario would not get any. We all look at this from our own angle, and as our people bring it to us. That is the way we have to do it. But I was just wondering if Mr. Legault's question was not too well answered by Mr. Baldwin at the time. Oh, Mr. Baldwin, I see you have returned. A question was asked of you previously, and I would like to return to it. First of all the Department of Transport operates right from the head of the lakes down, and it controls the whole of the lakes. How far does that control extend?

Mr. BALDWIN: I am not sure what you mean by the word "control".

Mr. ROXBURGH: I mean within the work you are responsible for.

Mr. BALDWIN: We administer certain harbours on the great lakes.

Mr. ROXBURGH: Right from one end of lake Superior to the other?

Mr. BALDWIN: Yes, that is right, and we are responsible for the regulation of shipping that moves on those waters.

Mr. ROXBURGH: And your department is also concerned with other aspects?

Mr. BALDWIN: That is right.

Mr. ROXBURGH: We certainly have to go to different departments in order to get their ideas; and the suggestion was made—whether it was Mr. Alkenbrack's suggestion or not—that perhaps there might be somebody over all that to make a study, because as we go into this business of each department with each situation, each one of us is talking about a situation representing the communities and areas all along the great lakes. One affects the other as we can easily see. You cannot do something in lake Superior which would ruin lake Erie, or vice versa. Have you any suggestions we might work on with a view to forming an over-all commission that is really going to look into the over-all set-up that we have for our great lakes? I know it would be a big undertaking. I think we all realize it. But should there not be some centralized body and not each department working within itself, which would be working by itself, and not doing just so much in a certain area? Should there not be a central authority over the whole area made up of representatives of the different departments or whatever the case may be?

Mr. BALDWIN: This may be, sir. We do assume that this is a type of thing which would emerge as a result of the reference to the International Joint Commission, if the problem is as you describe it, and I suspect that it is.

Mr. ROXBURGH: I do not know if I am describing it correctly, but this is the way it strikes me.

Mr. BALDWIN: I think that in the International Joint Commission's study you have considerably more than any specific remedial measure. But the problem is rather one of how to maintain at any time an integrated approach to it.

Mr. ROXBURGH: All right, thank you.

Mr. PETERS: What does the deputy minister think that this committee is going to accomplish? I ask this question because you have referred to the International Joint Commission several times. Are we supernumerary to it? Is there a chance of us being of any value in this situation?

Mr. BALDWIN: I think that parliamentary committees are always of value, for various reasons.

The CHAIRMAN: Perhaps your question should be asked in the House.

Mr. PETERS: This is a very technical field. Your answers have indicated that. Since we have an agency, the seaway authority, are there any figures available on the rate of flow, such as an increased flow by Montreal to a large degree, or is it dependant on the widening of the seaway?

Mr. RIPLEY: Actually, coincident with the opening of the seaway, these regulatory systems I spoke about arose.

Mr. PETERS: You mean the ones which are in operation?

Mr. BALDWIN: They were put into operation at that time or virtually at that time. Generally speaking, in the period since 1959 when they were first put into operation or thereabouts, this regulation of the lake has not caused the lake to flow, or has not raised it or lowered it greatly. It is within the bracket which has been experienced in the past.

Mr. PETERS: Is the amount of water going by Montreal now greater than it was?

Mr. BALDWIN: No.

Mr. PETERS: What studies has the department undertaken to establish whether or not some advantage would be obtained by putting in a dam to restrict the flow below Montreal?

Mr. RIPLEY: Well, as Mr. Baldwin remarked earlier, studies of that nature are a part of the continuing investigations which the department is undertaking. As I mentioned earlier, these will be expedited and accelerated to meet the circumstances we are faced with, not only in respect of low water, but also the demands created by deeper draft ships. The matter of control downstream from Montreal is part and parcel of these investigations.

Incidentally, presently we are engaged in that type of study and have a large hydraulic model in Montreal which we built some years ago, and with which we continually are carrying out tests of this nature.

Mr. PETERS: It appears there has been a drop in the water table in Canada which is pretty general. My area is in the head waters of the Ottawa river on lake Temiscaming. In that area the water table has dropped five or six feet in the last few years. This seems to be a general situation all across Ontario; there is a general decrease in the height of the water table. Is this something which is cyclical; can we expect the water table to rise in a period of years?

Mr. RIPLEY: I suggest it almost entirely is due to the precipitation rates which are received in the watershed area.

Mr. PETERS: It does not have much effect on the tables.

Mr. RIPLEY: The amount of priming your ground water system receives depends on the amount of water which falls on the watershed. Of course, there are some areas which actually might be served by water coming from an en-

tirely different watershed, such as an underground system of some type, but generally speaking it is a reflection of the amount of water which has fallen.

Mr. PETERS: Is this cyclical?

Mr. RIPLEY: Not really. We know highs follow lows and lows follow highs; that is about all we know. There is no known positive cycle.

Mr. PETERS: We have been told—and I think there is some merit in it—that some of the solution may be found in the Grand canal. What work has the department done in relation to this project which appears to represent a fairly easy solution to a very complex problem? If we were able to put half of lake Superior through the French river system, would this not solve most of the problem we have at the present time?

Mr. BALDWIN: This has not been a subject for special study by the department.

Mr. PETERS: Is this not an easy way of doing it?

Mr. BALDWIN: No. I think the answer is more complex, perhaps, than your question indicates.

Mr. PETERS: We have listened quite attentively to the discussion so far. As you say, the water is not going out of the great lakes system faster than previously, and if there is little advantage in building a large number of small dams in an effort to retain the water in the basin of the great lakes, then the solution is to get more water in or cut off the use of water, and we are not likely to do that. Therefore, I should think we would have to explore the idea of putting more water in the system.

Mr. BALDWIN: I would say this is something which should be explored.

Mr. PETERS: It seems to me this is something the department should have some opinion on. Studies have been made by some United States firms, and I believe there are fairly extensive engineering studies available beyond the plan for the Grand canal. Has the department looked over these?

Mr. BALDWIN: We have seen some of the reports. I am not trying to dodge any issue, but I think you may have misinterpreted the responsibilities of the Department of Transport; this is going beyond our normal field of responsibility. However, this is not to say that the studies should not be made.

Mr. PETERS: I have the same difficulty other members have; that is, the problem of having to deal with several departments, such as the Ontario department of lands and forests, the Ontario hydro, the Quebec hydro, and all the other agencies. Why is the Department of Transport not willing to give up its responsibility in the matter of navigable waters and in the matter of control? Every time anyone is willing to take over one of their responsibilities there seems to be a jealousy regarding your authority? It is only recently that the department of lands and forests has become involved in this; Ontario hydro have been into it for a little longer.

Mr. BALDWIN: In what respect?

Mr. PETERS: In northern Ontario almost all the headwaters of lake Temiscaming are being controlled not by the Department of Transport but by the department of lands and forests. Most of the control dams are put in by the department of lands and forests.

Mr. BALDWIN: But, this is not a transfer of responsibility in respect of navigable waters. Our responsibility still applies to navigable waters. I believe in certain cases we have agreed to works being put in in areas which have been presented to us for approval on the ground that these might be navigable waters. We have not objected to these always in cases where we have felt that the interest of industrial development was more important than the navigable waters aspect if it related only to a few pleasure boats. However,

I think I can say we have very zealously done our best to protect the navigable waters aspect of the waterways which are important to commercial shipping in this country.

Mr. DANFORTH: Mr. Chairman, I would like to ask Mr. Ripley one or two more questions, if I may. I was very interested in hearing Mr. Ripley's description of the control they have over the different lakes at different points. From time to time, as laymen, we hear theories put forward about the tremendous drainage systems being employed in agriculture today, and the deforestation of watersheds that is directly responsible in the main for the low water. When we have precipitation it is directed immediately to the rivers and thus to the lakes. Is that water lost to the great lakes water system, or do you have enough control that this water is controlled and we do not lose it as much as we have been led to believe?

Mr. RIPLEY: That is a very good question. There is no doubt about it that things such as you mention will alter the run-off characteristic; that is, you will get a quicker run-off and faster snow melt. Things were different in the pristine natural condition, there is no doubt about that. However, to the extent that we have looked at this question in trying to estimate the influences of these factors, and on the basis of the data which we have in the Department of Transport, there is nothing that suggests that has had a really large influence on it. When I see the information we now have available, I think it probably would be only fair to say it is something that should be looked into much more carefully. It is possible these relatively small factors in balance all add up and create problems which we really do not comprehend. I have answered the question in the sense of saying that to the extent we have looked at it we have not been able to see anything, but it should be looked into more thoroughly.

Mr. DANFORTH: Would I be safe in assuming that the speed of run-off would have a larger effect on the water table itself in an area rather than on the water levels of the great lakes?

Mr. RIPLEY: No; I would not say one was larger. I do not think it is really known. I would say it probably would affect the water table and the level of the lakes if there was any effect in it.

Mr. DANFORTH: I am pursuing this line of thought because I am interested in knowing to what degree the problem of retaining the water in the watershed itself by reforestation, dams, and other things, is being pursued, and what actual effect it might have on the great lakes system.

Mr. RIPLEY: I am afraid I could not add anything to what I have already said.

Mr. DANFORTH: To your knowledge are there any studies being specifically directed in this area whereby we might obtain this information?

Mr. RIPLEY: Mr. Richards, who has been working on matters relating to the great lakes institute has possibly something to say on that.

Mr. RICHARDS: This is not in reference to the great lakes area but it is in reference to such studies, and right now the meteorological branch is co-operating with a number of federal and provincial branches in the area of the Rocky mountains where they have taken a specific case of a small watershed. We are now studying this to get the average conditions, and from there we are going to move into changing this artificially by cutting vegetation so as to try to come up with an answer. Starting next year the major countries of the world will get together in an international hydrological decade, and these basin studies are going to be undertaken all around the world to try to get an answer to the question you are asking.

Mr. DANFORTH: Of course since it is based on such a broad scope you would have no idea of the length of time involved in this study. I cannot see how they could allocate a specific time to it.

Mr. RICHARDS: It is called a decade. We foresee a 10-year period. Perhaps the first three to five years will simply show what the conditions are. We are blanketing this area with instruments on rainfall, ground water, runoff gauges, radiation, all the meteorological factors. We will get the average conditions from that and then we will start to manipulate the vegetation to see if we do affect a change in the timing of these events. I think this is important if you want the same amount of rain but you want to change the time.

Mr. DINSDALE: I would like to follow up Mr. Danforth's line of questioning. It is very difficult from existing data to answer this question. Would Mr. Ripley be able to say that from the basis of the data that is available there is an absolute continuing loss of water; in other words the situation is constantly worsening?

Mr. RIPLEY: No, on the contrary. I think that to the extent we have been able to look at this the evidence is that the total quantity of water, the percentage of the total precipitation that falls in the basin and ultimately appears in the great lakes at the outlet of lake Ontario down the St. Lawrence, has, over the years, not changed materially. If I remember correctly it is about one third of the total precipitation amount that falls on the basin and ultimately appears at the outlet of lake Ontario. This has been fairly constant. The mean value is about one third of the total.

Mr. DINSDALE: Would that mean that this problem of the settlement and lowering of the water table is not having any long-term possible effect on the water conditions of the St. Lawrence system?

Mr. RIPLEY: It would suggest, on the basis of what I have just said, that it has not had any large effect, but I think it would change the rate at which the water is actually running off the basin in a short period, and this possibly could change the pattern of the lake levels.

Mr. DINSDALE: Would you regard this as a short term problem rather than a long term problem?

Mr. RIPLEY: No, I would not. I would say you would have to look at it to really discover all the facts, but I think the thing that probably is happening would be this change of great runoff.

Mr. DINSDALE: If it is a short term problem would you say that this could be handled by certain relatively simple remedial projects or would it need some rather more expensive and drastic action?

Mr. RIPLEY: I would take refuge in the remark made earlier that this is probably something which I am not really competent to judge at this time, and it is probably something which the I.J.C. should look at very carefully.

Mr. DINSDALE: It seems that there is insufficient co-ordination between your department and the provinces and between Canada and the U.S. at the present time to deal adequately with these problems, or would you feel that a greater degree of co-ordination between the federal and provincial governments and the federal government and the U.S. government would facilitate us in reaching some of these short term solutions that you suggest and would meet this navigational problem?

Mr. RIPLEY: My private view would be that the more difficult the problems become the more co-ordination and co-operation are required. We are in a position now where we definitely see we will have to establish other means of doing things and more co-operative ways of handling them. There again, as mentioned earlier, this is possibly the type of thing which will arise from the I.J.C. study. I am not using this as a means of getting away from anything. I

really think this is probably a clue to a successful solution to many of these problems.

Mr. DINSDALE: What we are trying to do is to indicate the problems to which perhaps the I.J.C. would turn its attention. Co-ordination between the various governments would seem to be one, and also determination of whether this is a long term or a short term problem, and a decision whether drastic steps or major diversions would be necessary. Would you agree that these are matters to which the I.J.C.s should give its attention?

Mr. RIPLEY: They have a reference. I dare say they will interpret the reference as they see it.

In the matter of control, if there is any indication of what will probably develop, once you establish a system of regulation for the entire great lakes—and this is the objective—it will be a continuing proposition to administer that, much in the same way as regarding lake Ontario or lake Superior. Once you have issued an order, then you must supervise it. In that respect once instituted it will be literally a proposition forever.

Mr. DINSDALE: Would it be fair to say that the Department of Transport is not unduly worried about the long term problem of water levels on the great lakes system and that in the normal course of events if the precipitation factors and evaporation and so forth remain fairly regular and normal they consider that the problem of the moment will right itself?

Mr. BALDWIN: I think this remains to be established a little more clearly. I am not quite sure about "unduly worried". We should perhaps never be unduly worried, but we are very worried over the immediate situation, as I think you recognize. All I can say is that we do not think that we know enough yet to be able to say that this is a permanent problem or that all the past indications would indicate that this is a simple cyclical problem and that the cycle will, in due course, reverse itself. Whether more basic research will indicate that the cycles are getting either shorter or narrower is something we do not know yet. If they are, then the worry becomes a much more long term worry.

Mr. DINSDALE: So I suppose any decisions to go ahead with these extensive dredging projects will depend on the results of further investigations?

Mr. BALDWIN: This could apply possibly within the great lakes on a limited basis. I do not think it would apply to the St. Lawrence ship channel because you have got a permanent long term continuing problem there anyway relating to the growth of the shipping.

Mr. WATSON (*Chateauguay-Huntingdon-Laprairie*): I am going to ask a question. You indicated earlier that you favour several approaches to this whole problem. I take it you believe that more co-ordination is necessary between all the federal and provincial organizations and departments involved in this problem, and also with any international or U.S. bodies that are involved with this water level problem. You feel, I take it, that a more co-ordinated effort is necessary. Is this correct?

Mr. BALDWIN: In regard to what?

Mr. WATSON (*Cateauguay-Huntingdon-Laprairie*): To the water resource problem in, let us say, northeastern North America, including the great lakes basin.

Mr. BALDWIN: Yes, the reference to the I.J.C. in effect indicates this is the only method by which the problem can be approached.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Do you feel this reference to the I.J.C. is all that is necessary as a move towards greater co-ordination at the moment?

Mr. BALDWIN: Not necessarily, but I think it is the principal step forward that is being taken, should be taken and has been taken.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): In the long run do you think the creation of a North American water resource commission will be necessary?

Mr. BALDWIN: You are getting a long way beyond my depth now. I am not an expert on water resources, and I will be the first to admit it.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): This is a question for Mr. Richards.

I have heard of some experiments—I think in Australia or New Zealand—having to do with prevention of evaporation by placing some sort of alcoholic compound on the surface of the water. I wonder if you people are contemplating any such experiments here in Canada.

Mr. RICHARDS: This is certainly going on in North America. I am not sure that there have been any such experiments in Canada, although there may have been. I think it is feasible where you are working with small reservoirs and you need the water very badly. These monomolecular films which stop the evaporation or hold it down can be broken down by wind action or wave action. You have to keep doing it; you spread it by aircraft or boat. It is a reservoir operation. It is particularly important in arid areas.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): You cannot foresee its practical application to any large body of water?

Mr. RICHARDS: No, I could not foresee it.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I have one other question which I am prepared to admit is perhaps a little irrelevant, but I wonder if any of you people—perhaps Mr. Patterson—can answer this. Have you considered the possible loss of water to the St. Lawrence system below Beauharnois if the Richelieu canal were able to go through and were to result in a canal from Valleyfield to lake Champlain. Has any consideration ever been given to that particular aspect of the Richelieu canal project?

Mr. ROCK: That is to the Hudson river?

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Yes, through lake Champlain and to the Hudson.

Mr. RIPLEY: The studies on the Champlain waterway are still before the International Joint Commission, of course. Consequently, not too much can be said about it.

From the engineering standpoint this matter has been looked into, and I think it would be fair to say that none of the plans or proposals for development of the Richelieu system would contemplate any large diversion of water out of the St. Lawrence river into the Richelieu river.

Mr. WHELAN: I have one short question.

We have read many items to the effect that the dredging of the St. Clair and Detroit rivers has a bearing on the low water levels of the great lakes. Is there any fact to support this?

Mr. RIPLEY: Yes, I think it would be correct to say that the dredging of the St. Clair river and the dredging of the Detroit river has affected the level of lake Huron and lake Michigan. I think studies have indicated that the effect is not as large as people have suggested, but nonetheless at times it could quite possibly be significant.

I should add that this is a matter which is presently being looked at very carefully by the United States corps of engineers, and they have proposed—not in final form but in principle—some remedial measures designed to offset whatever the effect has been from the dredging.

Mr. WHELAN: I would like to make one other comment. When I first suggested to Mr. Baldwin that there were too many bodies, I never knew there would be so many people thinking along the same lines. I am still of the firm opinion that we follow the example of the beavers—and I am quite serious about this though you may laugh at it. I see the former minister of northern affairs is here, a great naturalist—and I suggest we should propagate beavers and maybe the whole organization should become more “eager beaver” on this whole project.

Mr. SCOTT: That sounds like a good idea, one with which we should adjourn the committee!

Mr. ROCK: I have been looking through the charts trying to make up my own mind with regard to something, but now I would like to ask which lakes at this moment have control dams. I imagine this question should be put to Mr. Baldwin.

Of the five great lakes, which have control dams at the outlet?

Mr. BALDWIN: I will ask Mr. Ripley to answer this.

Mr. RIPLEY: I think I can answer this although Mr. Patterson is the expert on this and he is here. However, I will say that there are control dams at the outlet of lake Superior and there are control dams at the outlet of lake Ontario. There is a partial structure in the Niagara river which does not affect the levels of lake Erie and there are no control dams at all at the other lakes—that is, lake Huron and lake Michigan—or the St. Clair.

Mr. ROCK: Can any of you gentlemen tell us on what date the control dams for lake Superior were constructed?

Mr. BALDWIN: I am informed by Mr. Patterson that the date was 1921.

Mr. ROCK: Are you positive? Could it be after 1926 when they had the low water level?

Mr. PATTERSON: No, the structure was completed in 1921.

Mr. ROCK: And lake Ontario? Do you know? Is this just lately?

Mr. PATTERSON: It was constructed in connection with the Seaway development.

Mr. ROCK: They were completed around 1958?

Mr. BALDWIN: In 1959.

Mr. ROCK: I notice on these charts that since the gates have been built or since the control dam has been built at lake Superior you have had a more steady level of water compared to precipitation, except of course in 1926. I thought possibly the control dams were completed around 1928. The chart shows a very low water level in 1926. For the ones that have no control gates the levels seem to fluctuate from year to year, and in lake Erie the same occurs. In lake Ontario it has seemed to level off since, say, 1958 or 1959. In 1959 the level was going up and now we have more or less a level in 1960 to 1962. I would like to know whether the idea of building dams would bring about an immediate solution to the problem of levels on the lakes.

Mr. BALDWIN: It might help some areas but it would not necessarily be an over-all solution.

Mr. RIPLEY: I think certainly it is a suggestion or a plan which will get very immediate and close attention. Quite possibly in the long run this is the solution. It has been in part a solution for lake Ontario and for lake Superior.

I might add to that by saying that if natural circumstances are more severe than anything we have ever experienced, then plans which are predicated on experience just do not seem to work too well. But in the main, control works

MINES, FORESTS AND WATERS

of that sort properly handled, properly related to good basic data and generally good management, will tend to smooth out the effects, as you have noted.

While it is a very difficult and big area with which you are dealing, as I say I would be hopeful that ultimately that would be the result.

Mr. ROCK: You can understand our concern in this matter in view of the suggestion that we should go ahead and build this big watershed, the Grand Canal, and spend billions of dollars on this project. It might then be shown that we have wasted billions of dollars on such a project. As a member of this committee I am certainly concerned, as I think perhaps others are concerned, that we should not waste billions of dollars on this great project if possibly control dams would provide an immediate solution. This is why I wanted to get your comments on this matter.

Mr. WATSON (*Chateauguay-Huntingdon-Laprairie*): May I ask one question?

The CHAIRMAN: Mr. Watson.

Mr. WATSON (*Chateauguay-Huntingdon-Laprairie*): There have been suggestions about control dams at the exits to lake Huron for at least the last 50 or 60 years. Have you people made any estimates of the cost of such control dams?

Mr. RIPLEY: No, sir, we have not made any such estimates. It would not do any good for us to make them. I will say, however, that I believe the United States Corps of Engineers have looked at this and have estimated that such work would cost in excess of a billion dollars.

Mr. WATSON (*Chateauguay-Huntingdon-Laprairie*): The cost would be in excess of a billion dollars just for the control dam at the exit of lake Huron?

Mr. RIPLEY: And the other related regulatory work that would have to go with it.

The CHAIRMAN: I see the clock shows past six. I suppose we could entertain a motion to adjourn.

Before doing so, I would like to thank our witnesses on behalf of all members of the committee; they were most patient. I thank the members also for their presence and their wise questions.

The meeting is now adjourned.

HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 4

TUESDAY, NOVEMBER 17, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

WITNESS:

Mr. G. Millar, Chief Engineer, Harbours and Rivers Engineering Branch,
Department of Public Works.

Mr. T. M. Patterson, Director, Water Resources Branch, Department of
Northern Affairs and National Resources.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias Godin

Vice-Chairman: Mr. Ian Watson

and Messrs:

Aiken,
Alkenbrack,
Berger,
Danforth,
Davis,
Dinsdale,
Flemming (*Victoria-
Carleton*),
Foy⁽¹⁾
Grégoire,
Habel,
Hahn⁽²⁾

Harley,
Herridge,
Laprise,
Leboe,
Leduc,
Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,

Noble,
Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

Marcel Roussin,
Clerk of the Committee.

⁽¹⁾ Replaced Mr. Asselin (*Richmond-Wolfe*) on Tuesday, November 17.

⁽²⁾ Replaced Mr. Granger, on Tuesday, November 17.

ORDER OF REFERENCE

TUESDAY, November 17, 1964.

Ordered,—That the names of Messrs. Hahn and Foy be substituted for those of Granger and Asselin (*Richmond-Wolfe*), on the Standing Committee on Mines, Forests and Waters.

Attest.

LÉON-J. RAYMOND,
The Clerk of the House.

REPORT ON THE PROGRESS OF THE WORK

OF THE

COMMISSIONERS OF THE GENERAL LAND OFFICE
IN THE YEAR 1881

1882

LONDON:
PRINTED BY RICHARD CLAY AND COMPANY, LTD.

MINUTES OF PROCEEDINGS

TUESDAY, November 17, 1964.

(6)

The Standing Committee on Mines, Forests and Waters met at 3:45 p.m. this day. The Vice-Chairman, Mr. Ian Watson, presided.

Members present: Messrs. Aiken, Alkenbrack, Berger, Danforth, Dinsdale, Foy, Hahn, Harley, Laprise, Leboe, Leduc, Legault, Loney, Mitchell, Peters, Rock, Roxburgh, Ryan, Smith, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*), Whelan. (22)

In attendance: Mr. G. Millar, Chief Engineer, Harbours and Rivers Engineering Branch, Department of Public Works. Mr. T. M. Patterson, Director, Water Resources Branch, Department of Northern Affairs and National Resources.

The Committee resumed its consideration of the subject-matter of the water levels of the Great Lakes System.

Mr. Millar read a prepared statement which had been distributed in English and in French to the Members of the Committee.

The witness was examined by the Committee.

With the consent of the Committee, Mr. Turner on behalf of the Honourable Arthur Laing, Minister of Northern Affairs and National Resources, read a statement on Northern Diversion Proposals.

The Committee adjourned at 5:55 p.m. until 3:30 p.m. Thursday, November 19.

Marcel Roussin,
Clerk of the Committee.

MINUTES OF PROCEEDINGS

OF THE BOARD OF DIRECTORS
(1)

At a meeting of the Board of Directors of the [Company Name] held on the [Date] at [Location]

The following members were present: [List of Names]

The meeting was called to order by the Chairman, [Name]

and the minutes of the previous meeting were read and approved.

The Chairman then reported on the activities of the Board since the last meeting.

It was then moved by [Name] and seconded by [Name] that the following resolution be adopted:

Resolved, that the Board of Directors hereby authorize the [Action]

Witness my hand and the seal of the Corporation this [Date] day of [Month] 19[Year].

[Handwritten signature]

EVIDENCE

TUESDAY, November 17, 1964.

The VICE CHAIRMAN: Gentlemen, I see a quorum. I will now call the meeting to order.

There is no correspondence to report at this time.

I am pleased to introduce Mr. Gerald Millar of the Department of Public Works. Mr. Millar is the head of the division for harbours and rivers, and he is going to speak to us today in respect of the responsibility of the Department of Public Works for navigation in the great lakes.

Mr. G. MILLAR (*Chief Engineer, Harbours and Rivers Engineering Branch, Department of Public Works*): Thank you, Mr. Chairman and gentlemen.

The responsibility of the Department of Public Works for navigation in the great lakes-St. Lawrence river system is defined generally in the Public Works of Canada Act and the Navigable Waters Protection Act, part I.

The department is empowered under the Public Works Act to undertake dredging in Canada where required for public navigation. The Department's present dredging policy was established in 1956. Under this policy the department assumes the full cost of dredging main navigation channels to the depths required by public traffic, the approach channels to public wharves and the berthing areas at these wharves. Dredging of approach channels to, and the berthing areas at private structures is considered the responsibility of the owner; but if a national interest exists, the department may share the cost of dredging the approach channels. The department's share is dependent upon the extent of the public interest. In a harbour where there is no public structure and a private structure is used as a public landing place, consideration may be given to sharing the cost of all dredging. Recently, as an encouragement to the development of marinas where tourism is involved, the department has been authorized to pay up to 50 per cent of the initial cost only of any approach channel dredging to such an establishment.

The responsibility for dredging the St. Lawrence ship channel belongs to the Department of Transport. Certain of the channels in the interconnecting rivers of the great lakes have been by mutual consent, carried out by the United States government.

The controlling depth of the St. Lawrence seaway is 27 feet and the selected harbours of Toronto, Hamilton and the Lakehead have been deepened to accommodate seaway traffic. Dredging at these harbours has been performed by the Department of Public Works in accordance with the above mentioned policy. In addition to these main harbours administered by harbour commissions under the Department of Transport, dredging is carried out in many other great lakes and St. Lawrence river ports to maintain depths assigned to accommodate the public traffic using these harbours.

Since 1950, the Department of Public Works has expended the following amounts for dredging in the great lakes ports:

Lake Superior	\$ 10,500,000.00
Lake Huron and Georgian bay	\$ 4,200,000.00
Lake Erie	\$ 3,200,000.00
Lake Ontario	\$ 13,300,000.00

These amounts include: the cost of the capital dredging necessary to deepen the harbours of Toronto, Hamilton and the Lakehead to seaway depth; and the cost of maintenance dredging required to maintain channels and harbours to established standards. In some locations it is necessary to carry out maintenance dredging every year, in others less frequent operations provide satisfactory channels and harbour dimensions.

The levels of the great lakes have been gradually lowering from near normal conditions in 1960 to extreme low conditions this year. On lake Huron, the monthly mean level for each month, January to September, inclusive of this year, has established a new low record.

The range of water levels is greater on some lakes than on others generally because of the differences in the surface areas, it is an important factor in the design of wharves and other marine structures built by the Department of Public Works in the many harbours in the great lakes including the commission harbours at Toronto, Hamilton and the Lakehead, and in the establishment of the depths provided in dredged channels and berthing areas. All elevations both of structures and grades of dredged areas are referred to the low water or chart datum. This datum is an arbitrarily selected elevation within the limits of the range and most cases represents that plane which the water level will be exceeded 88 per cent of the time. Because of economic factors the additional expenditure necessary to provide facilities and dredging for the full range of water levels cannot be justified. In this regard navigation benefits 88 per cent of the time by higher than datum levels and suffers only 12 per cent of the time by lower levels.

As of September 1964, only the levels of lake Huron and Montreal harbour were below their respective chart datum. The September monthly mean level for lake Superior was elevation 600.95 which is 0.95 feet above chart datum: Lake Huron was 576.01 which is 0.79 feet below chart datum: Lake Erie was 569.04 which is 0.44 feet above chart datum: Lake Ontario was 243.67 which is 0.87 feet above chart datum: and Montreal harbour was 17.26 which is 0.74 feet below chart datum.

Under the provisions of the Navigable Waters Protection Act all structures built in navigable waters require the permission of the Minister of Public Works. In its administration of this statute the department is concerned only with the effect that the proposed structure may have on navigation. The responsibility for property rights, safety etc. are not within the terms of the act Plans for such works are examined to ensure that there will be no adverse effect on navigation and that the structure will not become a derelict and a menace to shipping during its useful life.

It is unfortunate that many structures such as private wharves, marinas, and so on are constructed without due consideration of the possible variation in water levels. In times of extreme high water on the great lakes there are many complaints because of flooding and erosion, the department is now flooded with complaints that the levels are very low.

Although the department has no responsibility for advising those building marine structures, on water levels, it does offer advice when such advice is requested. Unfortunately many individuals seem to be unaware of the vagaries of nature and accept water levels then prevailing, as the normal condition.

During the present period of extreme low water conditions, deepening of some of the more important harbours appears to be the only immediate practical solution. The federal government would be principally concerned with the main channels, approach channels to and berths at public wharves. The main channels in the open lakes are sufficiently deep to accommodate all traffic and, therefore, the present problem is in the depth of the approach channels to and in the public harbours.

The department performs a minor function in the control of waters flowing into the great lakes and St. Lawrence river. It maintains and operates dams at the outlet of lake Nipissing controlling the flow of the French river which discharges into Georgian bay on lake Huron. The department, by virtue of the responsibilities granted to it under the Ottawa river Act of 1870, has jurisdiction over the construction and operation of all works on the Ottawa river, and it maintains and operates storage dams controlling the flow of the river. Although this control does not affect the levels of the water in the great lakes, it is important to the harbour of Montreal and the navigation channel in the St. Lawrence river below that metropolis.

The VICE CHAIRMAN: Thank you very much.

Mr. FOY: That is a very good brief.

The VICE CHAIRMAN: Gentlemen, who has the first question to put to Mr. Millar?

Mr. ROCK: If I may ask a question at this time, Mr. Chairman, in respect of the last paragraph of your report could you tell me exactly where the Ottawa river ends when joining with the St. Lawrence river. The reason I am putting this question is that I would like to know how far the responsibility of the federal government extends in respect of the mouth of the Ottawa river.

Mr. MILLAR: I would say lake St. Louis.

Mr. ROCK: That is one outlet.

Mr. MILLAR: There are four outlets of the Ottawa river, two of which pass behind Montreal, namely the Mille Îles and the Des Prairies, and then there are the two other channels on each side of Île Jésus, and these two channels provide flow to the St. Lawrence river. This is where they add their flow to the St. Lawrence river.

Mr. ROCK: In respect of these two rivers which were named, Mille Îles and the Des Prairies and the other two channels you must admit there is a different canalization, but do you not feel that this is still part of the Ottawa river until it moves into the St. Lawrence river?

Mr. MILLAR: This may be a legal problem but I would say no, that the Mille Îles river and the Des Prairies river are part of the St. Lawrence river.

Mr. ROCK: That cannot be so because it is not the same water. It is the brown Ottawa river waters, not the clear blue St. Lawrence river waters. I would like to know how far the federal government's responsibility extends since 1870 in respect of the Ottawa river. There is good reason for putting my question. There has been a study made by your department in respect of the rivers mentioned, and the federal government is trying to involve the province and the municipalities. Since, in my opinion, this is the responsibility of the federal government, I believe that complete jurisdiction of the rivers mentioned is within federal responsibility, and it should not involve, in respect of water level studies and the maintenance of water levels, such other governments as the province of Quebec or the municipalities concerned.

Mr. MILLAR: Well, sir, the study that the Department of Public Works recently made in respect of these two rivers was not a study of levels per se; it was a feasibility study for navigation—that is, a canalization study.

Mr. ROCK: It is the same thing. The water levels are low and at times you can navigate, but at other times you cannot, so there has to be a canalization study.

Mr. MILLAR: Certain channels can be navigated at high waters but there are others which cannot be navigated at any time. You have a dam across one of these rivers.

Mr. ROCK: I would still like to know how far the federal government's responsibility extends. I would still like to know where the Ottawa river ends.

The VICE CHAIRMAN: Order. I think you are asking Mr. Millar for a legal opinion on something which I do not feel he is in a position to answer.

Mr. SMITH: I have a supplementary question. Are the Ottawa river limits defined in the Ottawa river act of 1870 or are there any regulations therein as to what the complete responsibility is in this respect?

Mr. MILLAR: No sir. The act, as you can see, is dated 1870, and it had mostly to do with the control of timber which was coming down this river in rafts. The department at that time owned and operated sluices and slides. It owned all the aids for driving timber. It collected tows. This act was passed at that time and it has been pretty well forgotten by everyone else since. But, I believe it is still on the statute books.

The VICE CHAIRMAN: Have you a question, Mr. Whelan.

Mr. WHELAN: Mr. Chairman, I have only a couple of questions. Mr. Millar mentioned the approach to public wharves. Do you interpret that to mean a private wharf being used by public shipping?

Mr. MILLAR: Yes.

Mr. WHELAN: Then you give no aid to private companies that have a wharf when, due to low lake levels difficulty is experienced in getting ships into their wharves. You give them no aid in respect of dredging in that respect.

Mr. MILLAR: At the berth.

Mr. WHELAN: To get into the berth. But, there is nothing in respect of the shipping channel itself?

Mr. FOY: I think you do.

Mr. MILLAR: Well, the department this year has performed some dredging over and above what it would have done in the normal course of events owing to low water, and certain channels were dredged ahead of time.

Owing to low water, certain channels were dredged ahead of time. Certain channels have to be dredged because of siltation, let us say, every four years. But after two years there was a bit of siltation, and whether the lakes were up to the datum or below it, we considered that it would be helpful if we dredged immediately. These are channels leading to wharves, and not to berths against the wharves.

Mr. WHELAN: What about the navigable streams that need dredging which lead into one of the main lakes? What is your responsibility about dredging that type of stream or river?

Mr. MILLAR: We are responsible for the dredging of navigable channels where traffic warrants it.

Mr. WHELAN: You say where traffic warrants it. Does this mean commercial traffic? You also commented on people building marinas and small wharves which could be a hindrance or a hazard to navigation. Does this mean that this type of traffic would be receiving these facilities?

Mr. MILLAR: I do not qualify it. It is true. It is usually taken to mean commercial traffic, but our department has been dredging channels for small boat traffic. Rightly or wrongly, we have been doing some dredging where the traffic was only pleasure traffic.

Mr. WHELAN: All these things are licensed by the Department of Transport?

Mr. MILLAR: Yes, but some of the smaller ones are not licensed.

Mr. WHELAN: Do you do the dredging for these navigable channels up to 100 per cent of the cost of the dredging.

Mr. MILLAR: When we dredge a channel we use the datum. If we see one dredged at four feet below the datum, then we do it. Suppose it is 1940 when the water was high, and it means going quite deep, or suppose the water is at the dam. What happens with marinas, as mentioned in my statement, is that we have had a fairly long period of high water and people were lulled into thinking that this was a water level requiring a marina, and that they had an area which was protected and where they had four feet of water, which was deep enough to warrant the provision of floats to operate a marina. They would go there naturally anticipating that this lake had a range of, let us say, six feet, only to wake up in 1964 to find there was no water at all.

Mr. WHELAN: The one thing I was trying to get at was the private wharf; through no fault of their own some of those wharves are becoming quite useless to ships which would use them commercially, by their not being able to carry their full tonnage of cargo. I am not saying that the Department of Public Works is at fault, or any of the federal authorities. They certainly had more power to control this than did the private individuals, or the company which owned these wharves, and who through no fault of their own are being asked to dredge out to the ship channel.

Mr. MILLAR: This only applies where the lake is below the datum. If it is above, or at the datum, it is the amount of water of depth that we provide. During the period of high water these ships may have the benefit of two, three, or four feet of water more than usual, and they have used ships drawing more water. The fact is that during a period of high water for example, the channel is maintained at 16 feet, while the lake is at zero, there is 16 feet of water in the channel. But over the last 15 years there has been 19 feet, and they have become accustomed to use 19 feet, while now they do not have it. But where the lake is below the datum, they have less than was intended to be provided.

Mr. WHELAN: I am thinking particularly of wharves along the Detroit river, not of lake ports. To get out to the ship channel they have difficulty with lower water levels, and this is a condition which a lot of the companies are finding, as far as that goes; they keep making representations to us to pay the cost of dredging their ship channels into their wharves. It is not a great distance, but they feel that they have done nothing wrong; they have had no power to control lake levels, while now they are being penalized for spending large sums of money to build these wharves, and they are losing the full value of them now.

Mr. MILLAR: I must say that our branch has not received too many requests of that nature, although they must exist. In the case of a marina where they expected an expanse of water and where floats are provided, they would have to provide the extra dredging, not only the floats to the marina, and we would not contribute. But we would contribute originally; we would contribute in the original cost. It may be that we could consider, if the government so decided, to go further during low water and to contribute to the percentage of dredging of approaching channels leading to the main channels.

Mr. WHELAN: I am not particularly thinking about marinas. I am thinking more of the commercial wharves at factories in that area, which are running into some difficulty. I am thinking particularly of the Allied Chemical plant, where a ship went aground one day last year and they had to get two or three tugs to move it, although it was not fully loaded.

Mr. MILLAR: Well, at this time it would be their sole responsibility.

Mr. WHELAN: One question I would like to ask is this: You said that you have responsibility of doing dredging. Do you do this dredging under your own authority, or is it done only when the Department of Transport tells you that you have to do the dredging, or some other federal authority, or does the Department of Public Works dredge it on its own authority?

Mr. ROXBURGH: People who are putting in marinas or docks, are investing huge sums of money, as you say, but there are statistics regarding lake levels low and high. Where may they receive information to find out if there is going to be a certain percentage of the lake in this area, or do they just go in because the water is of such and such a depth and put in a marina, and then wake up to the fact that they have not taken into consideration the average level of the lake?

Mr. MILLAR: I am afraid that is the case. Many of them do not apply under the Navigable Waters Protection Act. This act does not have any policing action. We do not police the act if somebody has built, unless we have a protest. If they apply under the act at this time we could advise them of what they are doing, for example.

Mr. ROXBURGH: Suppose for example it is a group of people or an individual. As we all know, there is an enormous amount of investment being put into these things; it looks to me, as you say, that they have taken a lot for granted. But if they did apply under the act, then it would be up to your department to inform them that this is possible, and say that before you put in this investment of \$200,000 or \$500,000, such and such is the case.

Mr. MILLAR: Well, we are not supposed to do it; there is no responsibility to tell them that; but we would certainly tell them.

Mr. ROXBURGH: If they made application?

Mr. MILLAR: Yes.

Mr. SMITH: Do they not have to get a licence if it is over \$5,000? Are they not supposed to get a licence?

Mr. MILLAR: We do not issue licences.

Mr. SMITH: Do they not have to get permission under the Navigable Waters Protection Act if it is over \$5,000?

Mr. MILLAR: They should, yes.

Mr. SMITH: Have you ever thought that the Navigable Waters Protection Act could do with some amendments to bring it up to date, particularly with reference to a definition of navigable waters?

Mr. MILLAR: The answer is yes, I do; I would like somebody to give me a definition of navigable waters.

Mr. SMITH: Is there any definition of navigable waters that the department uses; there is none in the act at all. That is the question.

Mr. MILLAR: I am afraid that is the answer.

Mr. TURNER: I will let Mr. Smith finish his line of questioning.

Mr. SMITH: There seems to be a considerable amount of disparity, resulting from this lack of a clear definition, as to where the department dredges and where it does not dredge.

Mr. MILLAR: I do not believe that the Navigable Waters Protection Act has too much to do with it, if we dredge or not.

Mr. SMITH: That is the controlling factor?

Mr. MILLAR: Well, it is a matter of fact that there is navigation, and there is going to be navigation, and public navigation in a channel. And if the gov-

ernment finds that there is sufficient navigation and a good economic reason to provide a greater depth, then it will decide the case on its merits.

Mr. SMITH: You refer to public navigation; is that public user or a public water transportation system?

Mr. MILLAR: I mentioned a moment ago that we have dredged channels and deepened them which will only be used by pleasure craft.

Mr. SMITH: That would be public user?

Mr. MILLAR: We did it where public user was only for pleasure.

Mr. SMITH: I have one final question, and it is on the matter of building breakwaters and other protective devices for channels which may or may not be navigable. Does the same uncertainty or lack of precision apply to the building of these things?

Mr. MILLAR: No, sir. Breakwaters and protective devices are considered as protecting the public harbour that exists, so you may wish to make them definitely federal, that is, under federal jurisdiction or responsibility.

Mr. SMITH: I realize there is federal jurisdiction, but the policy is whether they shall be built, or not.

Mr. MILLAR: It rests with the minister.

Mr. SMITH: You say it rests with the minister. There is no definition about it; each case is judged on its merits or lack of merits?

Mr. MILLAR: Yes.

Mr. TURNER: Mr. Millar, when Mr. Baldwin the deputy minister of the Department of Transport appeared before us he gave us statistics having to do with water levels at the port of Montreal, and as you know, the 35 foot level is considered to be the reasonable minimum for the use of shipping in that port. He told us that in 1963 levels below that 35 foot figure were experienced, for 108 days, and that in 1964, as of November 10, water depths below the 35 foot level had already been measurable in terms of 148 days; and that would make it about 155 days now. What effort has your department made by way of dredging to meet the problem of water below the minimum 35 foot level?

Mr. MILLAR: We have done nothing, because as I mentioned before, the approaches to Montreal are what are known as the St. Lawrence ship channels, which are under the jurisdiction of the Department of Transport, and the harbour is under the national harbours board.

Mr. TURNER: Have you done any dredging before in the port of Montreal at the request of the Department of Transport or of the national harbours board?

Mr. MILLAR: Before the St. Lawrence ship channel was transferred to the Department of Transport, the Department of Public Works did dredging in that section.

Mr. TURNER: Does the Department of Transport do the dredging now?

Mr. MILLAR: Yes.

Mr. TURNER: Do they use your equipment?

Mr. MILLAR: No, it is all done by contract.

Mr. TURNER: So they do not have any interdepartmental arrangement with the Department of Public Works for the use of equipment?

Mr. MILLAR: No, the Department of Public Works has no dredges on the great lakes, or around Montreal. We have some in the lower St. Lawrence.

Mr. TURNER: Would you be willing to express an opinion in respect of whether dredging would accomplish anything in the way of improving the harbour facilities and port channel in Montreal?

Mr. MILLAR: I believe dredging has accomplished about as much as it could and that now other measures, together with dredging, may have to be taken.

Mr. TURNER: In other words, in your opinion dredging has accomplished about the limit of what it can accomplish in the port of Montreal?

Mr. MILLAR: And maybe too much.

Mr. SMITH: By other measures, do you mean controls?

Mr. MILLAR: Yes.

Mr. TURNER: Flow controls.

The VICE CHAIRMAN: Mr. Laprise.

Mr. TURNER: Maybe too much...

The CHAIRMAN: Mr. Laprise.

Mr. LAPRISE: Mr. Millar, in the last paragraph of your statement you mention that you have certain responsibilities where the Ottawa River is concerned, you have jurisdiction over the construction and operation of all works on the Ottawa. Does that include the dams at Rapids Seven and Two at Cadillac?

Mr. MILLAR: No sir, not those dams. With regard to the part our department played in building those dams the province of Quebec had to ask the minister for his approval under the Navigable Waters Protection Act.

Mr. LAPRISE: Did the first group now to be found at the head of these dams have anything to do with water supplies for the Montreal harbour? Do you think the Department of Transport intervened?

Mr. MILLAR: There was no intervention as far as I know. As I have stated in my brief, the department controls the water level of the Ottawa River because it controls the Temiscamingue and Quinze dams. Several other dams also affect our control. At times we have full control of the rivers and at others we do not. The Ottawa River affects the water level of Montreal harbour because the Ottawa flows into the St. Lawrence. At the present time the level of the Ottawa and the volume of water in the storage basins are very low. This is the third year the level has been low. The low level of the Great Lakes causes this low level of the water in the Montreal harbour. It is unfortunate, but the two events have occurred at the same time.

The VICE-CHAIRMAN: Mr. Smith, you still are on the list.

Mr. SMITH: Could you tell us, historically or otherwise, why the responsibility for dredging the St. Lawrence ship channel belongs to the Department of Transport and the remainder to the Department of Public Works; is there an historic reason for that?

Mr. MILLAR: The transfer was done before my time. It happened in the juggling of departments and functions between one department and another. For example, our department was introduced at confederation, whereas the Department of Transport came much later. When the Department of Transport was formed, they took it from another department which was abolished, railways and canals, which was placed under the jurisdiction of this department. I could not give you the whole history, but it was in that manner that we lost this.

Mr. SMITH: Now that the St. Lawrence seaway has been opened and has been in operation, aside from political considerations, but by way of technical considerations, do you think it would be better if the matter of dredging and the waterways of the whole lake system were under the jurisdiction of one department?

Mr. MILLAR: I think so.

Mr. LEGAULT: Mr. Chairman prior to asking the two or three questions which I have, I would like to bring to the attention of this committee the fact that Mr. Peters and I attended a meeting in North Bay last Friday night. It was a very interesting meeting concerning an explanation of the Grand canal system by Mr. Tom Kierans, who is to be a witness before this committee in the near future; also present was Mr. Mezerow of the Great Lakes Water Commission from Chicago. Numerous reeves and mayors from municipalities directly affected by the water levels were present, and also members of the Quebec provincial house. The idea was to promote this project, and a general explanation was given. I think it would be of interest to the committee to know of the interest being shown by all municipalities, and that necessary pressures will be given to this.

My first question, Mr. Chairman, would relate to the one asked by Mr. Laprise concerning the water control as explained by Mr. Millar in respect of the Ottawa river. You answered to the effect that you do not control the watershed, which feeds into the Ottawa river, and that this makes it impossible for you at various times to have complete control of the Ottawa river itself. I notice on the Quebec and Ontario sides there are various storage dams, controlled by other organizations. Am I right in this?

Mr. MILLAR: That is right.

Mr. LEGAULT: You say that you have complete control at the outlet of lake Nipissing?

Mr. MILLAR: Yes.

Mr. LEGAULT: And you have no control above lake Nipissing itself?

Mr. MILLAR: No. The control there is in the hands of private companies and possibly Ontario hydro.

Mr. LEGAULT: By the hydro, the department of lands and forests and private firms?

Mr. MILLAR: Yes.

Mr. LEGAULT: How can you justify claims against the department for damages due to overflowing when you have no control of the waters that would be coming into lake Nipissing? The only control you would have would be by the outlet you have at lake Nipissing itself.

Mr. MILLAR: I do not wish to say anything against the courts of Canada, but there was a case decided by the courts in which we were found responsible. However, in the case of lake Nipissing we are endeavouring to do an impossible job. The outlet of lake Nipissing is too small to carry the water that would be required to be passed if we wanted to maintain the lake below a certain level. At certain times we would have to pass so much water that we would flood downstream; so, it is a matter of juggling and doing the best we can.

Mr. LEGAULT: Would there be compensation if the department had control of the water above in the watershed of lake Nipissing itself, and the Ottawa river itself?

Mr. MILLAR: It would, but in the case of the Ottawa river it is a misnomer; we should not have this control. In my branch, the harbours and rivers branch, we consider ourselves a construction agency of the government. We contract structures and pass them on to others for administration. These are remnants of things which were done quite some time ago when the policies of the government were different.

Mr. LEGAULT: Is it the anticipation that the water level of lake Nipissing would be lowered approximately three feet below the normal level during October and November because of the fear of flood during the spring season?

The reason I am asking this question is for numerous years different mill operations had to close down because of the low water level in lake Nipissing. The water level had been lowered the previous autumn, perhaps owing to anticipation of a heavy snowfall or heavy waterfall.

Mr. MILLAR: Primarily in respect of our regulation of lake Nipissing we like to start at the beginning of the freshet with the lake very low. As the flow increases, the lake goes up and we hope it will not go higher than what we think desirable having regard to flooding downstream. During the last two years, which were normal or less than normal years, we tried to reach an elevation of 642.5 feet. This is what is considered to be a good navigation season level. We try to maintain that level with the minimum flow in the river which we must give all the time. So, the river is controlled to a minimum flow and the lake in held, supposedly for navigation, as close as possible to 645.25 feet. It goes down naturally. Then, after navigation we let the lake go down in order to have the lake close to empty at the beginning of the freshet.

Mr. LEGAULT: Would that not be very dangerous, because in the last few years when we did have a very low precipitation the result was that numerous mills could not operate because of the low level of the lake which was owing to the anticipation by the department of heavier precipitation.

Mr. MILLAR: This is what would happen in nature if there were no control.

Mr. LEGAULT: Could this water be discharged during the winter months when there would be a more accurate appreciation of the water situation which would develop?

Mr. MILLAR: Actually, I am afraid you are thinking we have a great amount of water stored when we reach the month of September, but that is not the case. The lake has lowered, regardless of our control; it is still fairly good for navigation purposes. When we let it take its course, we are practically doing what nature would do.

Mr. LEGAULT: Thank you very much.

Mr. FOY: Mr. Millar, you mentioned that there is a relationship between the amount of work your department will do and the economy of the area there, I believe. I would like to pinpoint one place, and that is Grand Bend, where there are three fishing companies doing upwards of over half a million dollars worth of business a year. In this area your continual dredging is appreciated very much; you have been most co-operative. However, as you know we have been trying to obtain a solution and your department has had a study going on for a couple of years in respect of the water currents and so on. What formula do you use in justifying an expenditure in an area of this type? I do not suppose you would have this problem in major centres like Montreal, Toronto, Windsor or Sarnia, that you have in a small area like the village of Grand Bend, which is a great tourist spot which brings in about 10,000 people in the summer and still has two industries there. I believe that next spring you are going to make a decision with regard to whether or not you will try to work out something on a permanent basis. I am wondering what formula your department uses having in mind the amount of money that is required in the way of an expenditure to relieve the economy of the area.

Mr. MILLAR: I would rather leave the answer to that to our economics study group.

We have an economics group in our department, and in my branch we prepare estimates of costs for various works. This is passed to the economic branch, and they have their methods and policies which they follow and then come up with the answer. I can tell you this, for example, if we used a benefit cost ratio in the case of a continuing structure or harbour we would not use the same formula for a new project.

Mr. FOY: That is why I pointed out this particular area, so you would know what I was talking about. I understand then that you cannot give me an answer.

Mr. MILLAR: Not now, sir.

Mr. FOY: How would I go about getting it?

Mr. TURNER: Would the economic branch of the department have any objection to appearing before the committee?

Mr. MILLAR: I believe the committee can ask whoever they want.

Mr. FOY: I was wondering if I could make a request through you to ask the economic branch this question for me. Is this permissible?

Mr. MILLAR: Yes, I believe so.

Mr. FOY: In that case I am asking you for this.

Mr. ROCK: Mr. Millar, as you are well aware, all members here are concerned with the low water levels in the great lakes and the St. Lawrence basin. Most of us here are also concerned directly with our areas where we have low water levels. First of all, I would like to know from you, since you are the chairman of the federal interdepartmental committee, what co-operation you are getting from the other departments. As the chairman of that committee you would be in a better position than any other engineer in the department to know what co-operation you are receiving from all the departments. I would like to know what type of co-operation you have received in the past regarding water levels.

Mr. MILLAR: We have been receiving the very best co-operation from the Department of Transport. As you can see, the division of jurisdiction is very complicated, and my branch and the marine works branch of the Department of Transport are on very good terms. We consult practically every week. We get good co-operation from the water conservation branch of the Department of Northern Affairs. We get as good a co-operation as we could expect.

Mr. ROCK: When a project is being planned, who does all the preparatory work; is it your department or is it the other various departments concerned?

Mr. MILLAR: What type of project?

Mr. ROCK: Let us say that the Department of Transport feels that at a certain place a dam should be built. Who does all the preliminary study; is it your department who is in charge of that or is it the Department of Transport?

Mr. MILLAR: Apart from the seaway authorities I do not believe that the Department of Transport would have anything to do with building dams.

Mr. ROCK: Let us not take the seaway into account, but what about the dams up the Ottawa river?

Mr. MILLAR: Most of the dams on the Ottawa river are power dams. The latest one constructed was at Carillon, and there are others like Des Joachims.

Mr. ROCK: Since they are under some sort of federal jurisdiction could you tell me what co-operation you had on these projects from the various hydro commissions?

Mr. MILLAR: They had to come to the Department of Public Works for approval under the Navigable Waters Protection Act. They had to present plans showing the site and the structure, and they had to give us any other information that we required, such as information regarding the passage of logs, et cetera.

Mr. ROCK: Mr. Millar, you may be aware of a letter that I sent to your department. I am still concerned about the water levels of the St. Louis.

Around last January I sent your department a letter immediately after reading in the newspapers that your department was studying the possibilities of building an ice boom across lake St. Louis. In my letter I suggested that instead of spending millions of dollars on this ice boom which was going to be built at the widest part of lake St. Louis, it would be better to study the possibility of building a dam to control the ice and control the water levels with which we are concerned. This would assure proper water levels all the year round in the new seaway canal and the old Lachine canal. What I would like to know is what type of co-operation you got on that study because I know that you hired some consulting engineers to work on this project. I would like to know whether they took my suggestion into consideration.

Mr. MILLAR: I am afraid not.

Mr. ROCK: They did not?

Mr. MILLAR: They did not take your request into consideration.

Mr. ROCK: In that case I can say that not much thought has been given by your department or by any of the other departments to water level control.

The VICE-CHAIRMAN: Order, please.

Mr. ROCK: I am sorry, Mr. Chairman, but we are here to find solutions to these problems and we are also here to find out why in many instances nothing was done. I think this is very important. It is also very important to find out what type of co-operation was being given by the various departments and also what co-operation members of parliament are getting from these departments. It is here in this committee that we can find that out. I am talking about water levels, Mr. Chairman. I am strictly in order.

The VICE CHAIRMAN: I would just like to point out that the responsibility of the Department of Public Works concerns the navigation on the great lakes and the St. Lawrence river channel.

Mr. ROCK: In that case I am still in order because these water levels have a lot to do with the water levels of the navigable canals. Do not forget that lake St. Louis is navigable.

Mr. TURNER: Mr. Chairman, on a point of order; perhaps Mr. Millar can tell Mr. Rock why his suggestion was not taken into consideration, and in this way get rid of the problem.

Mr. MILLAR: The reason is that the dam that would have been required would have cost several times more than the very expensive ice dam that we are building. It would also affect the flow of the river, which would mean that it would control the river. Our department does not want to be involved in further control because it is not within our domain. The dams that I have mentioned on the Ottawa river would not have been built today under the present policies of my department.

Mr. ROCK: I know that possibly your department has no jurisdiction regarding the control of waters on lake St. Louis but I think the Department of Transport and the seaway authorities have a certain amount of jurisdiction because the St. Lawrence is definitely considered navigable. If anyone wants to do anything on the St. Lawrence river they have to get permission from the public works department. I therefore do not think you can just slip away by making a statement such as you made.

Mr. MILLAR: We have jurisdiction over the control for navigation purposes but other control is in the provincial field.

Mr. ROCK: Mr. Millar, first of all, when the water level drops for navigational purposes it is a navigation problem, and the water on lake St. Louis did

drop. This was a navigation problem. I tried to have something done in this regard and the type of answer I got was more or less the same as the answer you just gave me now.

I would like to mention something else, that as an alderman of the city of Lachine which I have been for twelve years, I have had the same type of answers given to me by the Department of Transport before I became a member of parliament. However, we went a little further and we got excellent results. We saved millions of dollars on a project. When you said that this was going to cost too much, did you know the cost of the two dams that Hydro Quebec had built just west of the outlet of the Beauharnois canal, the outlet into lake St. Louis? I believe that the same type of dam built in the position I mentioned in my letter, that is around La Salle where it is very narrow, would be much cheaper. I also sincerely believe that it would not have cost any more than the project for building these booms because the estimated price was not any more than the price for these two dams that were built by Hydro Quebec. This is why I cannot accept the type of answer you have given me very gracefully.

Mr. MILLAR: I can tell you, sir, that I do know that several years ago Quebec Hydro had done a very complete study regarding the building of a power dam below the Lachine rapids, and that it has not been built because it was not economic as compared to other developments elsewhere. One of the problems was frost and ice.

Mr. ROCK: I am glad you mentioned this because in the letters I received from the ministers I was told that they had no right to do so because Hydro Quebec intend to build a harbour project. I knew for a fact they had no intention of building a harbour and your answer convinces me that I am right. This is the situation: a member of parliament gets different answers from different departments. This is the reason why I would like to know what type of co-operation we are getting from different departments. You are the chairman of the committee composed of all the head engineers who are studying those projects.

Mr. MILLAR: What chairmanship are you talking about?

Mr. ROCK: The federal interdepartmental committee.

Mr. MILLAR: There is an interdepartmental committee that was formed when Montreal decided to increase the size of the island for Expo. At that time there were many departments of the federal government which were concerned, and a committee was formed made up of engineers from the Department of Transport, the St. Lawrence seaway, the Montreal harbour board and myself representing the Department of Public Works. It started with seven members, but it is now composed of only four members. The object was to protect federal interests because this work that was proposed would affect the flow of the river. It would affect the levels in the port of Montreal and would affect the St. Lawrence seaway, et cetera.

Mr. ROCK: In this case, you are the chairman of that specific committee. Therefore, there is no other interdepartmental committee of engineers to study other projects, and consequently there is no co-operation between the departments.

Mr. MILLAR: I would say no, but I would ask you, when you go to the department of northern affairs, to ask for Mr. Patterson who, I believe, will be a witness here.

Mr. TURNER: I think Mr. Patterson who is here might reply to Mr. Rock's question concerning an interdepartmental committee on water use.

Mr. T. M. PATTERSON (*Director, Water Resources Branch, Department of Northern Affairs and National Resources*): Mr. Chairman, there are a number of interdepartmental committees involved in water projects on the great lakes

and the St. Lawrence river, but I am not aware of a committee which had to do with the suggestion which Mr. Rock referred to in considering the ice boom in lake St. Louis or the alternative he has indicated that he suggested to the Minister of Public Works. I am not aware of a committee that has dealt with that.

Mr. ROCK: But, you are aware of it, Mr. Millar.

Mr. MILLAR: Another committee, you mean?

Mr. ROCK: No, but you are aware of my letter.

Mr. MILLAR: Yes, I do remember, and I must say that the project was formulated for the ice dam and at the time you wrote it was decided upon. But, I can also add that I do not believe if we had received the letter before it would have changed things. This is my personal opinion.

The VICE CHAIRMAN: Have you a question, Mr. Loney.

Mr. LONEY: Yes, Mr. Chairman. Mr. Millar, does your branch authorize dredging programs to be undertaken by the Department of Public Works?

Mr. MILLAR: Do you mean if it has the authority to authorize?

Mr. LONEY: No. Does your branch authorize dredging programs to be undertaken or do you recommend to the minister?

Mr. MILLAR: Yes, we recommend to the minister. We prepare our estimates, which are approved by treasury board, and when the money is voted by parliament, then we authorize the works.

Mr. LONEY: Now, where you have the responsibility for approach channels to a public landing place other than a departmental wharf does your branch determine the share that will be paid by the owner of that wharf?

Mr. MILLAR: Yes.

Mr. LONEY: To qualify this, I am referring now to the channel of the wharf; what distance must there be between a departmental wharf and a privately owned wharf which is used by the public before one can qualify?

Mr. MILLAR: I would say it would be judged on its own merits, wherever it is. There is no set rule.

Mr. LONEY: But, by your branch?

Mr. MILLAR: Yes, by our branch.

Mr. LONEY: In respect of the second paragraph here and the 50 per cent subsidy paid on marinas, does your branch determine or define marinas?

Mr. MILLAR: Well, we pay 50 per cent of the dredging of the approach channel to the marina.

Mr. LONEY: Yes, but would your department determine, where a marina was a private establishment, who would qualify?

Mr. MILLAR: Yes, we do. We receive requests by individuals or companies that are formed to operate a marina. Our engineers investigate and make a survey, and find the quantities that would have to be removed. If it is within the bounds of limits and the company is ready to pay its share we will recommend sharing 50 per cent of the cost of the approach channel.

Mr. LONEY: Now, this is in areas where there are other public landing places or departmental wharves.

Mr. MILLAR: Yes.

Mr. LONEY: Now, in the event that someone wishes to establish a marina in an area where there is no departmental wharf or there is no landing place, will you pay up to 100 per cent?

Mr. MILLAR: No, sir. In the case of marinas it is a straight 50 per cent. I believe what you are referring to is the case of a public harbour where there is no public wharf but where there is a private wharf, and there we will share in the dredging because there is some public interest involved because the federal government does not have to provide a wharf because this one is used by the public. Therefore, in that case we consider we can share, and sometimes we pay over 50 per cent. But, this is a commercial wharf.

Mr. LONEY: Well, I am referring to a harbour where there is no public structure and the private structure is used. Where there is a public landing place is consideration given to sharing the cost of all dredging?

Mr. MILLAR: Well, if it is a little harbour, say, in the maritimes or in Newfoundland, for example, where there is no public wharf but in which area a firm which controls the whole economy of that little settlement owns a wharf, and the coastal boat lands there, as a result of which we do not have to provide a public wharf because of the fact the public goes over this private structure—

Mr. LONEY: If I may interrupt, would this not also apply to the great lakes?

Mr. MILLAR: Yes.

Mr. LONEY: Then, would not a person qualify who is considering establishing a marina in an area where there is no public wharf?

Mr. MILLAR: I am referring to a commercial wharf, not a pleasure craft wharf. It might be interpreted later in a different way but right now it is not interpreted in that sense.

The VICE CHAIRMAN: Would you proceed with your questions, Mr. Peters.

Mr. PETERS: We are interested in the water levels of the great lakes, and part of this appears to hinge on the amount of waters that are put into the great lakes. Some of the discussion, particularly by Mr. Rock, took into consideration the waters supplied by the Ottawa river. As chief engineer, having regard to the Navigable Waters Protection Act and the rivers and harbours act, have you felt that over the years you have had sufficient control to really regulate water levels in the areas where you have such control. For instance, I am thinking of the Ottawa river and the fact that at the headwaters of this whole water system, namely Lake Temiscaming, the hydro have a dam. Have you been able to override the hydro's interest to maintain water levels on the Ottawa?

Mr. MILLAR: Yes, and no. This is very complicated. Of course, the hydro is interested in power and we are interested in navigation levels. In respect of lake Temiscaming and other lakes we have a set arbitrary elevation, which is what we call the elevation we need for navigation. We are concerned with navigation for towing logs and so on, and in releasing waters from our own reservoirs during the summer if we reach this elevation we will only release the inflow, and we will maintain that level. When we have done that the hydro have not complained. Of course, they would like to have more but they understand that navigation is one of our purposes and we have to take care of it.

Mr. PETERS: If we change the system, and I think there will be some discussion in this committee before too long in respect of building the Grand canal—and I know there is a more fancy name for this—will the public works department undertake this project?

Mr. MILLAR: That is a \$64 question.

Mr. PETERS: Would you be in a position to do the feasibility study on the work undertaken in respect of it?

Mr. MILLAR: I am afraid not, with the present staff.

Mr. PETERS: I am not really referring to the staff. I am concerned with whether or not the hydro will have a bigger influence than the federal government has in this field?

Mr. MILLAR: Well, the International Joint Commission has received a set of references by the government, and they are on the verge of naming a board to examine the levels of the great lakes and to come forth with some solutions, although this Grand canal is not in the terms of reference. You may know more about this than I do, but there was some reference to this in the *Gazette* published this morning.

This additional information would normally, I should think, come under this board that is being set up.

Mr. PETERS: What will be the situation if, as some people contemplate, navigation is reinstated on the Ottawa river, I mean heavy navigation? Do you feel that the act is such that this would be allowed, or have we given away to the Ontario and Quebec governments through hydro developments really the right to have navigable waters in that area?

Mr. MILLAR: No; the hydro dams on the Ottawa river were built with the basic idea that they would provide a base load, and they are run-of-the-river plants. Unfortunately today most of the hydro projects are operated as peak load plants. But on the Ottawa, since there is very little storage in front of these hydro dams, they cannot work the levels up and down more than a few feet, such as two or three feet; therefore they can only peak on a weekly basis, and this would not affect canalization of the Ottawa river.

Mr. PETERS: In other words, we really have not closed that door.

Mr. MILLAR: No, and if it should ever come that there was a necessity or justification to build canals, this could still be done.

Mr. PETERS: Are there not two studies, one for the diversion across from the Ottawa river to the great lakes? Is there a feasibility study on it available? This I understand was done about 50 years ago probably by your department.

Mr. MILLAR: I believe the one you refer to is the Georgian bay ship canal study which was made in 1908. The department brought forth an estimate of costs and feasibility, and the estimate of cost was \$100 million in those days for 20 foot navigation to the great lakes through the Ottawa river, the Mat-tawa river, lake Nipissing, and the French river.

Mr. PETERS: Could these be made available to the committee?

Mr. MILLAR: They are in the library here, I am sure.

Mr. PETERS: Could they not be made available through your department and photostated for the use of the committee?

Mr. MILLAR: There are about seven or eight volumes, I believe.

Mr. PETERS: Maybe it is only the conclusions that we want. Was there not an original feasibility study already done on this subject? It seems to me that this project was already in existence for a long time before you were interested in it in one form or another. Was there not a feasibility study done on it at any time?

Mr. MILLAR: I do not believe so, not on that one.

Mr. AIKEN: The general problem of controlling levels does not rest in your department.

Mr. MILLAR: Not generally, with the exceptions I mentioned.

Mr. AIKEN: Your main problem in the Department of Public Works is to follow along the levels and to keep navigation open.

Mr. MILLAR: Yes.

Mr. AIKEN: Has your department considered that there is an abnormal condition at the moment on the great lakes, particularly on lake Huron and on Georgian bay?

Mr. MILLAR: We do know of the condition, but there is very little that can be done.

Mr. AIKEN: What I am trying to get at is this. Do you consider this as a normal fluctuation of water levels, or is it something more than that, or have you reached any conclusion?

Mr. MILLAR: I would say that it is a normal fluctuation of the great lakes, from as much as we know.

Mr. AIKEN: Does your department go on the assumption that levels will eventually come back to what they were a few years ago?

Mr. MILLAR: Yes, sir.

Mr. AIKEN: Does your department consider that the development of the St. Lawrence seaway project had any effect whatever on these levels?

Mr. MILLAR: It gave us better control of some waters, because of the dams that are there, and the controls act to our benefit, I believe.

Mr. AIKEN: I am referring specifically to the general problem of low levels themselves. Are you looking forward or are you projecting a normal return in due course to the levels as they previously existed?

Mr. MILLAR: Personally I would think so.

Mr. AIKEN: Is there a government committee of which you know which is dealing interdepartmentally with the whole problem of lake levels, or has this been left?

Mr. MILLAR: This would be under the Department of Northern Affairs, in the water resources branch, under Mr. Patterson.

Mr. AIKEN: Yes. I know they are interested in the problem.

Mr. MILLAR: And in the lakes.

Mr. AIKEN: But is there not an interdepartmental committee of which you have knowledge?

The VICE CHAIRMAN: Perhaps Mr. Patterson could answer that question.

Mr. PATTERSON: Mr. Chairman, as I indicated before, there are several committees which operate on the great lakes system. These committees deal with levels. Some of these committees are international in character. We do have a co-ordinating committee on the great lakes, concerned with basic hydraulics and hydrological data, and on which three of the Canadian departments have membership along with three members from the United States. The purpose of this committee is to get an agreement on all sites as to the basic data which affect the hydraulics of the great lakes.

Mr. AIKEN: That is what I am trying to get at. I want to know if there is some committee within the government that is seized of this whole problem, because there are so many inferences involved in it. I wanted to know if there is one group which has over-all supervision of policy of water levels.

Mr. PATTERSON: Mr. Chairman, if I might add to what I have stated, and deal with the matter of policy, there is amongst government departments an advisory committee on water use policy which is chaired by the deputy minister of the Department of Northern Affairs and National Resources. This committee is designed to deal with policy matters.

Mr. AIKEN: Thank you. I think that answers my question to a degree. But I have one other thing. What liaison is there between this committee which you mentioned, and the International Joint Commission? Is there any?

Mr. PATTERSON: There is very good liaison between the committee and the International Joint Commission. I think you are referring to the second committee, the policy committee.

Mr. AIKEN: Yes.

Mr. MILLAR: The international Joint Commission is invited to have a representative sit in at the meetings of that committee.

Mr. AIKEN: Thank you. Now, one other question to Mr. Millar referring to Mr. Loney's question about dredging assessments in public harbours. I would like to ask if Mr. Millar could give us a definition—just a rough rule of thumb—as to where the division lies between what you classify as a commercial wharf and a non-commercial wharf; in other words, a commercial wharf would be one which is used for fishing or navigation and you would class it as commercial; but a wharf which is for private docking of private small boats would be non-commercial. What about the people who operate a marina as a business?

Mr. MILLAR: I guess it is a misnomer, because they are commercial, too. The definition has been carried for a very long time, I suppose, in my experience on the Atlantic, that a commercial wharf is where commerce goes over it.

Mr. AIKEN: I have one final question: Is there any consideration being given, or is there any discussion on the question of enlarging the area of assistance for wharves? You said that perhaps it could be done, but at the moment it is not. Could you tell me if there is any thought being given to it?

Mr. MILLAR: Yes, there is considerable discussion within the department of what extra assistance could be given by the federal government.

Mr. AIKEN: I presume a recommendation coming from this committee might be of some help?

Mr. MILLAR: Definitely.

Mr. AIKEN: Thank you.

The VICE CHAIRMAN: Now, Mr. Alkenbrack.

Mr. ALKENBRACK: Mr. Millar, at the last meeting of this committee I suggested to the witness at the time, who was an engineer from the Department of Public Works, that the solution to the water level problem on the great lakes was one of a multiple nature, one which concerns each lake, and its control, with the ultimate control of that lake; that we would have to spend money to do this in each location, and that the solution would be a series of measures. Do you agree?

Mr. MILLAR: Yes, sir. It not only is adding more water to the lakes, but it is controlling the outlets and providing the capacity of the outlets to pass certain volumes of water.

Mr. ALKENBRACK: The constituency I represent is in the lake Ontario basin, What is the average rate of flow of the St. Lawrence river in cubic feet per second at the present time?

Mr. MILLAR: Where?

Mr. ALKENBRACK: On the river.

Mr. MILLAR: The St. Lawrence river at Montreal?

Mr. ALKENBRACK: No. Anywhere; say at Prescott or Gananoque.

Mr. MILLAR: I am afraid I cannot give you the information offhand. I am pretty sure Mr. Patterson can make a wild stab at it.

Mr. PATTERSON: The outflow from lake Ontario through the St. Lawrence river at the present time is 195,000 cubic feet per second.

Mr. ALKENBRACK: The brief refers to 1960 and 1964 and makes a comparison four years apart. Assume the levels and flows were on an average for a century—of course we know they were higher than they are now—what was the average flow in November, 1960?

Mr. PATTERSON: Mr. Chairman, I cannot give the definite flow for November, 1960. The average flow of the St. Lawrence river over 100 years of record is in the neighbourhood of 242,000 cubic feet per second. I would suggest the possibility that in November, 1960, the flow was in the neighbourhood of 200,000 to 210,000 cubic feet per second.

Mr. ALKENBRACK: Then it is down quite a bit, but not as much as one would think by looking at the levels of the lake. I am informed that the whole basin is supposed to be the most stable year around flow in the world. That is, it is not like the river Nile which floods for part of the year and then goes down miserably in the rest of the year.

Mr. PATTERSON: Mr. Chairman, owing to the presence of the great lakes, I think those huge bodies of water do exercise a control which maintains a fairly uniform flow. I think it has been indicated in the earlier evidence that the Columbia river varies something like 61. The St. Lawrence is very uniform in flow.

Mr. ALKENBRACK: What is the present level of lake Ontario above sea level?

Mr. PATTERSON: Approximately 242.4 feet.

Mr. ALKENBRACK: What is the average controllable level attainable at the top of the Barnhart power dam? Is that not represented by that dark blue ink line standing there on the chart?

Mr. PATTERSON: Yes, sir.

Mr. ALKENBRACK: I am only a layman and I would like to point out what is on my mind. Is that it? (indicating)

Mr. PATTERSON: That is the Barnhart dam.

Mr. ALKENBRACK: What is the controllable level of that?

Mr. PATTERSON: Offhand I do not think I can give you that at the top of the dam, but this is not necessarily the level at which you could hold the water. You would flood out a lot of the interests around Morrisburg if you utilized that dam to its top.

Mr. ALKENBRACK: I did not mean that. I meant the highest controllable level without being sued for damages and the level it was intended to be built for.

Mr. PATTERSON: The control that was laid down for the maintenance of lake Ontario levels was a peak of 246.77.

Mr. ALKENBRACK: Then, would that be the answer to the question I asked you; that is, that they can control at the Barnhart dam and can hold the level at 246.

Mr. PATTERSON: No, sir. If the dam was all closed and the units were shut down, they could hold it higher than that, but it would result in damage to interests.

Mr. ALKENBRACK: Thank you. The old average mean level of lake Ontario in the days when there was no consternation about water levels was about 248 feet.

Mr. PATTERSON: I imagine so.

Mr. ALKENBRACK: Before the seaway was ever built that would be the old norm.

Mr. PATTERSON: The level that the lake went to in 1952 before the control was there with the dam on the old datum—and I think it is the datum you have in mind when you say 248—was 249 plus a few inches, and on the new datum and the levels I have been quoting, you have to deduct 1.77 from that.

The VICE CHAIRMAN: If I understand you correctly, Mr. Alkenbrack, you are leading up to a question of Mr. Millar?

Mr. ALKENBRACK: Yes.

The VICE CHAIRMAN: You realize Mr. Patterson will be before us later.

Mr. ALKENBRACK: Mr. Millar, you are a hydraulic engineer?

Mr. MILLAR: I am a civil engineer.

Mr. ALKENBRACK: Which is closely allied to a hydraulic engineer in the nature of the work which you quite often are called upon to do. Would you agree with me that we need a more definite and accurate control measure located closer to the outlet of lake Ontario in the St. Lawrence river and on the level of the average mean of the lake or nearer to the average mean of the lake? In other words, I am suggesting to you that we need, as another international measure, a dam to perform this function which I hope has been manifest in my questioning. This dam could be preferably in the Thousand islands where a lot of the engineering could be done from island to island, with the hope of doing it cheaper than at a place in the river a mile wide. I think a structure of that kind would cure our ills on lake Ontario.

Mr. MILLAR: I find myself incompetent to answer that question.

Mr. ALKENBRACK: In the first season a structure of that kind would retrieve the levels of run-off before the world shipping invaded the river again in the summer season. In the early spring run-off you would retrieve a lot of the levels that you have lost, would you not?

Mr. MILLAR: I do not see what you are driving at. I would like to repeat that I am a civil engineer with a little experience in river hydraulics but I am not a hydraulic engineer. Possibly a hydraulic engineer could answer you without any study of the question, but I cannot.

Mr. ALKENBRACK: Mr. Millar, Mr. Patterson's evidence has shown that the Barnhardt dam does not control lake Ontario to the proper and accurate degree required, and this is now shown by our lower water troubles, and it has also shown that a dam closer to lake Ontario, as I have suggested, would do so.

Mr. MILLAR: I do not believe that Mr. Patterson has implied that.

The VICE CHAIRMAN: Perhaps this could be cleared up by Mr. Patterson.

Mr. PATTERSON: Mr. Chairman, I think that the wrong inference must have been taken from any evidence that I gave. If the water is closed off, the Barnhardt dam can hold lake Ontario at the level at which it is today, but to do that the flow downstream in Montreal harbour would be cut off. The problem that faces us is lack of supply, lack of precipitation.

Mr. ALKENBRACK: If you had a dam closer to the lake you would more readily and more accurately control the outflow as you needed it. We would not have to face a situation where possibly you will have to forbid ships coming up the river, if they were going to use too much water to go through the canal.

Mr. PATTERSON: Mr. Chairman, the Barnhardt dam is fully capable of controlling the level of lake Ontario. If it were to fail, there is another dam above that, the Iroquois dam, which is fully capable of controlling the level of lake Ontario.

Mr. ALKENBRACK: The dam which you referred to is wide open now and it is not functioning at all.

Mr. PATTERSON: Because the Barnhardt dam is functioning.

Mr. ALKENBRACK: It is only there for the protection of the expensive works at Barnhardt island. That is one of its main functions, I believe. The Iroquois dam is a safety measure, is it not?

Mr. PATTERSON: That is correct, and that is all a third dam would be, a further safety measure.

Mr. ALKENBRACK: But it would cure our ills on lake Ontario. The records show that we have spent \$13,300,000 in 1950 in dredging it. I am sure a dam at Gananoque would not cost more than that.

Mr. MILLAR: This expenditure in dredging is not part of the capital cost of deepening it around Toronto. The rest is for maintenance, dredging and removing of silt. It has nothing to do with the level of the water.

Mr. HAHN: I wonder if I could ask a supplementary question following from the previous questions. Is my understanding correct that if you could put a dam at the end of lake Ontario and St. Lawrence and build it high enough to flood Toronto if you wanted, no matter what you do to stop the water flowing out of the lake, the fundamental problem is not the escaping water but lack of water in the system itself? So that if you put a dam at the end of lake Ontario and build up lake Ontario, you are going to have to starve the system below that dam. Is this correct?

Mr. PATTERSON: That is correct.

The VICE CHAIRMAN: Could I ask one question? To sum up, Mr. Patterson, could you indicate whether there is adequate control of water levels on lake Ontario, in your opinion?

Mr. PATTERSON: I think there is adequate control of water levels on lake Ontario.

Mr. RYAN: Mr. Chairman, for the purpose of our later consideration I would like to be a little clearer on the situation on the Ottawa river. About halfway through the last paragraph on page 2 Mr. Millar's brief it is said that the department, by virtue of the responsibility granted to it under the Ottawa river act of 1870, has jurisdiction over the construction and operation of all works on the Ottawa river, and it maintains and operates storage dams controlling the flow of the river. I would like to get this quite clear. Is this just pertinent to the interprovincial waters, that is the main stream of the Ottawa, or does it include all the tributaries in the Ontario and all the tributaries coming in from Quebec?

Mr. MILLAR: It applies presently to the main stream of the river which is the international boundary and just a bit further up, about 16 miles more.

Mr. RYAN: You told the committee that most of the power dams—in fact I think you said all of them—on the Ottawa were running river plants. From that I would take it it is very important that they go into the tributaries in Ontario and Quebec and dam up these tributaries to provide reservoirs so that they can get extra power out of the dams. Is this the case?

Mr. MILLAR: Yes and no. There are already many tributaries on the Ottawa river, mostly in Ontario, which are developed and have power dams, such as the Madawaska. There are already rivers that are controlled and used for power.

Mr. RYAN: I take it they not only have power dams but control dams as well. Is this the case?

Mr. MILLAR: Yes, but only for their needs and up to the capacity to which the dam has been developed.

Mr. RYAN: I take it these dams built up the tributaries would then be under the sole control of the hydro interested. They open the gates, pull the logs through and let the water down as they see fit. Is that the situation?

Mr. MILLAR: Yes, except that we get records from both the Quebec Hydro and the Ontario Hydro. These are instant records if we want them.

Mr. RYAN: What about Quebec?

Mr. MILLAR: The same thing applies to Quebec especially because they control the main reservoir at the very top end of the river.

Mr. RYAN: In that case there would be considerable invested interest in hydro at the present time on both sides of the Ottawa?

Mr. MILLAR: Yes.

Mr. RYAN: Any development on the river would have to take that into consideration?

Mr. MILLAR: Very much so.

Mr. DANFORTH: Mr. Millar, I was very interested in two particular pieces of information you gave the committee. Am I to understand from the information we got here that to maintain the level of the navigable waters of the St. Lawrence you have two main sources of regulated supply, one from the great lakes and one from the Ottawa river basin itself? Am I correct in that?

Mr. MILLAR: Yes, from the point where the Ottawa river meets the St. Lawrence.

Mr. DANFORTH: I understand from previous information that the control of the water in the great lakes and its emptying into the St. Lawrence river is a joint control rather than strictly a Canadian control. Am I correct in that assumption?

Mr. MILLAR: Although this is not in my field I can say that it is under joint control.

Mr. DANFORTH: I think that is well understood. In that case, once we have the maximum amount of flow permissible under joint control, the water actually provided for the control of the St. Lawrence navigation lies in the Ottawa flow; is that right?

Mr. MILLAR: Partly. That is the Ottawa does affect the levels in Montreal harbour.

Mr. DANFORTH: Actually, if we are getting up to the maximum allowed internationally from the great lakes system our only recourse then is the Ottawa river.

Mr. MILLAR: Yes, and that is not very much.

Mr. DANFORTH: That would be in proportion to the amount of water involved.

As an engineer perhaps you could answer a question which has been puzzling me for a long time. In the information provided to the committee we have, I believe, a record since 1920 on the water levels of the great lakes. Now, something that I cannot understand is this. Why is it that there is not a similarity between high water levels and low water levels among the lakes themselves. As you know, some lakes will have a minimum amount of water at one particular period and two or three years later another lake will have a minimum. As an engineer, could you explain why this could happen?

Mr. MILLAR: Well, this again, is not in my field, but I believe you are wrong when you say that when we have a period of low water on the great lakes some lakes get lower more quickly than others. When we get down to the bottom of the trough they are all low at the same time or, at least, practically all of them are low at the same time.

Mr. DANFORTH: Well, may I use an example to clarify my thinking in this connection. We have a low indicated by the graph. One of the lowest levels in respect of lake Superior was recorded in 1926. But, to take another lake, such as lake Erie, the maximum low was in 1934, whereas lake Superior in that same year was relatively high.

The VICE CHAIRMAN: Mr. Danforth, are you referring to the statement of the Department of Transport dated November 3?

Mr. DANFORTH: Yes, I am referring to the graphs under that date. There must be a logical answer to this, but I am not aware of it.

Mr. MILLAR: Well, I have a graph here, which is not the one that you have. However, it should be similar. It shows the low period in 1933, and lake Ontario, lake Erie and lake Huron were low at the same time. But, lake Huron was not low at that time. It is very evident from this graph. This is a publication of the Canadian hydrographic service water levels in 1963. It is a very good graph and I believe these graphs are the next to be given to members of this committee.

Mr. TURNER: On a point of order, Mr. Chairman, I think when Mr. Patterson appears before the committee he will be able to explain to the committee the whole relationship of flow in the lakes.

Mr. DANFORTH: I would be perfectly willing to pass if we will have an opportunity to clear this matter up later on. Perhaps it has something to do with the damming.

Mr. ROCK: I believe I asked that question of others and I believe dams were mentioned in this connection.

The VICE CHAIRMAN: Are there any other questions?

Mr. DANFORTH: I was just wondering if there was any information available to the harbour engineer in respect of any kind of a cycle. I do not wish to put words into your mouth but my impression was that you stated it was your opinion that the water would increase in quantity in the period ahead of us. Perhaps this would not happen right away but you did say that it would happen or, at least, that was your assumption. You mentioned that this period of low would be followed by a normal period of rising waters. Is there available in the department any type of information that would give any indication that there are cycles of low and high water?

Mr. MILLAR: No. All we know is when the water has become low it always comes up again. There is no periodic cycle shown to date in the records, which are available.

Mr. DANFORTH: I have one other question along the same lines. From time to time we see indications that such a level is the lowest on record. Does the fact that we control the water have any bearing with an unusual low. What I am trying to establish is whether or not the fact we do control the water in various lakes has any influence on the high and low water levels. Would the fact that there is an unusual low in lake Ontario be due to the less amount of water available in the watershed or is it due to the fact that we control it more than we did formerly?

Mr. MILLAR: I believe lake Ontario is higher than it would be if the control dams had not been built.

Mr. DANFORTH: Where there are indications that the water is abnormally low—is it because, in effect, we are controlling it?

Mr. MILLAR: No. You can control the water but you can only control what you have.

Mr. DANFORTH: I appreciate that. I also appreciate that we are in a period when lesser amounts of water are available. What I am trying to ascertain for my own satisfaction is why in some areas there seems to be a lower amount of water than at any other recorded time.

Is it due to the fact that control of lake Ontario is not at that degree now, or is it because there is less water in the watershed now than ever before? That is something of which I am not sure.

Mr. MILLAR: I would say that it is because there is less water now than there was before.

Mr. DANFORTH: There is less water being poured into the lake system.

Mr. MILLAR: Yes, in my opinion.

Mr. TURNER: I wonder whether in view of Mr. Peters' and Mr. Legault's questions earlier and the fact that the minister replied to the question of Mr. Martin in the house yesterday, I might be permitted to state to the committee on behalf of the minister the current situation with respect to proposals having to do with diversions?

The VICE CHAIRMAN: You have the consent of the committee.

Mr. TURNER: The government has given considerable thought to proposals for diverting waters which now flow northward in Ontario and Quebec into the great lakes-St. Lawrence basin. The initial, though admittedly very preliminary, information does not suggest that any of these proposals would be economic. However, to arrive at any useful opinion on this point would require very great investment of engineering man-hours in the way of feasibility studies on these and other possibilities which may be found to exist.

Earlier this year when it became apparent that continued below-normal precipitation would produce further deterioration in the great lakes water levels, the government reached two decisions; one, to seek the co-operation of the United States government in having the International Joint Commission study whether it would be feasible to extend the present system of regulation in the great lakes and secondly, to undertake, if the provinces affected concurred, a more extensive study of diversion possibilities. These studies, even though they will be of a preliminary feasibility category, will be quite expensive and will involve considerable engineering man-hours. The replies we have received from the premiers of Ontario and Quebec, while not final, are encouraging. Pending final agreement with the provinces we are giving thought to the organization of these studies. As I have indicated, they will be expensive and will take a considerable amount of time, but I can assure the house the studies will be pressed forward.

In making this announcement I want to stress that the government has not come to any conclusion, however, tentative, about the viability of diversion possibilities which it is now proposed to study, but is merely pursuing a policy of examining every possibility which might make a contribution to the great lakes water levels problem.

Mr. PETERS: Will Mr. Kierans be brought in on this?

Mr. TURNER: Mr. Kierans has asked to testify before the committee, and the committee will be asked to set a date to hear him. The statement says that governmental forces are going to be applied. It is axiomatic to the Kieran's proposal and all other proposals affecting northern diversion.

Mr. ROCK: If that is the case, then why are we sitting here now? Why did the minister not say this was being studied by the standing committee here, instead of making a statement?

The VICE CHAIRMAN: Are we to understand that the government is now prepared to launch upon a feasibility study of the Grand canal project?

Mr. TURNER: When the government gets the final co-operation, or the final terms of co-operation from the Ontario and Quebec people, it will proceed with commercial studies; but it is bringing itself to the point where the studies can be undertaken as quickly as possible. The problem of diversion is merely one of the effects of the great lakes problem. This indicates that the government is taking responsibility to explore this matter.

Mr. ROCK: I am not convinced that it is diversion which will correct the problem. I thought that was the reason we had this committee sitting, to find out from the various experts that come here and give testimony, so that we may make some sort of recommendation as to whether we should go ahead by damming or by diversion, or by both.

The VICE CHAIRMAN: Order.

Mr. PETERS: I do not know if we can leave this. I would think that this is probably what we were set up to decide, and if the government is going ahead, and it is going to decide on a solution, we are going to have to be made aware of what the cost is. We understand from Kierans that this diversion will put into the great lakes system about one eighth of the water that goes over Niagara Falls. This amounts roughly to about 30 million cubic feet per second, or rather 30,000 cubic feet per second, or 200,000 cubic feet per second. This would I think be enough water to raise the water levels to the extent that they would be dangerous, would it not? So we have solved the problem if we put this into effect.

Mr. TURNER: There is a study going on.

Mr. PETERS: I welcome the fact that the federal government asked us to consider this. The presentation was made by the chairman of the Great Lakes Commission who represents eight of the American states affected. He is of the opinion that the International Joint Commission has in their terms of reference an opening left which will allow for a presentation of the figures, and that these will be discussed at some length. I think this is the solution. But there is another solution which has been suggested. I wonder if Mr. Millar is handling the model? There have been two solutions suggested. One is to divert water from the Arctic watershed and James Bay, and the other is to build a dam in the area of Three Rivers. We understand there is a mockup feasibility model or something of this nature to ascertain whether putting in water restrictions in the Three Rivers area—while it could not cut down the flow of the river—would produce surplus waters?

Mr. MILLAR: This would be of benefit only to Montreal, not to the great lakes, and it is under the Department of Transport.

Mr. PETERS: If you had lots of water at Montreal we would not need to let more water out. I think we are getting the wrong picture if that is not true. If you back up the water in the St. Lawrence as far as it will go, let us say to Montreal, and then have a dam to keep it in at the blue line, the Moses dam, or whatever it may be, you can back the water up, with lake Ontario behind the Moses dam, and you would restrict it at Niagara and all the way back to lake Superior. All you need is water to provide 28 feet of draft in the canal system. The idea of putting in more dams would be feasible; in other words, you would be constructing a large series of locks and would not need water in them except to fill the lock.

Mr. TURNER: There is a study being conducted under the jurisdiction of the Department of Transport at Lasalle across from Montreal in the hydraulic laboratory. There is a model there, but the study only goes down half way to Three Rivers. I understand the Department of Transport is studying the possibility of building an addition to the model to include Three Rivers. It might be interesting to the committee to go down and take a look at that model.

Mr. PETERS: The problem is we need a larger volume of water to fill up the basin in the St. Lawrence because it leaks out by a normal flow. If we did not lose that water, we would not need to put it in.

Mr. MILLAR: I am afraid you are wrong. In the present system as it is with the interconnecting channels, the elevations are owing to a certain flow of water which would have to be maintained in order to continue to have the 27 feet for navigation.

Mr. PETERS: On the far side of the chart there you see that the height of water remains constant until it gets to the bottom. Back up from the St. Lawrence you get a straight line to almost lake Ontario. Then there would have to be a high lock, but there really would not have to be much of a flow. The water is running down, but if you backed it up to that level, you would not need very much water.

Mr. MILLAR: That would be here in the St. Lawrence in the way of compensating works and it would affect only Montreal which is here.

Mr. PETERS: Yes. So, if you hold that water you do not need to worry.

Mr. MILLAR: I think you are thinking now only of a couple of feet.

Mr. PETERS: But that is millions and millions of cubic feet per minute.

Mr. MILLAR: To get navigation through the St. Clair river, the Detroit river and lake St. Clair, you need a substantial flow in order to get a certain elevation to give you 27 feet.

Mr. PETERS: A dam in the locks will take care of that.

Mr. MILLAR: Yes, or even compensation works.

Mr. PETERS: I may be mistaken, but it seems to me the reason we are emptying the water out through that dam in lake Ontario is for Montreal and not for any other purpose; it is to maintain water in the Montreal area.

Mr. TURNER: It is for the whole of the great lakes.

Mr. PETERS: I agree that if you do not bring the shipping into the St. Lawrence, you do not get it into the great lakes. If you back the water up to the point we need, that would give us all the water required. In your opinion, would this be a solution to the problem of the water in the Montreal area? I think that is the important part of it.

Mr. PATTERSON: The suggestion which has been made would solve the problem in Montreal harbour; it would maintain levels there. Depending on what type of a dam is built downstream and how high it is raised, the introduction of another dam there would involve another lock which would slow up navigation and add to the cost of navigation.

Mr. PETERS: If we slow down the inflow by cutting the width of the river, would this be proportionate to the amount you would increase the speed of flow by decreasing the size of the opening?

Mr. PATTERSON: Studies are being made on the model to which Mr. Turner referred in an effort to determine just what can be done in the way of weirs or obstructions below Montreal which will have the effect of raising the level in Montreal harbour.

Mr. PETERS: If you restrict the flow, really the flow only will be restricted for a limited period because as soon as the level builds up the natural flow of the river will continue down to the ocean; it will go over the top of it.

Mr. PATTERSON: Yes.

Mr. PETERS: Is there something which does not show on this map? As you look the map, there appears to be a straight line. Is that in actual fact a straight line below the dam at Iroquois?

Mr. MILLAR: It is a straight line shown here, but this is because it is tidal.

Mr. PETERS: Does the level back up on a straight line or is slightly slanted?

Mr. MILLAR: It is not a straight line if you had an immediate cross section.

The VICE CHAIRMAN: Mr. Danforth, have you a supplementary question?

Mr. DANFORTH: I have a question I would like to ask Mr. Turner on the report he gave. In respect of Mr. Rock's remarks on the feasibility studies, I certainly would hate to be on a committee which recommended a certain solution and then five years later find that the solution is not feasible.

Mr. ROCK: You are wrong in what you suggest, because this is exactly what I want to do.

Mr. DANFORTH: Mr. Turner, if I understand you correctly you said something to the effect that there would be an inquiry with the United States government in respect of increased control. I am just wondering what you meant by this. I thought that with the International Joint Commission we had control now.

Mr. TURNER: There is control over two lakes only, lake Superior and lake Ontario.

Mr. DANFORTH: At both ends.

Mr. TURNER: Yes. Lakes Michigan, Huron and Erie are not controlled. The joint reference which now has been made to the International Joint Commission by both governments is to investigate the possibility of adding further controls to the existing great lakes system which would contemplate controls at lakes Michigan, Huron and Erie to bring all the lakes under control instead of just lakes Ontario and Superior.

Mr. ROCK: When you look at these graphs or diagrams you notice that the precipitation is about the same. Also lake Superior has not the same fluctuation as the two lakes that are not dammed. If you look closely you will notice that the two lakes that are not dammed are lake Michigan and lake Erie which have the same fluctuation. Lake Ontario had the same fluctuation until 1958. After 1958 when the dam was built, a regular level was reached.

Supplementary to that, Mr. Chairman, I have another problem, and that is the study that is being made now at La Salle, which is actually my county. This study regards the feasibility of building a dam around Three Rivers. I would like to suggest, as I did in the past regarding the damming up of lake St. Louis, that we could also possibly dam up lake St. Louis and lake of Two Mountains and have two watersheds created. In this way you would not have to build this dam and the locks at Three Rivers. These are two very large lakes and they could be considered a watershed for the port of Montreal.

I would also like to say something to Mr. Patterson. When he said he did not know anything about that letter, I would like to inform him that I did send the letter to the Minister of Transport and also to the president of the seaway authority as well as to the Minister of Public Works regarding the study of the water levels of lake St. Louis.

The VICE CHAIRMAN: Order, please.

Mr. ROCK: I am more in order than many of the other members here.

The VICE CHAIRMAN: I think that your particular suggestion, Mr. Rock, is one that we should consider in the steering committee. We should consider in the steering committee whether or not we should visit, in the near future, the laboratories at Ville La Salle. At the same time we can also consider Mr. Foy's suggestion that the economic basis of your decisions on dredging be undertaken.

Are there any further questions, gentlemen? If not, I would like to remind everyone that on Thursday all the members should bring the large brochure that has been sent to each of them. There will not be any additional copies available here next Thursday.

Mr. TURNER: Who will be our witness next Thursday?

The VICE CHAIRMAN: Mr. W. E. van Steenburgh, deputy minister of the Department of Mines and Technical Surveys.

On behalf of the committee I would like to thank Mr. Millar for the very informative discussion we had this afternoon, and also Mr. Patterson for his assistance.

HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 5

THURSDAY, NOVEMBER 19, 1964

TUESDAY, NOVEMBER 24, 1964

THURSDAY, NOVEMBER 26, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

WITNESSES:

Dr. W. E. van Steenburgh, Deputy Minister, Dr. J. M. Harrison, Assistant Deputy Minister, Department of Mines and Technical Surveys; Mr. Ed MacFarlane, President of the Central Georgian Bay Tourist Association; and Mr. T. M. Patterson, Director of Water Resources Branch, Department of Northern Affairs and National Resources.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

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Vice-Chairman: Mr. Ian Watson

and Messrs.:

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Alkenbrack,
Berger,
Danforth,
Davis,
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Flemming (*Victoria-
Carleton*),
Foy,
Grégoire,
Habel,
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Harley,
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Mitchell,
Moreau,
Noble,

Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

Marcel Roussin,
Clerk of the Committee.

MINUTES OF PROCEEDINGS

THURSDAY, November 19, 1964.

(7)

The Standing Committee on Mines, Forests and Waters met this day at 3:50 p.m. The Vice-Chairman, Mr. Ian Watson, presided.

Members present: Messrs. Dinsdale, Harley, Laprise, Legault, Loney, McBain, Peters, Rock, Scott, Smith, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*), Whelan (13).

In attendance: Dr. W. E. van Steenburgh, Deputy Minister; Dr. J. M. Harrison, Assistant Deputy Minister (Research); Dr. W. M. Cameron, Director, Marine Sciences Branch; Mr. N. G. Gray, Hydrographic Service; Mr. G. C. Dohler, Hydrographic Service; Mr. C. G. Champ, Hydrographic Service; all of the *Department of Mines and Technical Surveys*. And Mr. T. M. Patterson, Director, Water Resources Branch, *Department of Northern Affairs and National Resources*.

The Chairman introduced Dr. van Steenburgh who read a prepared statement which had been distributed in English and in French.

The witness was questioned at length by the Committee.

The Chairman informed the Committee of the recommendations of the Subcommittee to hear the following witnesses:

November 24: Mr. Ed. MacFarlane of the Central Georgian Bay Tourist Operators Association;

November 26: Mr. T. M. Patterson, of the Water Resources Branch;

December 3: The Montreal Port Council, and on

December 8: Mr. Nezerow, of the Great Lakes Commission.

The Committee agreed that the maps and charts shown on November 19 to the Committee be reproduced as appendices. (*See this issue*)

At 5:35 p.m. the Committee adjourned until 3.30 p.m. Tuesday, November 24th.

TUESDAY, November 24, 1964.

(8)

The Standing Committee on Mines, Forests and Waters met this day at 4:05 p.m. The Chairman, Mr. Godin, presided.

Members present: Messrs. Aiken, Danforth, Godin, Habel, Hahn, Laprise, Legault, Loney, Mitchell, Peters, Rock, Roxburgh, Ryan and Smith (14).

In attendance: Messrs. Ed. MacFarlane, William Aikman and Roy Parker respectively president, secretary and director of the *Central Georgian Bay Tourist Association*.

The Committee resumed its consideration of the subject-matter of the water levels of the Great Lakes System.

The Chairman introduced Mr. Ed. MacFarlane who read a prepared statement which had been distributed in English to the Committee.

The witnesses were examined by the Committee.

The Committee discussed also the relationship between the problems explained by the witnesses and the order of reference of the House.

The Chairman informed the Committee that it might be necessary to hold two meetings next Thursday on account of the unavailability of the witness, Mr. Patterson, on Tuesday, December 1st.

At 5:38 p.m. the Committee adjourned until Thursday, November 26 at 3:30 p.m.

THURSDAY, November 26, 1964.

The Standing Committee on Mines, Forests and Waters, having been duly called to meet at 3.30 p.m. this day, the following members were present: Messrs. Alkenbrack, Davis, Godin, Legault, Loney, Rock, Smith and Turner (8).

In attendance: Mr. T. M. Patterson, Director of Water Resources Branch; F. I. Morton, Engineer in Charge Great Lakes St. Lawrence Study Office, Water Resources Branch and R. H. Clark, Chief Hydraulic Engineer, Water Resources Branch all of the *Department of Northern Affairs and National Resources*.

The Chairman called the attention of the members present to the lack of quorum. By unanimous consent, the members present agreed to hear the witness scheduled to appear today and to postpone his examination until later on when a quorum is present.

Thereupon, the Chairman submitted the following schedule of meetings:

Thursday, December 3rd: Montreal Port Council.

Tuesday, December 8th: Mr. Patterson of the Department of Northern Affairs and National Resources.

Thursday, December 10th: Mr. Albert J. Meserow, Chairman Great Lakes Commission, Ann Arbor, Michigan.

Mr. Patterson started his presentation by making corrections to pages 23 and 27 of the Proceedings and Evidence of the Committee. These corrections were allowed. The witness then proceeded to read a prepared statement which had been distributed in English and in French.

At 5.58 p.m. the meeting was adjourned.

EVENING MEETING

The Standing Committee on Mines, Forests and Waters, having been duly called to meet at 8.00 p.m. this day, the following members were present: Messrs. Aiken, Godin, Hahn, Legault, Loney, Rock and Turner (7).

In attendance: same witnesses as in the afternoon.

There being no quorum at 8.20 p.m., the Chairman adjourned the meeting until Thursday, December 3rd at 3.30 p.m. when Mr. Bourguignon of the Montreal Port Council will be heard.

Marcel Roussin,
Clerk of the Committee.

EVIDENCE

THURSDAY, November 19, 1964.

The VICE-CHAIRMAN: Gentlemen, I see a quorum. I will call the meeting to order. We are very pleased to have with us today Mr. van Steenburgh. Before introducing Dr. van Steenburgh, I would like to mention the result of our steering committee meeting which was held yesterday.

For November 24, Mr. Aiken is to arrange with Mr. MacFarlane of the Central Georgian Bay Tourist Operators Association to be here. On November 26 and December 1 we had been counting on having Mr. Patterson from the water resources branch. However, Mr. Patterson has indicated that December 1 is not a day when he would be available. Probably we will have to hold two meetings on November 26 with Mr. Patterson. On December 3 it was decided to have the Montreal Port Council, and on December 8, Mr. Mezerow from the Great Lakes Commission. The dates after that we are leaving open until we hold another steering committee meeting.

Gentlemen, we are very pleased today to have with us Dr. van Steenburgh who is deputy minister of the Department of Mines and Technical Surveys. Dr. van Steenburgh and his staff have gone to a great deal of effort in preparing this brief for us in both English and French. This is one of the first times a brief as complicated as this brief has been submitted in both languages. I feel he and his staff deserve congratulations for preparing this difficult brief in both languages.

Dr. van Steenburgh will introduce to you the various members of his staff who are with us today and who will testify after we have heard from Dr. van Steenburgh.

Dr. W. E. van STEENBURGH (*Deputy Minister of Department of Mines and Technical Surveys*): Mr. Chairman and members of the committee, I am honoured to appear before you today to offer the views of the Department of Mines and Technical Surveys on the causes of and possible remedies for the problems caused by the low water levels of the great lakes.

I would like to take this opportunity to introduce the specialists whom I have brought with me. On my right is Dr. Harrison, assistant deputy minister of research of the department and a geologist by profession. Also, I have with me Dr. W. M. Cameron, who is director of marine sciences branch, Mr. Gray, who is dominion hydrographer, Mr. Dohler, who is in charge of the section of the hydraulic services dealing with lake levels, and Mr. Champ, who is one of the specialists in this particular field.

Also, I would like to ask the Chairman if I might pass out to you in both English and French copies of this informal statement I am making today. Our formal statement is in the brief.

The Honourable Mr. Laing, Minister of Northern Affairs and National Resources, has told you of the importance and gravity of the problem. He has also told you of the large number of agencies—international, federal and provincial—responsible for the study of the great lakes. You have heard from representatives of the International Joint Commission, the Department of External Affairs, Department of Transport, Department of Public Works, and now it is my privilege to present the views of the Department of Mines and Technical Surveys.

My department, as you know, is a highly complex engineering and research organization, which plays a unique role in the development of Canada's physical resources. It comprises the surveys and mapping branch, which is the federal mapping agency; the geological survey of Canada; the mines branch; the observatories branch, and the geographical branch.

Four years ago, we were given the added responsibility of meeting the vital need for information on Canada's coastal and inland waters for defence and resources assessment purposes—a tremendous task. Our Canadian hydrographic service has been charting Canada's coastal and inland waters since 1883, and since 1924 has been carrying out tidal, water level and current studies, but because of the magnitude of the task ahead and the increasing importance of oceanography in the world today, this effort had to be augmented and expanded. We therefore, established the marine sciences branch. It comprises the Canadian hydrographic service, a new division of oceanographic research, and a new ship division.

We shall not find a better illustration of the great need for the expansion of oceanographic research in Canada than in our present lack of knowledge of the various factors affecting water levels in the great lakes. At the same time, it is an excellent illustration of the value of the knowledge, gained from such research, to the country's economy.

On the subject of lake levels, I should like to outline the over-all problem as we see it, and the role that my department is playing and possibly can play in the solution of the problem. Data on the area and depths of the great lakes systems are recorded on the charts of the lakes and connecting rivers, prepared by our Canadian hydrographic service and the United States lake survey.

The Canadian hydrographic service is also responsible for the measurement of the lake levels. Details of its operation and publications have been given in our more formal brief. The water levels section of the service provides the fundamental data on water heights, on which all nautical charting is based. It has carried on a highly effective gauging program on the great lakes, and in co-operation with the United States lake survey, it has taken part in assembling the lake level records, which now go back over 100 years as shown on Appendix I.

I should like to point out here that, in 1952, the lakes reached the highest levels since the late 1880's. In just 12 years, therefore, we have travelled a full cycle from concern on the causes of high lake levels to this present review of low lake levels.

You will note that lake Superior has never shown the marked variation of the other lakes. You will also note that the graph for Montreal harbour is the only one showing a really decided downward trend over the past 100 years.

Superimposed upon the changing yearly mean lake levels are the seasonal cycle and shorter term fluctuations. Appendix II indicates the range of annual, monthly and daily means, and the highest and lowest readings ever recorded on our automatic gauges. Particularly noticeable are the large ranges recorded in lake Erie, which is much more sensitive to meteorological disturbances because of its smaller size and shallower depth. The great range in Montreal harbour is caused primarily by the effects of the ice dams which form in the winter.

The seasonal variation and changes in depth from month to month are shown in the hydrograph for lake Huron which is Appendix III. You will note the new low minimum record for each month of this year.

Our data on lake levels are accurate, but it is only in relatively recent years that these levels have been recorded with precision, by automatic gauges, and to a common base. The level of the gauge must be referred to a network of bench marks which, in turn, are tied into a geodetic network of precise levels, developed and maintained by our geodetic survey.

The precision of the level networks is now such that it is possible to detect slight changes in the absolute height of the areas surrounding the great lakes. This land is still rising from the massive weights of the ice sheets which covered the region some ten to twelve thousand years ago. Unfortunately, gauges in the nineteenth century were not as precisely located nor as carefully tied into a geodetic network, and the absolute amount of the changing tilt of the great lakes basin is difficult to determine.

I believe that a detailed study of geological influences on the great lakes is an important aspect of the over-all problem. The effects of any great changes that are made by man in the great lakes system will have to be weighed against the inevitable geological changes, now in process. Crustal tilting, unlike the random fluctuations of precipitation and evaporation, tends to move in only one direction. Whether it will be more or less influential in the long term than a trend in climate, we do not know, but we must have a more accurate assessment of its magnitude.

Such investigations are carried out by two branches of my department: the geological survey of Canada and the observatories branch which, in its gravity and seismic studies, can contribute basic material to this fundamental study.

Our water levels section is continually improving the reliability of its measurements by research and development. It must also turn more attention to a critical review of past records, to an analysis of the degree of correlation between gauges at different localities on a lake, to the effect of seiches, of wind stresses, and of barometric differences, from day to day, week to week, and even their cumulative effect on the long-term averages. Just this morning we received the complete plot from the computer of the lake levels for the month of October.

In a more precise way, we must also study the drainage basin that feeds the Great Lakes system, that is the drainage, vegetation, run-off and evaporation from the land surface. This study would be impossible without the availability of the accurate, up-to-date, large scale topographical maps produced by our surveys and mapping branch.

We must consider, too, the effects of deforestation and urbanization. During the past 50 years or more, there has been no clear evidence of any profound effect of deforestation or urbanization on evaporation or run-off figures, but a much more intensive study of evaporation and run-off as functions of land type must be undertaken. When the varying effects of different land forms become better known, we shall be in a stronger position to interpret the land-use studies of the geographical branch of my department in terms of water levels and to predict the long term effect of the inevitable changes in the watersheds that will ensue from the growth of our population.

The Great Lakes system is dynamic. Water is being added continually, in one form or another, at numerous locations and it is being drawn off, in various forms, at other locations. You will gain some idea of the relative magnitude of these various factors and of their intimate interplay from appendix IV, which is a schematic diagram of what is known as a hydrological cycle.

The basic problem in forecasting lake levels is that water enters the lakes by several avenues, which can be measured with varying degrees of accuracy. It leaves the lakes by various means which can also be estimated in varying degrees of accuracy. The interplay of these fluctuating increases and decreases, sometimes large in over-all quantity but small in difference, is an extremely complex relationship which is only imperfectly understood.

Appendix IV shows the hydrological cycle of the Great Lakes. The particular lake is not important for the same factors affect each of the lakes, differing only in degree of importance.

1. A river flows into the lake from the lake above it. The fluctuations of its flow can be measured. The extent of these fluctuations is indicated by the

different parts of the arrow which represent minimum, average and maximum flows. Remember that this variation is real but measurable.

2. Water flows into the lake from the local watershed. It is not so easily measured; in fact, it represents the difference between the precipitation over the watershed and the evaporation from that watershed. Water evaporates from the streams and pools of the area, and a large amount is given off through vegetation. The relative width of the arrows is an attempt to indicate these magnitudes.

3. Even more uncertain is the groundwater contribution. This has been indicated by a dashed line. The width of the line is our best estimate of its relative magnitude. It probably has the least fluctuation of all the factors.

4. Rainfall on the lake surface makes a large contribution but it is variable and uncertain. The same holds true for evaporation. It is the net difference between these two factors which is the most dubious, uncertain element in our equation.

5. Finally, water flows outward from the lake to the lake next in series toward the sea. This again varies, whether naturally or by control, but it is measurable.

Thus the rise or fall in lake level is the result of many factors, some of which are difficult to measure and to predict.

Summarizing the various factors, we have the inflow from the lake upstream, the drainage from the local basin, and the outflow to the next lake seaward. These measurements are the concern of the water resources branch of the Department of Northern Affairs and National Resources. Secondly, we have the fluctuating precipitation-evaporation system to which the meteorological service of the Department of Transport gives special attention. Finally, we have the unknown subterranean system of groundwater which is an area of study by the geological survey of my department.

The representative of the Department of Transport made reference to the important effect of precipitation on the watershed as well as on the lakes. He pointed out the necessity for improved measurements of a contribution which fluctuates so widely from day to day, month to month, and year to year. He stressed the even more difficult problem of estimating evaporation, emphasizing how sensitive it is to the difference between air temperature and water temperature.

The interplay of precipitation and evaporation on the great lakes system not only has a profound effect on the lakes, but it also presents a most difficult problem of measurement and understanding, one which can be solved only by fundamental research. The meteorological service has tackled this problem, and it is being assisted by the Great Lakes Institute, which has begun a study of water temperature in the great lakes.

The problem of evaporation from the seas is of great concern to oceanographers of our division of oceanographic research. We consider that the research capability of this growing division must be expanded and directed to this and other problems concerning the great lakes, which require attention and research.

If the determination of evaporation were the only problem confronting us, there is no reason why this special study could not be carried out exclusively by the meteorological service of Canada. However, we in our department must assume a responsibility for a much more penetrating study of the great lakes than is required to resolve the problem of lake levels, with which you are mainly concerned.

We face, for instance, the very real problem of pollution in the lakes. The Great Lakes Institute has examined the extent of this problem and has

called for federal assistance in tackling it. We are now giving careful and urgent consideration to the magnitude of the contribution our department can provide.

An investigation of pollution will demand a detailed knowledge of all the properties of the lakes. Biological and chemical studies must be accelerated, and there are agencies well suited to the task. But these studies depend upon a knowledge of the physical characteristics of the lakes: their circulation, stratification, mixing, and the whole gamut of actions and reactions that decide whether a pollutant will be dissipated harmlessly, or will increase its concentration in time.

Our marine sciences capability can be expanded to assume this new responsibility. When we do undertake this broad and fundamental study, the resultant data will be pertinent and valuable to a better understanding of evaporation.

Our marine sciences branch also maintains and operates the Canadian oceanographic data centre. This now holds all of the oceanographic data collected off our coasts since 1915. New data from various agencies are being added constantly, processed and published. We are now studying the inclusion of the great lakes in this system.

Turning to the matter of possible remedies of the problems of water levels, it is unlikely that man will be able to control or change the fluctuating values of precipitation or evaporation. Nor will he be able to control the contribution of groundwater to the lakes system. The only feasible way in which the lake levels can be kept at a constant height is by a complicated control of the flow from one lake to the other and finally to the St. Lawrence river.

The question then arises as to what, if any, effect will fluctuating flows through the lakes have on their basic characteristics? Very little, one would think, but the fact remains that the more oceanographers study the complex circulation of the world's oceans, the more impressed they are with the delicate balances that prevail between opposing forces of short and long term periods, and with the profound influences of slight changes in these balances on biological and physical properties of the seas.

Therefore, the problem of lake levels cannot be solved by massive engineering construction of day-to-day controls, without considering the secondary effects that these structures and their operation will generate. These effects may be negligible. On the other hand, there may be surprisingly great and long-term effects. The scientific study of the seas and lakes is difficult and expensive, but I am convinced that it is only through fundamental research that we shall solve the problems which we face today on the great lakes.

I have outlined very briefly the responsibilities of my department, the work we have done, and the work we can do in connection with the problems you are reviewing. We have the scientists and the facilities in each of the several disciplines that must be brought into play to arrive at a long-term solution. True, there will be difficulties, but I am convinced that we must move forward in this direction in spite of difficulties, and I assure you that my department intends to bend every effort to make an appropriate and worthy contribution to the solution of this difficult problem.

Thank you.

The VICE-CHAIRMAN: Thank you very much, Dr. van Steenburgh. Are there any questions?

Mr. TURNER: Dr. van Steenburgh we are exploring here a number of methods to regulate the level of the lakes, and one has been to achieve a better control of the existing lake system. Another is to study whether or not diversion from other watersheds into the lakes system would help to solve the problem. In this connection one of the things has become important is the difficulty

in respect of weather forecasting because of the time lag in flow through the lakes system, which takes about three years for half a rise in lake Superior to work its way through the system to Montreal, and if you were to allow new water to be injected into the system from a possible diversion in, say, year one, and we had a heavy precipitation for years two and three there would be the possibility of a flood situation on our hands. Could you tell us how close we are to achieving the kind of weather forecast necessary to allow us to operate a control of the various watersheds?

Mr. van STEENBURGH: We are aware that the meteorological service, which has this responsibility, is giving a great deal of thought to it. This does not fall within our responsibility. I do not know whether any of my specialists who are here today have any contribution to make in this connection. But, as I say, this is not one of our responsibilities and, therefore, I cannot tell you precisely what progress is being made in forecasting except, at the present time, under present conditions we do get a forecast of what conditions are apt to be in the lakes six months hence. We have a copy of this new forecast which just came out, which we can make available.

Mr. TURNER: Do you not need these forecasts to dovetail them into your study of the effects of precipitation and evaporation.

Mr. van STEENBURGH: The matter of co-ordination in the great lakes is not as poorly done as the witnesses of this committee previously indicated. We do have in Canada, operating under the auspices of the Canadian government, the Canadian committee of oceanography. This committee is composed of senior officials from all the federal agencies that are interested in great lakes levels. This committee also has on it representatives from universities who are interested in oceanographic work. The committee meets about four times a year, and the meteorological work as well as the great lakes institute work, our work and the Department of Transport's work are carried on through that committee. We have made quite considerable progress in this committee in looking at the great lakes program. But, the Canadian oceanographic committee feels there are a great many problems that are not covered by this committee, and they are recommending that a new committee be set up, and that this committee be expanded to take in the agencies not now represented. But, I think there is a fair measure of co-operation at the present time in many of the fields of operation concerned with conditions in the great lakes.

Mr. TURNER: Surely your problems of fundamental research and the effects of evaporation and precipitation on the lakes cannot be complete with a view to solving this problem unless the weather forecasting is more closely co-ordinated.

Mr. van STEENBURGH: I agree entirely with that.

The VICE-CHAIRMAN: Have you a question, Mr. Whelan.

Mr. WHELAN: I just wanted to ask a couple of questions, Mr. Chairman.

Dr. van Steenburgh, how many people do you actually have doing this work in your department?

Mr. van STEENBURGH: Well, on the water levels only I think there are four specialists. They are dealing with the gauges alone. Then we have one ship doing hydrographic work in the great lakes. They are doing charting. We have several groups in the geological survey branch doing the mapping of the whole watershed from one to 50,000, and this is almost complete. They are doing land form studies also in the geographical branch. I cannot give the exact total but we do have quite a number of people working on problems related to the great lakes water levels.

Mr. WHELAN: You would not care to give a rough estimate of the number.

Mr. van STEENBURGH: Perhaps Dr. Harrison would be able to do that.

Dr. J. M. HARRISON (*Assistant Deputy Minister, Research, Department of Mines and Technical Surveys*): That is a question which, Mr. Chairman, I do not think one person properly can answer, but I would hazard a guess and say that scientific and technical people engaged on studies which could be directed toward the problems of the great lakes would be of the order of 15 to 20.

Mr. WHELAN: That is in your department?

Mr. HARRISON: Yes.

Mr. WHELAN: You would not have any idea of the other departments? Perhaps I have put an unfair question. Do you know how many there are all told, including the other departments?

Mr. van STEENBURGH: This would be an impossible figure for us to try to give you.

The VICE-CHAIRMAN: Have you a question Mr. Harley.

Mr. HARLEY: I have two questions. In respect of page 4 of the statement you have made, particularly the centre paragraph dealing with the changing tilt of the great lakes basin, could you tell us what is happening, how it is happening, and how it is apt to affect the water levels on the great lakes.

Mr. van STEENBURGH: I have tried to indicate in the paper that we have not precise information in this field yet because our actual gauges have been only operating in conjunction with the geodetic survey people over a matter of 25 years, but our geologists estimate that the uplift is taking place quite actively, and it may amount to 10 inches or 12 inches in lake Huron. Perhaps I should let my geologist amplify that statement.

Mr. HARRISON: The best way to approach it is to say that when the northern part of the world was covered by a heavy sheet of ice it depressed the surface of the earth in the same way as if you took your hands and were pressing on a mildly inflated football. When the ice melted the rebound was not as fast as the disappearance of the ice was. This action will continue through the next 10,000 years. Because the ice disappeared most recently from the far northern part, it is logical to assume, that the rebound in the north is faster now than it is in the south, so we should expect to find the northern part of the lakes is rising in respect of the southern part of the lakes. There is some suggestion this is so. I believe the minister, Mr. Laing, mentioned this in the course of his presentation to you. For example, we know that certain parts of the land around Hudson bay, which is now 600 feet above sea level, was once below sea level when the ice retreated, so it has risen that much. And, we have much more detailed information to indicate how fast this is happening and what relative effect it is having in Canada today. This can come through great lakes gauging over a period of many years, but this is not something we will learn today or tomorrow.

Mr. HARLEY: My other question was in respect of page 7, dealing with the subterranean system of ground water. Could we have any idea how that is done and if this comes under the responsibility of your department? Could you tell us how it is measured.

Mr. van STEENBURGH: Dr. Harrison will answer that question. It also concerns geology.

Mr. HARRISON: There is a plan underway in connection with the international hydrological decade, which has a strong bearing on the study of the great lakes and which will involve a co-operative study between the Department of Mines and Technical Surveys, the Department of Northern Affairs, the Department of Forestry and possibly the Department of Agriculture, to

take one drainage basin and make a detailed study of it in order to try to calculate the total amount of water that goes into the drainage basin. In this connection I should have mentioned the Department of Transport and the meteorological branch. As I say, this is to determine the amount of water that is lost from the ground water circulation through evaporation and so on. Calculations can be made on this basis. Then, at the same time, efforts are being made to determine the direction of flow of the underground systems—that is, where the water comes in and leaves. We suspect that the outflow from the ground water is into the great lakes and that there is none from the great lakes into the underground reservoirs. But, in this connection, we do not know how much there is. Let us hope that in the next few years we can get some quantitative data in this connection.

Mr. SMITH: Am I correct in assuming that the chart at the left indicates the long range view and that the greatest problem is in connection with the Montreal harbour because that is where the water continuously has kept getting a little lower over a long period of time?

Mr. van STEENBURGH: Yes.

Mr. SMITH: I assume the water at Montreal flows past the harbour or downstream at a fair rate.

Mr. van STEENBURGH: Yes, but there is another fact that must be taken into consideration. There probably has been more dredging below Montreal and with that dredging your flow of water is increased.

Mr. SMITH: If you were starting to rebuild a series of controls would it be illogical in solving this problem to sort of work back the control down river from Montreal into the great lakes?

Mr. van STEENBURGH: Perhaps Mr. Patterson would like to answer that question. This is more in his field. He is not a witness today but he is here.

Mr. T. M. PATTERSON (*Director, Water Resources Branch, Department of Northern Affairs and National Resources*): Well, if I understand the question correctly, Mr. Chairman, the provision of weirs below the harbour in Montreal to compensate for dredging that has been done in order to raise the level of Montreal harbour above what is occurring there now would only be beneficial to that area of the river and would not compensate for the low levels on the upper lakes.

Mr. SMITH: I was suggesting that if you are going to start diverting water into the great lakes system in order to bring the levels up that in order to get the maximum value of the diversion it would be best to start regulating the escape of the water at the other end.

Mr. PATTERSON: I think, Mr. Chairman, the two efforts could be carried on simultaneously; as has been pointed out here today, the introduction of water into the upper part of the basin would not benefit Montreal harbour materially for some considerable months or a few years, and at the same time the provisions of weirs downstream, which I understand the Department of Transport is studying with a model, would give immediate benefit to Montreal harbour.

Mr. SMITH: Which would indicate that if the problem is a single problem that is one of the places where the start might come, and then we work back. You said the weirs would give immediate help to Montreal.

Mr. PATTERSON: Yes, as rapidly as they could be—

Mr. SMITH: As rapidly as they could be built and filled up behind. Would the same apply generally to weirs or some type of control in the outflow of lake Huron on the St. Clair river?

Mr. PATTERSON: Any weir or control placed at the outlet of lake Huron now would only aggravate conditions on lake Erie. To improve lake Huron you would have to hold back water from lake Erie, lake Ontario and Montreal harbour.

Mr. SMITH: To get the maximum benefit of any diversion is it not necessary to control the use of the water as best you can within the system rather than just dump it in and let it flow through more or less as fast as it can.

Mr. PATTERSON: Mr. Chairman, I am informed, in connection with diversion of waters into the great lakes system, that you would have to take adequate control measures at the various lakes either to get rid of this extra water or to regulate it for the best use.

Mr. TURNER: In your formal brief at page 8 you say:

In view of the critical problem of water levels in Montreal a detailed study is about to be undertaken, at the request of the national harbours board, to see if techniques can be devised to enable forecasts to be made of water levels in the harbour.

I am concerned about this phrase "is about to be undertaken". We have had low water levels there all season.

Mr. van STEENBURGH: This is forecasting and I will ask Mr. Dohler to answer your question.

Mr. G. C. DOHLER (*Gauging and Publications, Canadian Hydrographic Service, Department of Mines and Technical Surveys*): I must say that in 1960 we attempted to do something along those lines but, unfortunately, we were interrupted in carrying this work out. We feel that the tide in the ocean entering the St. Lawrence river could be utilized probably for bringing more water toward lake Superior and, perhaps, Montreal. We started to use different approaches for the analysis and the prediction of the tide, and we are operating in this area of lake St. Pierre, Quebec, Grondines, Batiscan and Trois Rivières because the tide in this area is quite different from the tide elsewhere. We have started at Quebec and Grondines, and by doing this all the way up to lake St. Pierre and into Montreal we will find there are ways and means by which to a certain extent one can forecast the astronomical tide in Montreal, and this gives us the possibility of telling the ship owners if the water level will fall or rise during the next several days.

Mr. TURNER: You are about to undertake this. You started in 1960 but your work was suspended. From that chart it would appear that the water level in Montreal has been going down steadily. Why was it that your forecasting survey was not continued on from 1960?

Mr. van STEENBURGH: I am sure you gentlemen have heard of what is known as the austerity period; that austerity period struck us very hard and probably harder in the hydrographic service because that service lost more people during a period when we could not recoup them. The result is that at the present time this organization is very much under strength; this is one of the difficulties and reasons that we cannot undertake more work.

Mr. TURNER: So, this work which you could not undertake in 1960 really has been suspended from then until now?

Mr. van STEENBURGH: Yes.

Mr. TURNER: In the Montreal area?

Mr. van STEENBURGH: Yes.

Mr. SCOTT: Are you still short of technical staff?

Mr. van STEENBURGH: Very short, particularly in the hydrographic staff.

Mr. SCOTT: Because of lack of money or because you cannot find people?

Mr. van STEENBURGH: It probably is a combination of both, but the hydrographic service is one of the most difficult services we have to recruit for. There is no use my trying to give you the reasons; there may be myriad reasons. However, the actual fact of the matter is we are having great difficulty recruiting people for the hydrographic service.

Mr. SCOTT: Why is this?

Mr. van STEENBURGH: People just do not want to be hydrographers.

Mr. SCOTT: It is not because of salary levels or anything like that?

Mr. van STEENBURGH: The salary level in the hydrographic service is comparable to that in the other services.

Mr. DINSDALE: I notice in Dr. van Steenburgh's brief the statement that he recently has undertaken the study of the pollution problems. I suppose this responsibility also in making excessive demands upon the limited staff.

Mr. van STEENBURGH: Well, we feel we have to enter into this pollution field in so far as it is inorganic in character; that is, mixing currents, the effect of tides, water levels and other physical characteristics of pollution are our responsibility. We are undertaking work in this field on the coast. We have not been able to do much in the great lakes. However, we hope to put this on very high priority in our budget for the next year. If we have any choice in the matter we will study pollution in the great lakes to a great extent. What worries us, as scientists, about the building of large control systems in the lakes, is that we wonder what those control systems will do to the lakes, because pollution will be more important in the long run, I believe, than water levels.

Mr. DINSDALE: This is being handled under the marine services branch?

Mr. van STEENBURGH: The physical aspects of it, yes.

Mr. DINSDALE: That is a fairly recent addition to the activities of your department I believe.

Mr. van STEENBURGH: Yes. We had the hydrographic service before that. Four years ago we were given the responsibility, for military needs and for resource needs, of developing a physical oceanographic organization. Two years ago this officially was incorporated in the department as a new branch.

Mr. DINSDALE: Are you having any difficulty in recruiting personnel for this branch?

Mr. van STEENBURGH: We have a very good nucleus of scientists already; we obtained them before the freeze took place. We were, of course, held up in the recruitment of technicians and supporting staff, because we were not allowed to recruit. This year we are building up the supporting staff for the scientists.

Mr. DINSDALE: If your department was to look into a study of the problems of urbanization and reforestation as they affect water levels, under which branch would that come?

Mr. van STEENBURGH: Our geological branch at the present time is conducting land utilization studies around the great lakes. At the present time in this study they are endeavouring to determine how the land is used and we hope to go on to be able to suggest how the land ought to be used; but this is a land utilization study.

Mr. DINSDALE: In view of the fact that there is so much diversification in the study of this problem and so many departments and branches involved, do you feel it would be helpful, in coming to grips with the problem, if there was a greater degree of co-ordination, more on the basis of interdepartmental committees?

Mr. van STEENBURGH: As I said earlier, the only good co-ordination at the present time is through the Canada committee on oceanography, and that deals mainly with the physical aspects of the problem and some of the biological features because the fisheries research board was represented on that committee. However, so far as I know, this is the only committee which at the present time is doing any work towards a co-ordination of the problem.

Mr. TURNER: Of pollution?

Mr. van STEENBURGH: Pollution and levels.

Mr. DINSDALE: Does it also seem that some sort of a water control co-ordinating agency is required to bring together all the diversified information on this problem?

Mr. van STEENBURGH: This matter came up at the last meeting of the Canada committee on oceanography and in their minutes there is a resolution to the effect that there should be a senior committee set up to cover the entire field rather than part of it.

Mr. DINSDALE: As I recall it this also was a recommendation of the resources for tomorrow conference. It was pretty strongly endorsed by the various groups taking part in that conference. I think my recollection is right in that regard.

Mr. van STEENBURGH: Yes.

Mr. SCOTT: Who comprise such a senior committee?

Mr. van STEENBURGH: The membership of the Canada committee on oceanography is composed of directors, assistant deputy ministers or deputy ministers, all of whom have within their own right certain executive powers. Generally that committee can sit around a table, work out a program, and has the executive authority to implement the program. I think that any committee set up should be a large enough committee and have people on it of sufficient stature that they can talk about a program and then help to implement that program.

Mr. SMITH: Authority rather than stature?

Mr. van STEENBURGH: Yes, so that they will have the authority within the committee.

Mr. DINSDALE: What sort of liaison does Canada have with the United States experts in this field; is there any continuing liaison apart from at the International Joint Commission level.

Mr. van STEENBURGH: On the working level, at which recommendations are made, our people on lake levels, for instance, exchange data freely. On the working level it is very good. I do not know how it is working out through the joint United States-Canadian body.

Mr. DINSDALE: Do you meet with your United States counterparts on a regular basis?

Mr. van STEENBURGH: Yes.

Mr. DINSDALE: In a committee of some kind?

Mr. van STEENBURGH: We attend their meetings and they attend ours. There is a committee known as the working committee on the great lakes which is sponsored, so far as Canada is concerned, by the great lakes institute. This body includes on it people from the various United States agencies as well as the United States universities. We have a representative on the committee and the great lakes people and the universities which work with the great lakes people also are on this committee. They meet at least once a year.

Mr. WHELAN: I would like to ask Dr. van Steenburgh one question with regard to the diversion of this river which Mr. Kierans is advocating. Do you think this is feasible and prudent, or do you feel there is insufficient knowledge on this at this time to express an opinion?

Mr. van STEENBURGH: Well, I think you know that scientists are very cautious people; they have to be cautious, and their training makes them cautious. I would not like to make any statement regarding diversion until we have had an opportunity, with the other agencies, to look at the problem in its entirety, because there are many variables in this which have to be carefully considered before you can come up with any sort of a satisfactory answer.

Mr. TURNER: May I, with Dr. Steenburgh's permission, ask Dr. Harrison a question about weather forecasting. You say you receive weather forecasts from the meteorological branch on a six months forecast basis. Is that what I understood?

Mr. HARRISON: I think there is a misunderstanding there. The forecast that is given is given by the United States team that is studying the great lakes. They make forecasts six months ahead.

Mr. TURNER: Weather and precipitation?

Mr. HARRISON: Weather on the great lakes six months ahead.

Mr. TURNER: On the basis of the existing precipitation?

Mr. HARRISON: Yes.

Mr. TURNER: How accurate is this forecast on a six months projection?

Mr. HARRISON: I have seen figures recently to the effect that it might be between 25 and 30 which is not—

Mr. TURNER: Very great.

Mr. HARRISON: It is not very great, no.

Mr. TURNER: What degree of forecasting do you think we are going to get in order really to have some sort of control over this water level problem, taking into consideration that you have a time lag of three years for water to move down the system?

Mr. HARRISON: I am afraid I could not give a reasonable answer to that question. Perhaps it will come up in more detail in some of the evidence of Mr. Patterson in terms of the hydraulic studies which are being made. However, I would think the degree of forecasting currently available is not sufficient in order to attempt to tell the port of Montreal, for example, that in three years hence the water level there will be so much. I think it is impossible to do this with any degree of accuracy with the forecasting we have now.

Mr. PETERS: What is the indication in the forecast you are now given for the next six months?

Mr. HARRISON: Low, low.

Mr. van STEENBURGH: A very interesting feature about this weather forecasting is that it is improving all the time, and with the weather satellite it will continue to improve. I believe the meteorological people are quite encouraged with the possibilities of making more accurate long term weather forecasts for the future, but whether this will extend to six months or a year is another thing.

Mr. WHELAN: In the Windsor *Star* an article appeared to the effect that the United States engineers are predicting an upturn after six months.

Mr. van STEENBURGH: I will let Mr. Dohler speak to that.

Mr. DOHLER: You are quite right; they have made this forecast for the next six months. We have been looking into this. We checked this with the actual levels occurring. Sometimes this is quite accurate, but sometimes it can be off as much as a foot quite easily. So, until we have better ways and means of obtaining meteorological data, I think we should leave it to the great lakes people to make the forecast.

Mr. TURNER: What do you think we need in terms of weather forecasting?

Mr. DOHLER: No comment.

Mr. van STEENBURGH: Would you care to comment on this, Dr. Cameron?

Mr. CAMERON: I think Mr. Patterson is likely to bring this out very strongly in his evidence. Personally I feel the possibility of forecasting precipitation and evaporation as far as two or three years ahead is completely out of the picture.

Mr. TURNER: By out of the picture do you mean impossible?

Mr. CAMERON: I think so within our lifetime at least. That is my personal opinion.

Mr. TURNER: It is pretty difficult to obtain tomorrow's forecast.

Mr. CAMERON: But, generally, you want it a lot more accurately than you are thinking of for three years. If we are prepared to put in extensive controls which, as he said, allow you not only to restrain the water on certain occasions but to get rid of it rapidly when it begins to accumulate, it is feasible from an engineering point of view to be able to cut down this lag of three years to a more reasonable figure. The cost, I am sure—although I have not calculated it—probably would put the St. Lawrence seaway into a very insignificant bit of backyard sand digging. But, the problem is not so much conserving the water when low as getting rid of it when high.

Mr. PATTERSON: That is correct; that is part of the problem.

Mr. LAPRISE (*French*)

(*Not recorded*)

Mr. DOHLER: I think I should refer this question to Mr. Patterson, if he does not mind answering, because we do not measure the discharge in the great lakes.

Mr. PATTERSON: I am afraid, Mr. Chairman, that I did not hear the question.

Mr. TURNER: He wants to know how many cubic feet per second of flow would you need to reestablish the level on the great lakes.

Mr. SMITH: And, to put it back into place.

Mr. PATTERSON: You mean, I assume, not only to put it back into place but to maintain it there. I could not give an offhand answer on that.

Mr. SMITH: Where are these studies being carried on in connection with comparative evaporation rates on land and the open lake?

Mr. van STEENBURGH: From meteorological service headquarters in Toronto. But, I think I should let Dr. Cameron answer this question because we are approaching the studies of the precipitation in quite a detailed fashion and I think that any techniques we would introduce in estimating the amount of evaporation would be quite sophisticated in respect of what is being done now.

Mr. CAMERON: Well, the measurement of precipitation over the lakes is a matter of having enough sampling.

Mr. SMITH: You do this by means of putting tin cans out in various places in the lake?

Mr. CAMERON: That is true. We definitely can measure precipitation on land by that means and, of course, the present technique is to extrapolate land measurements, and we assume that within a certain region of reliability these land measurements are reflected over the water. But, for the same reason there are always heavy snow falls on the south east side of lake Ontario, which provide the excellent skiing, the water itself does affect the precipitation and so on. Now, meteorologists can tell you precipitation patterns change as movement over the water occurs, and this means going out on the lakes and making studies of these changes. When you turn then to the problem of evaporation it is an even more difficult thing to measure. It can be measured on land from ponds. But, over the water reasonably good techniques have been developed involving differences in water temperature, air temperature, the speed of the wind and the stability of the air.

Mr. SMITH: Who are doing these things?

Mr. CAMERON: Well, these are generally studies that are done the world over. Equations are being developed and have been developed to use these programs to estimate evaporation. These techniques are being used by the meteorological service in company with the great lakes institute in making a special study of the great lakes. They are attempting to test these equations to see how they fit into the equation of water balance, and they are trying to improve them all the time. But, the problem is going to be increased. Our more detailed knowledge of the distribution of temperatures, winds and cloud over the lakes would indicate that in order to be able to apply these equations more effectively a greater effort would be required than we have been able to mount up until now.

Mr. SMITH: What is being done now is being done by the meteorological service in Toronto in co-operation with Professor Langford.

Mr. CAMERON: In company with his group, yes.

Mr. SMITH: And there is nothing in the department at present?

Mr. CAMERON: Not in the lakes. We are working at sea on this problem.

The VICE CHAIRMAN: Have you a question, Mr. Loney?

Mr. LONEY: Mr. Chairman, my question has been partly answered in Mr. Dohler's reply to Mr. Whelan. But I would like to have your comments in respect of the recent study by the United States engineers, who predict a further two foot drop in lake Huron this fall and early winter. Would you care to comment on the degree of accuracy of that statement?

Mr. DOHLER: If I could give you a figure for October, 1963, the forecast for lake Huron was 2.4; the actual level was 1.4.

Mr. LONEY: That was a decrease.

Mr. DOHLER: Yes.

Mr. SMITH: They were one foot out.

Mr. DOHLER: Yes. The same applies for lake Ontario, until the six months are past—

Mr. SMITH: If I may interrupt, is there any reason to suspect that their prediction in respect of the two foot drop is completely wrong or is it just the law of averages; it might or might not be wrong?

Mr. DOHLER: I would not say it is completely wrong. But they base their prediction on back data and, of course, from the back data that is all you can come up with.

Mr. SMITH: In other words, lake Huron may only go down one foot instead of two?

Mr. DOHLER: Yes.

Mr. SMITH: But, on the other hand, it might go a foot in the other direction.

Mr. C. G. CHAMP (*Technical Assistant, Canadian Hydrographic Service, Department of Mines and Technical Surveys*): I have a correction: The United States engineers forecast for lake Huron is that the level will stay at about the same; the two foot fall is predicted for lake Ontario and not lake Huron.

Mr. WHELAN: I have a question.

The VICE CHAIRMAN: Is it a supplementary question?

Mr. WHELAN: Not really but it has something to do with the matter being discussed. I live on the Detroit river in the great lakes area. The residents there speak of the low water level and they say it will be back up. They have no doubts at all that the water will come back up. As a scientist would you say that these people are being factual?

Mr. DOHLER: Yes.

The VICE CHAIRMAN: Would you proceed now, Mr. Rock?

Mr. ROCK: Mr. van Steenburgh, looking at these charts of the great lakes, I would like to know your opinion in this connection. If at the time they dammed lake Superior they dammed the other lakes would we have the same conditions as we have today?

Mr. van STEENBURGH: Perhaps Mr. Gray would answer that question.

Mr. N. G. GRAY (*Dominion Hydrographer, Canadian Hydrographic Service, Department of Mines and Technical Surveys*): I wonder if this might more properly fall within the terms of the water levels branch. Perhaps Mr. Patterson would answer this question.

Mr. PATTERSON: In connection with the suggestion which Mr. Rock has made, if other dams had been in operation at the very high water times the present water condition on the lakes would not be as serious as it is now. The levels could have been improved upon if dams had been in existence.

Mr. ROCK: Now, Dr. van Steenburgh, you mentioned before that the low water level at the port of Montreal was due to the recent dredging or, at least, you implied that.

Mr. van STEENBURGH: Are you referring to Montreal?

Mr. ROCK: Yes, for Montreal only.

Mr. van STEENBURGH: Yes.

Mr. ROCK: Now, did they actually dredge deeper or did they just take the silt and sludge that goes back into the channel and remove that, as they do off and on? Every year you see dredging going on in the St. Lawrence. I think it is a continuous work. I would like to know whether or not they took six inches more than they should or did they remove what usually goes back in?

Mr. van STEENBURGH: I would like to clarify my answer by saying that I did not mean to imply that dredging alone was responsible for the low water in Montreal. I think we would have had low water regardless of the dredging this year. But, as I understand it, the channel has been widened and deepened below Montreal, and this allows a greater flow of water.

Mr. ROCK: Now, when a channel is widened and deepened but the material which is removed is not placed, let us say, outside but within the same river bed does the flow not remain the same?

Mr. van STEENBURGH: I would like to refer this question to Mr. Patterson. It really is not in my field.

Mr. ROCK: I just put the question to you because you answered a related question.

The VICE CHAIRMAN: Would you care to answer this question, Mr. Patterson?

Mr. PATTERSON: Well, Mr. Chairman, you can take material out of a river bed and not increase the flow of the river, and it does not matter where you place it. You can remove it away from the river bed. But, if you take material out of a portion of the river bed that is acting as a control on the level of the harbour or lake upstream and if you place that material in an area of the river that is not acting as a control it will not act as a counterbalance. The level will lower. But, if you replaced the material in some position where it counterbalances the effect you made on the existing control then you compensate.

Mr. ROCK: Is this done sometimes when they do widen channels? Do they do their best to replace that material in a position where it will not increase the flow?

Mr. PATTERSON: That is a proposal in connection with the channel enlargement in the St. Clair river. The corps of engineers at their waterways experiment station have a model set up now and they are investigating where the best place is to place underwater dikes in the channel of the river to compensate for the enlargement in the navigation channel. This is an undertaking between the two countries, and it is a requirement that they do place such structures to compensate for any lowering effect occasioned by the dredging which they have done in recent years in connection with the seaway.

Mr. SMITH: For the benefit of upper Canadians and others, do you think it would be possible for us to be supplied with a map of the Montreal area and lake St. Peter so that we can get this straight in our minds; are these maps available?

The VICE CHAIRMAN: If the committee will consent to this, I am sure a request directed to Dr. van Steenburgh would produce these maps for the next meeting.

Mr. ROCK: Do you think that the great lakes have a good deal to do with the weather conditions within the same area, and that they have an effect on the temperature of the area, and things like that?

Mr. CAMERON: Yes. The great lakes have a very important effect on the local climatology of the area around the lakes. As an example, you know that the average temperature range in Toronto is much more moderate than it is in Ottawa which largely is due, not to a difference in latitude, but to a moderating effect in the lake itself.

Mr. ROCK: To come back to the proposal in respect of the Grand canal, these rivers which they want to divert all are flowing north, and are in a cooler region than we have here. With this water which will go to James bay and then be diverted back here to the great lakes system, will this by any chance change the actual conditions in this area; could it perhaps change the weather conditions in this area?

Mr. CAMERON: Not because the water originates in a more northern latitude. By the time it gets into the great lakes, it will have effectively reached the temperature of the lakes. I am quite sure it will not make a material difference. This is a general opinion.

Mr. PETERS: In the summer you can swim in James bay; that is about all you can do in lake Temiscaming, too.

Mr. CAMERON: By the way, I should point out that the last time I was a meteorologist was some 20 years ago, so my associates in the Department of Transport are much more qualified to answer these questions than I am.

The VICE CHAIRMAN: Are there any further questions?

Mr. TURNER: Dr. van Steenburgh, you have gauges to measure levels of the lakes?

Mr. van STEENBURGH: Accurate gauges.

Mr. TURNER: But your department does not measure flow?

Mr. van STEENBURGH: That is correct.

Mr. TURNER: The water resources branch of the Department of Northern Affairs and National Resources measures flow?

Mr. van STEENBURGH: Yes.

Mr. TURNER: Would there be any advantage in having both flow and level measured at the same place by the same authority?

Mr. van STEENBURGH: This is an unfair question.

Mr. PETERS: Is this not now done?

Mr. TURNER: No.

Mr. PETERS: Why should it not be done?

Mr. van STEENBURGH: Because this matter was considered by the Glassco commission and is under consideration at the present time by the government. I would prefer not to express a personal opinion.

Mr. TURNER: That is all right, but I do not think the question was unfair.

Mr. van STEENBURGH: It is unfair in that sense.

Mr. TURNER: You mentioned that the Canadian hydrographic services are understaffed?

Mr. van STEENBURGH: That is correct.

Mr. TURNER: With regard to your department's ability to contribute to the solution of the water levels of the great lakes, are there any other branches which in your opinion are understaffed?

Mr. van STEENBURGH: In our oceanographic branch—and this oceanographic branch will be making a study of the great lakes—we still are understaffed. It is very difficult to recruit people and it must be a slow growth. Actually, we had started building up this potential five years ago and things were halted and we are starting again. I might say that so far as the department is concerned, we are placing a very high priority on the development of this organization. We did this this year and I hope we can continue to do so. I might say that at the present time we are planning to increase our work materially in the great lakes next year.

Mr. WHELAN: May I ask Mr. Patterson a question having to do with staff. How many people do you have in northern affairs working on the great lakes? I hope it is not like what they told me in connection with the checking into insecticides and pesticides, which resulted in a great press release and it turned out that there was one man in Canada doing all of this.

Mr. PATTERSON: Mr. Chairman, as Dr. van Steenburgh indicated, this is a difficult question to answer. We have what we call a great lakes study office at Cornwall which has about seven persons in it. We have a number of engineers in Ottawa who spend part of their time on great lakes material, just as part of my time is concerned with great lakes matters. We have a district office in Guelph which looks after the tributary streams to the great lakes in Ontario. They operate gauges and discharge measurements on the tributary streams. If I were asked to tie down how many people actually work on great lakes water matters, I would suggest possibly in the neighbourhood of 20 technical and professional people are employed full time in that area.

Mr. PETERS: May I ask who measures the flow of water in the great lakes?

Mr. van STEENBURGH: Mr. Patterson's group, I understand.

Mr. PETERS: Does the man who takes the measurements on the dam not have some method of calculating flow; for instance, at Iroquois we have an elaborate set-up for measuring. Do we not also take the flow?

Mr. PATTERSON: In co-operation with the United States lake survey force, a branch of the United States Corps of Engineers, we have rated the power plant and the structures at Barnhart and through these ratings we obtain the flow through the power plant and any flow that may pass outside the power plant. Similarly, on the Niagara river we have ratings of the various power structures and keep track of the flow used by each power plant. We have a rating of the flow in the Niagara river itself. Similarly, on the St. Marys river we have worked in co-operation with the United States interests and have rated the rates in the compensating works and the flows through the power canal at the Sioux. Similarly, on the St. Clair river we have been co-operating with the United States lake survey team in obtaining a rating of the flow out of lake Huron. In that connection, the lake survey team has been doing the bulk of the work. We have been co-operating with them in supplying one or more individuals on occasion.

Mr. PETERS: It would appear that where the United States is not operating in conjunction with us, we really are not taking flows. For instance, no agency can tell you every day what the flow by Montreal is on a given day; there are no charts or data available immediately at Montreal in respect of the outflow of the St. Lawrence system.

Mr. PATTERSON: The outflow on lake St. Louis is rated. We keep daily data on the flows there. The Ottawa river is rated and we get daily flows of the Ottawa river at different points. On the smaller tributary streams throughout the province, the water resources branch maintains gauges and has ratings of flows against the gauge readings. We obtain daily records of flows on the principal tributaries to the great lakes system on the Canadian side.

Mr. SMITH: In how many places are these flows measured by a department of the federal government?

Mr. CAMERON: May I clarify a little confusion which I think is in all our minds. Mr. Patterson has used the term "rating" which is a technical term. He can correct me if I am wrong. In hydraulics you measure the capability of a stream to carry water at different levels and you get a relationship between the discharge of a stream and the level of the stream. After that discharge relationship is established, if there are no changes made, the measuring gauge each day gives you a very accurate measurement of the discharge. So, the measurement need only be made at two or three levels on a few occasions. Thereafter, the flows are calculated from the gauge readings; that is, the height of the stream in question.

Mr. TURNER: In other words you could calculate a flow by reason of equations which have built up.

Mr. CAMERON: Yes.

Mr. PETERS: What type of relationship is there between the lowering of the level and the rate of flow; for instance, do you increase the volume by deepening the channel so that even with a decrease in water we have increased the flow?

Mr. CAMERON: The flow actually depends on the difference of height between one end of the river and the other. Water has to run downhill. In general the higher the difference the faster the water flows. So, if one level is kept at the same height, by measuring the level at the upstream end, the higher that level is the faster will be the flow.

Mr. PETERS: Is there not a calculable difference between the surface water which is affected very much by the height and this undercurrent which you get that Mr. Patterson talked about?

Mr. CAMERON: I had not proposed to get technical in the hydraulic sense. The water flows at a constant rate through a section. It represents a balance

between the difference in level and the frictional effect that retards or holds back the water, and it is the bottom characteristics, how deep the channel is in respect of its width, which determines the relationship between the flow and the head. If you reduce the friction then for the same difference in rate there will be more flow. If the friction remains the same then the higher the head the lower the flow.

Mr. PETERS: Perhaps I should not ask you these questions but we are concerned with two things in order to solve our problem. Mr. Turner mentioned precipitation and the control of the amount of water which flows out of the system, whether it goes to Chicago or Montreal, and of course this involves a series of controls within the system, which people have been talking about. If we were to install a facility of one kind or another—say, a dam of some description, whether it be weirs or something else—quite distant down the river, say at Three Rivers, which would cut the force of water flowing down, as well as raising the level would we be able to back that water system up to provide a high enough level back to the head of the great lakes?

Mr. CAMERON: Well, of course, if you put a dam in you cannot back the water up unless the water is maintained to the level surface. If you are prepared to put a dam in and flood the neighbouring shoreline, it is a practical solution.

Mr. PETERS: But, could you not cut down the force of the water without cutting down on the amount of water, or does it operate in direct proportion?

Mr. CAMERON: Well, the relationship between the slope of the water—in other words, the head and the friction I mentioned earlier—and the speed occurs only in one spot. This relationship applies only to one spot, and so all this balance must be maintained at other points in the river. I see I am not making myself clear. This is an area Mr. Patterson could explain. I am a little bit out of my speciality in this connection.

The VICE CHAIRMAN: Do we have any further questions, gentlemen?

Mr. ROCK: I have just one. We were talking about installing weirs. If weirs were installed in the St. Lawrence river and then we had a lot of precipitation—in other words, rainfall—in the great lakes, with a resulting large surplus of water, what effect would this have on the St. Lawrence river? Would there then be floods in the St. Lawrence river area?

Mr. HARRISON: To save Mr. Patterson the embarrassment of answering all the questions for the Department of Mines and Technical Surveys I would say this is the sort of thing which probably will be discussed by Mr. Patterson when he gives evidence sometime in the future before this committee.

Mr. LEGAULT: I do not know to whom to address my question, but I am under the impression that we are underestimating the proportion or the amount of water that is taken out of the watershed due to evaporation and, generally speaking, due to reforestation and forest fires which we have experienced in this particular watershed. I think it has a lot more bearing on the water level than we seem to accept. Am I right in my understanding that a detailed study would have to be made of evaporation in the watershed system itself?

Mr. HARRISON: Yes, I think it is safe to say that evaporation, of course, is only one aspect of conditions which will change water levels or affect them. As Dr. van Steenburgh mentioned earlier in his presentation, the temperature of the water has an enormous effect on the evaporation and, therefore, with the loss of water from the lakes there is the loss of water in run-offs. I question, however, whether it is not as serious as the actual decrease in precipitation which has been felt in the whole great lakes watershed over the past few years. Over the last three to five years the total precipitation was about 10 or 12 inches less than the average which one would have expected at that period. If the water is not put in, you cannot get it. There may be certain amounts that

are taken out. I read some evidence that was given in Chicago, probably by Mr. Laing, that 1700 cubic feet per second were used for the city of Chicago. This is a minuscule amount compared with the total amount of water that is passing through the great lakes. However, I agree that all these things need to be studied. I think they need to be studied by Canadian scientists, and it should be done quickly, otherwise we are going to be in the unfortunate situation of having to accept data that is provided to us by the United States.

Mr. SMITH: We are going to have to do more independent work in relation to the knowledge so that we will be able to bargain at future times.

Mr. PETERS: Could I ask this question: Did your department do any work in testing of the precipitation by seeding?

Mr. HARRISON: The meteorological branch of the Department of Transport did that. I know they have done some work on this matter, but the department is only concerned in results.

Mr. PETERS: What are the results?

Mr. HARRISON: By this I mean the actual measureable results, what effect the success of these activities would have on the amount which might be contained in the great lakes and the navigable streams.

Mr. PETERS: Have you gathered any data?

Mr. HARRISON: On the basis of the experimental work the amount has been negligible.

Mr. PETERS: How about the controlled areas? Are there any reports from other countries as to the effect this has had?

Mr. CAMERON: I gather the results of the Canadian experiment are not yet completely analysed.

Mr. TURNER: Which is a nice way of saying that on the basis of silver iodide seeding or freezing there have not been any concrete results in the terms of inducing precipitation.

Mr. CAMERON: I do not think they have actually finished the analysis of the data. I am sure that when this is finished the meteorological branch will publish the results whether they are favourable or unfavourable. This has been a problem in which the scientists have been more emotionally involved than with any other meteorological phenomenon in the world. It is most difficult to determine. Without any question, the actual effect of these seeding experiments is very difficult to determine because there are so many random variations of nature. I do not think scientists are trying to conceal anything. It is just that they cannot honestly say, in many cases, whether there has been a significant effect or not.

The VICE CHAIRMAN: I would just like to ask one question. On page 8 of your brief, in the second paragraph, you say:

"The interplay of precipitation and operation on the great lakes system not only has a profound effect on the lakes, but it also presents a most difficult problem of measurement and understanding, one which can only be solved by fundamental research."

On page 9 you say:

"Our marine sciences capability can be expanded to assume this new responsibility. When we do undertake this broad and fundamental study, the resultant data will be pertinent and valuable to a better understanding of their operation."

I take it that you are implying, or that Dr. van Steenburgh is implying, that there is a lack of research and that more should be done. My question is really supplementary to Mr. Turner's question. Are you people being hampered in any way by lack of funds in pursuing this fundamental research?

Mr. van STEENBURGH: Probably I should ask Dr. Cameron to answer this question because he is director of this organization and he might have different views from mine because I have to look after all the department not just the oceanographic research. I would like to say to the committee that the department has, for the last four years, given the highest priority to this area, both in personnel and in money, and the speed of growth in the oceanographic research has been the vastest of any in our department. If we were given more money we could probably speed this work up. This may be questionable because available men can only be recruited at a certain rate and we want good people. However, I can assure the committee, as long as I have any control over the future of the department, that this area of our department is going to grow as fast as we are allowed to grow.

The CHAIRMAN: Thank you. Dr. Cameron, would you like to speak on this?

Mr. CAMERON: I certainly will not differ with Dr. van Steenburgh as it would obviously be a dangerous thing to do, but I would like to try and put this in its proper perspective. I continue to be amazed at the rate at which the requests are coming to our branch for particular services. I am not restricting my remarks to the oceanographic research aspect. The Canadian hydrographic service is swamped with demands for charts, for special studies on tidal streams, for forecasts of what is going to happen when you put in causeways. We cannot possibly look at all the problems that we are faced with. An astronomical growth would be involved. So we have to allocate our resources as best we can to the agency and the priority of the problem that exists.

In regard to the lake problem, rightly or wrongly we have been concentrating our oceanographic research to the problems of the cost because there were urgent problems that involved fisheries, involved defence problems, and involved all the problems for which oceanography is required. Even then we are not answering all the questions that are being asked. The great expansion of all explorations off the coast is facing our geophysicists every day with questions they cannot answer. We wish we could but we have not got the staff, and if we had the opportunity I am not sure where we could recruit them. It is not a case of shortage of money. The questions are coming in much faster than we could possibly answer them. This is one of the questions we are being faced with.

Mr. PETERS: I have one last question which I would like to ask. It would appear to me that the temperature is moderating in Canada considerably. It looks as if there was moderation in temperature. Does this have some effect on precipitation? Temperatures seem to be more moderate now and perhaps this is because more farms are being cleared, more factories are going up and so on. As I say, the temperatures seem to be moderating.

Mr. CAMERON: There is a recognized increase in temperature in the northern atmosphere. I have forgotten when the upturn started. But, it is relatively modest in terms of the temperature you sense yourself when you go outside. The moderation in temperature you sense is not so much a reflection of moderating temperatures themselves but your capability of being able to adjust to these measurements better than you did 20 or 25 years ago. It is much more comfortable now going around in a car with an efficient heater than it was back in the old days when you used it to go around in open touring cars.

Mr. PETERS: When we speak of the moderation in temperature and the high extremes, in my area it used to go down to 40, 50 and 60 below zero. Would this have an effect on the precipitation?

Mr. CAMERON: These fluctuating extremes are a reflection of the total weather picture. It may be a result of the differences in circulation which, in itself would have an effect on the precipitation. I would not say the fluctuation in temperatures themselves necessarily would cause any variation; these things are all tied in together.

Mr. ROCK: How much effect has the change of tide in the St. Lawrence river had on the outflow of fresh water in the St. Lawrence? How far does this tide, which originates in the ocean, reach up the St. Lawrence river?

Mr. CAMERON: Mr. Dohler will answer your specific question.

Mr. DOHLER: The actual tide, which we see on our gauges along the St. Lawrence river, can be measured as far as Montreal. From day to day we have high and low water. We have gauges at Longue Pointe, and I am sure some of you are familiar with this area. For example, at Lake St. Peter there is still a tide of one foot. At Sorel, Quebec, there is a tide of four inches. But, the main thing is the fluctuation of the amplitude of the tide at the different times at the mouth of the St. Lawrence river, and the changes there. Sometimes there is a large change and at other times a small change, and this change can be observed as far as Montreal. The amplitude is about 3/10ths to 4/10th of a foot, so in two weeks one can expect in Montreal a change of one foot because of the influence of the tide.

The VICE CHAIRMAN: If there are no further questions I will adjourn the meeting. Before doing so, on behalf of all the members of this committee I would like to thank you, Dr. van Steenburgh, and the officials of your staff for coming this afternoon and providing us with a very informative session. Also, I would like to thank you for preparing these excellent charts.

TUESDAY, November 24, 1964.

The CHAIRMAN: Order, gentlemen, I see a quorum.

I am sure the members will be pleased if I welcome the delegation which is here to testify before the committee. They are from the Central Georgian Bay Tourist Association.

I would like to introduce the gentleman sitting on my immediate right, Mr. William Aikman, secretary of the Central Georgian Bay Tourist Association. Next to him is Mr. Ed MacFarlane, president of the association, and lastly, Mr. Roy Parker, one of the directors of that association.

The clerk advises me that yesterday he received 25 copies of the brief which the organization proposes to present, and that today he received a few more copies. I trust all members have one. There is no other item of business. You accepted the second report of the steering committee at your last meeting. This carries our meetings up to December 5. I believe the committee accepted the report of the steering committee. Any further suggestions by the steering committee will be brought forward, of course.

Since there are no other problems, just in case we disperse in a hurry, I wish to remind the members that next Thursday we are to hear Mr. Tom Patterson, director of water resources for Canada. The committee, as you may recall, designated two hearings for Mr. Patterson. I believe the steering committee report indicated that they would set aside two days, normally, Thursday of this week and Tuesday of next week. Those two days are set aside for us to hear Mr. Tom Patterson, and if there is to be an amendment, the committee should be made aware of it. We have been informed that Mr. Patterson could not be here today. That is why we opened this meeting to the present delegation.

I have no further comments, and I see that no hands are up.

Mr. HAHN: I wonder, before the witnesses begin, if you would identify for us the area which is covered by the Central Georgian Bay Tourist Association.

The CHAIRMAN: Very well. Would you do so on this map here, if it is big enough.

Mr. Ed. MACFARLANE (*President, Central Georgian Bay Tourist Association*): The southern limit is down at Parry Sound, while the northern limit is just south of Pointe au Baril.

Mr. HAHN: Do you cover Collingwood?

Mr. MACFARLANE: No, that is too far south.

Mr. SMITH: When you say "small area", do you mean a small area in geographical dimensions?

Mr. MACFARLANE: Yes.

The CHAIRMAN: I now invite Mr. Aikman to present his brief.

Mr. WILLIAM S. AIKMAN (*Secretary, Central Georgian Bay Tourist Association*): Mr. Chairman and members of the committee, I would like to submit a brief on behalf of the Central Georgian Bay Tourist Association as follows:

The tourist industry is the third largest source of United States of America dollars flowing into Canada. It is therefore obvious that the health of the tourist industry has a large bearing on the nation's total economy.

The importance of the tourist industry to the total economy is even more important when the disposal of its revenue is considered. Very little of this revenue is spent to purchase products or services from the United States of America for the tourist industry. This money is largely spent to purchase Canadian-made products and services. The United States of America dollars are therefore available to industry other than tourist to purchase materials from the United States of America necessary in the operation of industry other than the tourist industry.

Another consideration to point up the importance of the tourist industry is the fact that it is made up of thousands of small operators giving labour to thousands more. The product the resort operators sells is not a product mass produced with a small labour content.

Giving due credit to the government for roads, advertising, etc. it is still a fact that the tourist industry has grown by private capital largely unassisted by Government grant or subsidy.

Problem:

The tourist areas located on Georgian bay and lake Huron have been adversely affected by the low water of the past several years. The area of central Georgian bay represented by this association has in 1964 been affected to such a degree that it must be considered a disaster area. With the 1964 level breaking all records of over 100 years' recording the industry was caught ill prepared. Although we expect and prepare for normal fluctuation in water level we could not in 1964 cope with this record low level. Another year such as 1964 may well spell the end of the tourist operations in this area unless some government aid is forthcoming quickly.

Many reasons have been brought forward to explain the present low water level. These reasons include lack of precipitation, increased

diversion of water for domestic and commercial use, deepening of channels, and so on. Regardless of cause the effect in the central Georgian bay area has been disastrous.

For the foregoing reasons this association requests the government to give sympathetic consideration to extending aid to individual tourist operators in this extreme situation.

Recommendation:

This association requests that the government give serious consideration to extending aid in the following categories:

1. Financial grants:

Make financial grants to reimburse operators for costs incurred to remain operative. These costs would cover such things as dredging, filling, dock construction, road construction, relocating wells, etc.

2. Compensation for loss of business:

All operators have been faced with some loss of business. To some this has been almost total loss. To others who have been in a position to operate the adverse publicity has meant operating at a loss.

3. Long term financing and government participation:

As previously outlined, the tourist industry has been largely self-financing. The time has now come when the industry has reached a degree of importance entitling it to more government participation. This participation by government is now necessary to act as a buffer if the industry is to survive such disasters as those presently brought on by the present low-water levels.

Government guaranteed low or interest-free loans should be made available to the tourist industry to allow it to develop and expand comparably with the national pace of development.

Summary:

The type of government participation requested by our Association for the tourist industry would parallel that now enjoyed by the agriculture and fishing industries. Drought, flood or hail can cause the farmer disaster. This the government recognizes and offers aid. The same effect is experienced by a tourist operator but he has no government agency or department to turn to. The government should set up a permanent department to deal with these problems in the tourist industry.

This association sincerely hopes that the present government will recognize the urgency of the present situation. We hope that quick and decisive action will be taken to relieve the distress presently being experienced by the members of this organization.

We request that the government participate and give recognition in direct proportion to the importance of the tourist business in the country's total economy.

ESTIMATED COSTS INCURRED TO REMAIN OPERATIVE
DURING LOW WATER CRISIS

(These costs are estimates from ten typical operations in the area)

Average capital investment in these operations would be approximately \$48,000 each

Operation	Extra cost 1962-3-4	Extra cost 1964 only	Anticipated extra cost in 1965	Loss of business 1964	Total for items 1 and 3	Total for items 1, 3 and 4
	\$	\$	\$	\$	\$	\$
1	1,750	1,750	400	1,200	2,150	3,350
2	800	800	250	1,500	1,050	2,550
3	6,100	1,800	5,000	2,000	11,100	13,100
4	2,500	1,800	500	1,200	3,000	4,200
5	1,800	600	5,000	No est.	6,800	6,800
6	1,250	1,250	400	Nil	1,650	1,650
7	1,769	503	No est.	No est.	1,769	1,769
8	6,035	4,750	2,000	No est.	8,035	8,035
9	1,050	280	No est.	2,350	1,050	3,400
10	350	150	No est.	No est.	350	350
Total	23,404	13,683	13,550	8,250	36,954	45,204

The CHAIRMAN: Thank you, Mr. Aikman.

Mr. AIKMAN: I might add that we have added a table at the back of the report. We took 10 typical establishments and asked for the costs involved over the past three years. We broke them down to show 1964 only, although reference is made to 1962, 1963 and 1964. I would say that these are typical of what is happening every day in our area.

The CHAIRMAN: If the committee will permit, may I ask for an explanation under No. 1?

Mr. AIKMAN: No. 1 is just for identification.

The CHAIRMAN: I know that.

I notice that \$400 is the anticipated extra cost in 1965, but what about the extra cost of \$1,750 in 1964? Is there any basis for guidance?

Mr. AIKMAN: In the case, if I may be allowed to rely on memory, of this particular installation they had figured they were going to have additional dredging in 1965 although they had carried it out extensively in 1964.

The CHAIRMAN: Mr. Smith.

Mr. SMITH: On page 2, Mr. Aikman, you mentioned it has been affected in the past several years. How many years?

Mr. AIKMAN: I would say the past three years. This has been progressive. There were some operators who were, possibly, not affected until last year.

Mr. SMITH: Further down on the same page you say the central Georgian bay area is the area represented by your association. Are the members of this association all commercial operators?

Mr. AIKMAN: We are all commercial operators or businessmen in that this is the source of our livelihood.

Mr. SMITH: You are serving the public in what way?

Mr. AIKMAN: With marinas, resorts, grocery stores and post offices servicing the area in the summer.

Mr. SMITH: Members of your association operate the various summer post offices?

Mr. AIKMAN: That is correct.

Mr. SMITH: How many summer cottages are there in the area covered by the central Georgian bay area?

Mr. PARKER: Three thousand.

Mr. AIKMAN: I would say 3,000, possibly more.

Mr. SMITH: Now you have delineated the area between Parry Sound and Pointe au Baril. Is there substantially any difference in the problems facing the operators south from Parry Sound to, we will say, Midland or Honey Harbour?

Mr. AIKMAN: I would say although all have been affected by the low water we, possibly because of the terrain are particularly affected.

Mr. SMITH: What about the area north of Pointe au Baril as far as the point of Manitoulin island?

Mr. AIKMAN: I really would not be in a position to say just how they are affected.

Mr. SMITH: I have just one or two more questions.

On page 3 of your brief you mention government guaranteed low or interest free loans. Have businesses in your area in Ontario been able to take advantage of the small business loans made available through the banks?

Mr. AIKMAN: Not to the extent we feel they should have been.

I believe there is a tendency on the part of all bank managers to look at financial statements. Our experience in the past three years has been such that very few of us have been in the position to show a profitable operation. Because of the water level our overhead is considerable.

Mr. SMITH: My last question: You suggest various means whereby the government might assist your association. If you were to put a priority on your needs, in what area is the help most greatly needed?

Mr. PARKER: In navigation.

Mr. SMITH: By navigation what do you mean?

Mr. PARKER: It is needed to enable us to get boats into our harbours and our docks.

Mr. AIKMAN: If I might interpret that, it is to restore reasonable navigational facilities to private operators who depend on water access for their business.

Mr. SMITH: In providing navigation, what does that entail? Dredging or damming, or what?

Mr. AIKMAN: It involves several things depending on the particular operation. I would say in probably the bulk of the operations it would involve dredging, but there are other operations where the successful approach might be to build or extend docks.

Mr. SMITH: Those two areas, then, would be the highest priority if you were listing them—extending the docks and dredging to improve navigation?

Mr. AIKMAN: Yes, sir.

The CHAIRMAN: Mr. Danforth.

Mr. DANFORTH: I would like to follow along the line of Mr. Smith's questions.

On page 2 the statement was made that "although we expect and prepare for normal fluctuation in water level we could not in 1964 cope with this record low level". Might I ask, for the edification of the committee, what preparations

you can take for the normal rise and fall of the water levels as pointed out here?

Mr. AIKMAN: We normally try to take care of this with floating docks or adjustable docks. In my particular installation I have relied on adjustable docks, and I can adjust approximately three feet.

To answer the earlier part of your question about what has been done in the last three years, until this year I was just able, with adjustments to my dock levels, to maintain things. However, this year I had water within 150 feet from the end of my dock. This was really a drastic condition.

Mr. DANFORTH: I appreciate this. This is what I would like to get into. We are told about the work of dredging and the work of extending docks, and the problems caused by this low level, especially for marinas. We were told what is proposed to alleviate some of the problems, but could you give the committee some picture of the actual hardships under which you are operating because of this record low? This condition of the water being 150 feet from the dock, is the type of thing I would be interested in. I would like to know just exactly what hardships you are working under and how you are affected by the water level when you speak of this 100 year record in water level. The committee would like to get a word picture of just exactly what you are faced with.

Mr. AIKMAN: If I may take my own operation, which I can probably describe better than some of the others although it may not parallel some of the others, I will try to answer this way: In Sand Bay where my resort is located, the present maximum fall would be about 13 feet. We are about in the centre, on the mainland, of the 30,000 islands. As everyone knows this is a rather shallow area. It has not a sharp drop off; a change of water level of one foot might represent the shoreline receding or coming up 150 feet.

Although I have just operated this resort for about six years, it has been in existence for 20 years. I have a boat slip that will handle two cruisers. One could play tennis in front of it on the sand. I operate a summer post office in the area and there is a main dock at that point.

As I say, the water receded until it was about 150 feet from the point at which we normally do our launching. I saw it was going to be impossible, and I tried to anticipate the future. I happened to have a rock point at that area, and by filling it with cement I made a dock that would be good if the water went down another three feet.

During the season I had dredging done twice because we expect high winds. This year, although the prevailing winds are westerly, we had a few freak winds which were just the reverse; you might say they were tidal waves, and in 24 hours our level changed three feet. Unfortunately our docks went just a few days after Labour day. We ran into a storm and everyone went out.

For two or three years we have been faced with the water continually dropping. We like to think of ourselves as reasonably intelligent businessmen, and if we thought we could not lick this we would get out of it. We have been faced with about three years when we have really dug into our pocket books and extended our financing as much as we could. Most of the members have had to do this.

This is the first appeal we have ever made, but we are really badly hit. About 75 per cent of our guests are from the United States. I did lose some of them; they are not coming back next year because when they are launching they are a little bit afraid. I lost them to somebody with a little better facilities.

I hope in trying to give this word picture I have not talked too much. I am trying to paint a picture.

We do have some photographs that the committee would be quite free to look at when they want to. Some of our members have given before and after pictures.

Most of us are mortgaged to the limit. I know my own personal future; I am not going to be able to mortgage it any further. I have to get help if I am going to go on.

Mr. ROXBURGH: What percentage of the different businesses in the area are affected? There are many hundreds of businesses, tourist reports. Is everyone affected? Are they all in the same boat. Are some successful?

Mr. AIKMAN: Some are not affected to the same degree. They would be affected by adverse publicity when people heard the water is low in Georgian bay, and so forth and so on. If the people were to go in there they would find the facilities were okay. They are affected to that degree.

Mr. ROXBURGH: What percentage of the businesses are affected, have you any idea?

Mr. AIKMAN: I would say 100 per cent of them are effected to a degree in our area.

Mr. DANFORTH: I am very interested in the statements that have been made. May I pursue this a little further? I think the committee has a picture of what is going on now. May I ask how costly it is when you speak of dredging? Can we have some idea of how costly it is from resort to resort? Could we have some idea of the cost of dredging and the cost of extending your docks? Is this a question of anticipating extra costs to some of these operators of \$400 and \$250 and \$500 as opposed to the extreme case of \$5,000? What leads me to ask this question is that I have, as a layman, no idea of what it would cost to deepen a channel three feet for 100 feet in a particular area.

Mr. AIKMAN: In my particular instance probably bulldozing would be the best way to do the dredging; a bulldozer that could work in up to three feet of water; but there are other members in our association, and these are the ones that you see running 8,000, 13,000, where they have an installation where they are handling bigger boats. I happened to be handling the tourist operation, largely the boat that is pulled on a trailer. Ed. MacFarlane, our president, I believe could answer that better, because he has a little different operation.

Mr. MACFARLANE: I am thinking of one of the members who spent \$5,500 this spring to open up his docks, at least a hundred feet away from the water, and he wrote his customers and asked them would they delay coming up this spring until he could get things organized so that he could handle their boats.

This particular member handles storage of boats, all sizes of craft. Now, he used this spring a dragline, and it was \$5,500 that he spent, with a dragline operating for a certain time, I cannot just say how long, and with trucks to truck this silt from the bottom back inland, out of the way of the cars and traffic that might be coming in. He had to take it way back in the bush.

I would think that among our members he was the hardest hit this spring, that spent the money. Now, he borrowed that; he did not borrow that in Parry Sound. Our friendly bank managers there lend us their ear, but they are businessmen, and they know that it is pretty risky lending us any money at this time, with this water situation the way it is. It is going down, and we keep hearing reports it is going to drop farther. Well, it would be awful silly of them to lend us money and we would not have money to pay it back. But I am thinking of this man who spent \$5,500, and he did, I would say, about a hundred feet of dredging plus putting in some new docks, a marina.

Mr. DANFORTH: May I ask this, Mr. Chairman: Is the major part of your problem met? I appreciate that 1964 was your bad season. If the water does not drop to an appreciable extent, are you gentlemen over the hump, or is part of your trouble to be expected seasonally, regardless of the water level?

Mr. MACFARLANE: We are in trouble right now. Some of us will have a great problem in trying to open up next spring. For instance, in my own case

I have a marina, a post office. We have many customers on the islands, who come in and depend on our docks for getting their mail, for getting their groceries, going into town to get their supplies, et cetera. Just last week I had one instance of a small cruiser that had to come out of storage. In the last three years I have been pouring coarse gravel onto the shore and continuing this ramp out as far as I could to try and catch up with the water. Last week we had this terrific blow from the south which lasted for three days. When we get a south wind, it takes our water away from us. It will come back to the level at which it was before the wind started, but this cruiser had to come out. In my case I get \$5 for using my equipment. I have a Land Rover plus a hoist which will work in the water. I push this apparatus into the water, drive the cruiser into it, pick it up in straps or slings, and pull it on shore. The flat rate is \$5. Last week the whole thing bogged down. The water was down, the Land Rover, the sling, the cruiser and everything else was down. I did some damage to the cruiser and I had to get a tow truck plus a winch to get the whole mess onto the shore again. That cost me \$18. The owner of the cruiser is not very happy with me because I believe I got the shaft on it, and that may have to come out of my pocket. He did not look very friendly when I last saw him. Those are situations that develop.

If this water stops going down, then we can see how much it is going to cost us to get this thing in shape, but I had another report that it is going to drop another two feet in two years.

Right now we can spend money and go back to the normal operation, if we had the money to spend and if our bank manager would lend it to us. We have been spending money continuously. We are not showing a profit. Most of it can be blamed on this low water situation.

Mr. AIKMAN: I detected something else in your question which I think possibly you were asking, that is whether this is a problem and whether if we get off the hook we are going to stay off the hook.

What has happened to us in the last couple of years is a record in lows, and we have been telling ourselves that this is cyclical and it will go back to normal. Maybe after what we did last year we would do a little more if we knew it was going to continue. We did enough to get ourselves off the hook. However, this is not a bottomless pit into which we should pour money. For instance, in my area it can be licked. Unless the water goes down another six feet, I am still going to be able to launch it, but it was not necessary to consider this particular site up until this year.

If I may elaborate a little more, the question was also asked: How long has this gone on? I really only got involved in it this year. I was able to contend with it, for the most part, up until this year. It then got so bad I had to stop using the boat house. However, this year I had to do some pretty drastic things. In some of the other areas the water was so low three years ago that the other chaps had to take some definite action. We find ourselves, honestly and sincerely with disaster on our hands if we have to stay in this business in that area.

Mr. PETERS: How close are you to the French river system?

Mr. MACFARLANE: It is exactly 60 miles to the centre of our area.

Mr. PETERS: Do you represent part of the French river?

Mr. MACFARLANE: We do not; they have another association north of us. They have a more rocky coast line and they may not be affected by it as much as we are. We have sandy harbours and a sandy beach. In that area they have quite a bit of a drop off. Of course we prefer the sand, but they have more fish than we have.

Mr. PETERS: I was wondering about the amount of water that can go into the French river. We had some discussion about the methods of letting water out of the French river in the fall and about the controls, which appear to be inadequate. Do they have any effect in your area?

Mr. AIKMAN: For two years we had everybody and his brother giving us answers on what causes this. We are in no position to say what causes it. We suspect the fact that the Huron and Georgian bays do not have the controls. If it is a big season, Superior can keep up its levels; if it is a bad season, down here they can open everything up and take it away. I feel that the fluctuation is centered in Georgian bay. That is a personal opinion.

Mr. PETERS: I do not know when were the normal years, but when you had a good amount of water, four or five years ago, what was the annual fluctuation in your area?

Mr. MACFARLANE: About ten years ago it was normal and our fluctuation was not over 20 inches. We did not have to worry about any more than 20 inches.

Mr. PETERS: Your topography is so designed that the 20 inches was on your shoreline?

Mr. MACFARLANE: Up and down, not along the shore.

Mr. PETERS: It would fit in with your normal geographical configuration?

Mr. MACFARLANE: The only time when we would get considerably more water would be with a strong west wind blowing, but the normal level would be within a difference of 20 inches, and it might happen maybe twice a year. However, it did not hurt us in any way. Our bumpers on the docks were long enough for boats to ride up and down. There were no boats scraping the bottom, and we had ample space underneath the boats to float them; but now we just do not have it.

Mr. PETERS: Has there been any assistance from the provincial government for the tourist operation?

Mr. MACFARLANE: None.

Mr. PETERS: Do they provide dredging on a cost plus basis?

Mr. MACFARLANE: If they do, I am not aware of it.

Mr. PETERS: What assistance has the provincial government given you in building roads to your sites or camps?

Mr. MACFARLANE: There was no assistance in building roads to our site, but roads were built to their park, for instance to Kilbean Park of which you have probably heard. It is a very beautiful park and it is coming along fine. They have built about six miles of first class highway right through the country roads into this park, and I would say that that would help. No dredging was done there.

Mr. PETERS: This question leads me to another upon which you might want to comment. Of course, part of your difficulties are financial. What financial relation has the establishment of the provincial park in your area to your tourist operation?

Mr. AIKMAN: I am going to digress a little. We like the idea of the government setting up these provincial parks. We think there is nothing better.

However, we are a little less than happy when we go in and cut a resort out of the wilderness for 20 years and lay in our roads and pay our taxes regularly, and then when the area is opened up the government comes along and puts in a provincial park. We are just a little less than happy when that happens. However, we have found that when it rains some of these people leave their tents, and in the long run this will help. We would feel much better if the

government took the risk and opened up areas other than those already established. I am happy you asked me that question.

Mr. PETERS: I get continuous complaints from places like Martin river and the operators in the Timagami area. As a member representing that area I am sure you get these complaints. The reason they are in serious financial difficulties is not the water level, a great deal relates to the operation of provincial parks.

Mr. AIKMAN: No, it does not hurt me in that respect. I believe it has given me customers over the years.

Mr. PETERS: I have one last question. I believe the small business loans which the federal government provides through the banks are government guaranteed loans.

Mr. MITCHELL: Ten per cent.

Mr. PETERS: Well, they are protected anyway. Have these loans been made available to the tourist operators in Ontario?

Mr. PARKER: I have taken advantage of that, but you have to hog-tie a bank manager to get him to come out to see you. He does not want to take the time to come out because it takes him away from his own business. You really have to put him on the hook before he will come out and look your place over to see if it is worth the risk.

Mr. PETERS: But, the guarantee would take away from the bank manager the risk he would be experiencing in short term loans.

Mr. PARKER: They just do not want to take the time to come and look your place over.

Mr. MACFARLANE: We are very poor risks, the way things are now. As a matter of fact, I would say that 90 per cent of our organization is for sale, if we could find a buyer.

Mr. PETERS: This committee is not going to be able to assure you that you are going to have sufficient water next year in the great lakes. As we are not able to do this, could you by changing your operation in some way weather this period? It looks as though even if we were to put in dams in lake St. Clair and install some of the other controls suggested it would be a long term proposition. Is the industry going to be able to exist under these circumstances?

Mr. MACFARLANE: No.

Mr. PETERS: Is it going to be able to exist for a period of time?

Mr. MACFARLANE: No. One of our operators already has folded up. He did not open this year. His customers had to walk too far to get to their boats. The boats were pulled up on shore, and when the wind swung to the south the boats were all smashed up. He tried, but he called it quits. But, if we have a certain amount of money and we know there is a guarantee that this water is not going to go farther back—and I do not know how we will get that—we could go ahead; but without it I cannot see how we can manage.

Mr. PETERS: There has been some talk in this committee by some of the officials of our grants system being insufficient to apply in this case, but there is some indication there may be a change in the attitude toward dredging in respect of what they call commercial works, harbours and so on—in other words, shipping in a commercial sense. If the program were to be changed and dredging services by the Department of Public Works were supplied to tourist operators, would this not destroy your tourist operations in any event?

Mr. MACFARLANE: No.

Mr. PETERS: You know there is a great deal of backfill and that will come from the dredging.

Mr. MACFARLANE: Well, we would not want them to pile residue from the dredging on our front door steps because we would be in the same fix; we would have to wade through it. But, I think if a committee were sent there to look over these things to see what could be done for us it might be very beneficial. In some places it requires fill to do the trick, where they can start an abutment and put in floating docks. Other places have to be dredged back, with floating docks. Every operation is different. I could not say one thing should be done for all.

Mr. SMITH: You might find yourself digging fill out of one operator's place and putting it in another.

Mr. PETERS: Anyway, this is sand.

Mr. MACFARLANE: We have a lot of silt in the bottom.

Mr. AIKMAN: I did a fair amount of dredging this spring. There are some private cottages adjacent to my place. The terrain was such that I did a wonderful job for them because by the time the currents were through I ended up with a lot of sand that had not been dredged. I think we have raised every nickel we could borrow over the past two or three years.

As I pointed out, 75 per cent of my guests are from the United States. I know I do not go over to Buffalo to spend my dollar; I have to stay at home and pay my bills for dredging. We feel if the government would take over a percentage—and my associates will shoot me for saying this—it would be better. Until now we have taken it all on our own.

We believe in this industry. We are betting on the future that we are going to make money, in the last three years we have not; and we have mortgaged ourselves to the hilt. We feel this is a national problem.

We may be exaggerating from another's point of view, but we feel in our own way that our operation is a pretty important one.

Mr. ROXBURGH: I have a supplementary question in respect of this bank loan business. You made the statement that you had to practically drag bank managers in. Have a group of you gone together to see the bank manager in respect of financing under the Small Loans Act, or has it been done independently?

Mr. PARKER: It has been done individually.

Mr. ROXBURGH: You have made your loans yourself and you have not tried to do this under the small business guarantee?

Mr. PARKER: No.

Mr. ROXBURGH: Why could it not be done in that way?

Mr. PARKER: I have borrowed \$5,000 under small business loans.

Mr. ROXBURGH: But what I am getting at is this. I agree with you when you mention the difficulties you experience in this connection. When you have needed money you have had to borrow it from somewhere. What I am unable to understand is why you did not try to get it through the small business loans of which the government guarantees a percentage. In this way the bank would not be on the hook quite as much as it would be in respect of an ordinary loan. I am having difficulty in understanding this.

Mr. SMITH: I was going to interject—

The CHAIRMAN: Are you on the same topic?

Mr. SMITH: Following from Mr. Roxburgh, Mr. Chairman.

There is quite a lot of paper work involved in a small business loan and the interest rate is not high. The ease or difficulty with which they can be

obtained depends somewhat on the competitive situations between the banks in a certain area. In other words, if there are not too many banks and there are lots of people wanting to borrow money, they look at small business loans last.

In the small city from which I come from there have been a great many small business loans because all the banks are in competition for customers.

Mr. HAHN: Mr. Aikman the line of questioning that I want to follow with you is off on a different tack; it is not aimed at your immediate problem.

I would like to look at this matter from the point of view of prevention rather than the cure for a problem. One of the witnesses we heard before from the Department of Public Works indicated that under the Navigable Waters Protection Act all structures built in navigable waters required the permission of the Department of Public Works and that they looked at them primarily from the point of view of impeding navigation and this sort of thing; but they were also able to offer advice in terms of water levels and so on if someone sought this advice.

Did any of your people have any contact with the Department of Public Works about water levels prior to putting in your installations?

Mr. AIKMAN: Speaking for myself, I purchased this property with the installations which I have modified.

Mr. HAHN: They also indicated to us that there is a datum level for each of the great lakes and that is supposedly exceeded 88 per cent of the time. The water levels drop below it maybe 12 per cent of the time. They dredge out the channels on the basis of maintaining adequate water at this datum.

I am looking at the figures for lake Huron and lake Michigan and I see that in 1952 the level was over five feet above datum. Since that time it has been dropping down, and it was below datum by nearly a foot in 1959. In 1960 it was a little over two feet above datum, and it has been dropping down again. This means that there has been a fluctuation from datum upwards of about five feet.

Mr. AIKMAN: That is the low water datum to which you are referring. There is a high water datum and the water has not gone five feet above the high water datum. Shipping naturally works from the low water datum, so this being five feet above was not five feet above average, it was five feet above the low water datum.

Mr. HAHN: That is right, but there has been quite a fluctuation.

In 1952, for instance, did the high water cause you any hardship in your area?

Mr. AIKMAN: It did not cause me any hardship because I have sand and then above that there is rock. The high water would certainly cut down on the beach. However, with the particular terrain where I am located my cottages would be on an average of 10 or 15 feet above the high water mark, so I would be faced with a cutdown on the amount of beach that I would have for bathing. However, my installations would not be hurt.

My permanent dock at the present time is about seven feet above water level and then I have adjustable sections that add on. They have steps. If it came up seven feet I would just have to raise my permanent dock.

Mr. HAHN: Do you have any idea at the time you add the installations—docks and so on—of the water level at that time in terms of its historical highs and lows? In other words, do you know where you are in the cycle when you are adding?

Mr. AIKMAN: I think every one of our members receives a chart every month. The charting goes back for 104 years. We get our chart on lake levels from the United States Army. I know that I consider those things and I would

assume that everybody would do so and would put their installations well above the high water.

Mr. HAHN: I have a final question.

If you are suggesting, as you are, that maybe in times of disaster or abnormally low levels the government should step in and help, as they do in the case of crop insurance and so on, do you think it would be reasonable to expect operators to submit plans prior to installation so that the plans may be approved, thus ensuring that the plans will cope with everything down to a certain specified water level, let us say? The private operator would then take the responsibility down to the datum level and government assistance would only apply under abnormal conditions.

Mr. AIKMAN: I would think that would be very reasonable and I see no reason why it should not be done. We would be dealing with mature individuals in the government as well as on the business end and, provided we did not have to plan for fluctuations beyond—

Mr. DANFORTH: Beyond average?

Mr. AIKMAN: That is right, provided we did not have to plan for fluctuations beyond the average I see no reason why it should not be done. We were hit with something that has not happened for 104 years.

Mr. HAHN: The chart I am looking at is the monthly and mean water levels on the great lakes. You can see what sort of fluctuations you might normally expect.

Mr. AIKMAN: Yes, I think that would be a very sensible approach to it.

Mr. HAHN: That is fine. Thank you very much.

The CHAIRMAN: Mr. Smith.

Mr. SMITH: May I continue with the business of charting?

In addition to the 3,000-odd summer cottages and motel type structures is there any other type of business you get?

Mr. AIKMAN: Yes, in my particular instance that would be 25 per cent of my business. I have a number of housekeeping cottages and, as I pointed out, about 75 per cent of the clientele are from the United States; they rent accommodation and boats and motors from me.

Mr. PARKER: I might add that we are on the inside channel going from Parry Sound northwards and we get transient boat trade.

Mr. MACFARLANE: We have lost the cruiser business from lake Simcoe.

Mr. SMITH: This year the present government put out a new chart of Georgian bay designed particularly for the use of cruiser owners and small boat owners. It has been very well received I understand.

Mr. AIKMAN: That is right.

Mr. PARKER: Yes.

Mr. MACFARLANE: Yes, that is so.

Mr. SMITH: A considerable amount of money was spent on it I suspect, particularly in making the survey, both by this government and the predecessor government.

Mr. PARKER: That is true, yes. It is a beautiful map.

Mr. SMITH: The purpose of that was to try to encourage particularly United States cruiser owners, owners of the larger self operated cruisers, to come into the 30,000 islands and ultimately into the Trent system with a greater amount of confidence.

Mr. PARKER: Yes. Most of those boats were just coming as far as Manitoulin and they were afraid to come any farther.

Mr. SMITH: On the other side, to Southampton and Port Elgin?

Mr. PARKER: Yes.

Mr. SMITH: The question then is how will the low waters affect that business? How will that business which we are spending money to encourage be affected?

Mr. MACFARLANE: Some of our members who have the facilities for handling the small cruisers were enjoying the small cruiser business. These cruisers are equipped with depth finders and they will not come off the route this year at all. We only had three small cruisers in our place in the whole season. They dropped their hooks and came in on a dory whereas in other seasons they have tied up to our dock. I have had four and five of these cruisers tied up at one time. They brought considerable business to us, not only the business of taking on supplies and ice and charging their batteries but also minor repairs and all the other things they needed. We have now lost that business completely; it has gone. When the depth finders start to beat they just turn around and go right back.

Mr. HAHN: I apologize for asking two sets of questions and I realize I am probably a little out of order, but while we have these witnesses here I would like to get a little extraneous information from them.

My question deals with the question of water pollution. I would like to know if at your facilities you allow boats that are tied up to discharge their heads in your water.

Mr. MACFARLANE: No. It is an unwritten law that these cruiser owners do not discharge their heads in the waters. When they tie up they use the facilities on shore.

Mr. HAHN: You provide facilities?

Mr. MACFARLANE: Yes. We have flush toilets on shore. When they hook up to our electricity their whole apparatus is taken over and some of them go into our small motel and spend the night on shore rather than riding at anchor. Maybe they have been travelling for a week and are tired, and they enjoy a night on shore. Then they go on board next day.

Mr. HAHN: If it were requested that boats have a storage tank into which they would pump their heads, do you think it would be practicable to have pumping facilities at installations such as yours to pump out and empty these storage tanks?

Mr. MACFARLANE: We do not have this facility right now, but certainly if it is asked for, we could arrange for it. I think it is a good idea. Some of these boats today are equipped with storage tanks and they have been emptying them away out in the deep water. Then, there is another apparatus they have on board that takes care of sewage. I am not learned enough to know how it operates; it is approved under the department of health. They still do not discharge that in a harbour. If anyone had an idea that any of these cruisers were doing anything like that, certainly they would not be welcome at all. I do not think there is any law to this effect, but no cruiser operator would do that.

Mr. HAHN: It is the etiquette and part of the rules of the game?

Mr. MACFARLANE: Yes. When they are in a harbour they know they are over somebody's pipe line as well.

Mr. SMITH: Generally speaking do you find that cruiser owners are co-operative in the matter of pollution?

Mr. MACFARLANE: Very much so.

Mr. AIKMAN: The worst offender is the camper.

Mr. MITCHELL: How many members are there in your Tourist Operators Association in this area?

Mr. MACFARLANE: In our area I think up the shore there would be around 100 to 115, or something like that.

Mr. MITCHELL: Already it has been mentioned that there are roughly 3,000 cottagers.

Mr. MACFARLANE: Approximately that.

Mr. MITCHELL: How many of the operators in your association would not be on the Georgian bay watershed but would be on inland lakes adjoining?

Mr. MACFARLANE: The number I mentioned all are on Georgian bay.

Mr. MITCHELL: There are operators in your area who are on inland lakes?

Mr. MACFARLANE: Yes.

Mr. MITCHELL: Why would they not be members of your association?

Mr. MACFARLANE: Because they are situated inland and are members of another association. They are not affected by this.

Mr. MITCHELL: Are they seriously affected on inland lakes?

Mr. AIKMAN: No; they are enjoying effective water facilities.

Mr. MITCHELL: This would apply to a great many other areas where most of the operators are located on inland lakes.

Mr. AIKMAN: Yes.

Mr. MITCHELL: They would not be suffering the same hardship you are?

Mr. AIKMAN: No.

Mr. PARKER: There are exceptions where the water has been dammed.

Mr. MITCHELL: I realize that, but I am from northern Ontario and I know that probably the bigger percentage of tourist operators are on inland lakes and not on navigable waters.

Mr. MACFARLANE: I would say that is right.

Mr. MITCHELL: They are in a better position than you are?

Mr. MACFARLANE: We might just be there ourselves some day.

Mr. RYAN: Do you feel the Parry Sound harbour is badly affected by these levels?

Mr. PARKER: Yes. The larger cruisers carry only half loads like the oil boats.

Mr. RYAN: Your association extends over what area?

Mr. MACFARLANE: From Parry Sound roughly to below Snake river.

Mr. RYAN: What are the main centres which are badly affected in this area; would you give us some of the main harbours?

Mr. MACFARLANE: Snug Harbour, Dillon Cove, Carling bay, Sand bay, Bull bay area, Blind bay area, Kilbean park, Deep bay and Pongally bay. I do not know whether or not these names are familiar.

Mr. RYAN: Some of these are on the mainland?

Mr. MACFARLANE: All are on the mainland.

Mr. MITCHELL: You do not go as far as Britt.

Mr. MACFARLANE: We have none at present at Britt; they have an association of their own.

Mr. RYAN: How is the harbour there making out?

Mr. MACFARLANE: The land drops off a little quicker there. I do not think they are in the same position we are.

Mr. RYAN: And at Thirty Thousand islands?

Mr. MACFARLANE: I would say the same thing applies there. I think we have only one member on an island. He is affected to a degree.

Mr. AIKMAN: But he also has a location on the mainland where he is affected.

Mr. RYAN: I take it that in this area the shore does not drop off very steeply?

Mr. MACFARLANE: Only on the points and there are no operators or marinas on the points. We try to get into a sheltered harbour and that takes us down to the bottom of these bays which are like long fingers. Away down on the bottom there is where we are located. On the points it drops off fast, but the bottoms of these bays are either sand or silt.

Mr. RYAN: I take it that the shipping channels coming into these ports or harbours are good and deep for the cruisers and other vessels?

Mr. MACFARLANE: Oh yes; out in the centre, off in the big sound, they are going over 300 feet of water; there is no situation there. As they approach Parry Sound harbour it is a different thing.

Mr. RYAN: Are small boats landed there?

Mr. MACFARLANE: They rely on the operators in the area. Usually there is a small charge, or if they are customers who are buying gas and oil from us, sometimes we do it free of charge, but they do look to the tourist operators to provide facilities for their launching. As an example, the government dock this year was not in use; I do not know why it was not. I know they came down to my place to launch.

Mr. RYAN: It has been mentioned that they are not getting cruisers from lake Simcoe. What is the reason for this?

Mr. MACFARLANE: The low water level. It costs too much to free one of these cruisers from the mud and they do not wish to take a chance on it. Only three cruisers have dropped their hooks and come in on dories a distance of a couple of hundred feet.

Mr. LONEY: Reference has been made to the reluctance of the recognized banking institutions to finance your operation. I would like to know whether this is what has motivated your third recommendation.

Mr. AIKMAN: No. We feel this is a national industry. We have footed the bill and have borrowed every nickel we could. Some of us have borrowed from the bank. We have extended our credit to the limit and we feel the government should shoulder some percentage of this cost because we are facing a disaster. The farmer does not expect hail every year, but if he gets it three years in a row, somebody has to help him out. We are really extended. Whether the money comes from the bank or from any other source, it is going to be tough to pay it back.

Mr. DANFORTH: Mr. Chairman, there is probably a logical answer to this question, but I am not familiar with this subject. May I ask whether any consideration has been given by your association, which has 100 to 115 members, to making a joint effort to solve some of your own problems? It seems to me one of the major problem has to do with dredging and fill.

With the advent of the big haul service tractors with blades, and with bulldozers, has anything been done in a co-operative effort to solve your problem? I am leading up to a possible expenditure of government funds to provide this particular facility. Is it feasible? In my particular area this was done to solve the problem caused by water. I am thinking more of weeds, and cutting of them. But has anything been done by your association in this field?

Mr. AIKMAN: One moment please. Yes, there was one in our area. A group did get together last year to bring in a sandsucker, and they shared the expense.

But it was not too successful. I believe this was rather on account of the equipment used. I would say other than that, no.

Mr. DANFORTH: Perhaps I might phrase my question another way. Has your association investigated this particular aspect?

Mr. AIKMAN: No. We have members in our association who are actually engaged in that business, and who support our association because they get business from the tourist operators. We have a member who is actually in that type of construction. It was one of our members that I used for my particular job. I think I probably got a little better hourly rate from him than I would have got on the open market.

Mr. DANFORTH: There is no co-operative venture as such?

Mr. AIKMAN: No; you are right, there is not.

Mr. DANFORTH: Are you aware of any tourist area in the region which is approaching this problem?

Mr. AIKMAN: No.

Mr. SMITH: Is not the problem as put by Mr. Danforth partly because the dredging equipment is so expensive?

Mr. AIKMAN: That is right; I would say so. Moreover, this problem is concentrated, and it is increasing at a terrific rate. There were people who had a problem this year who did not have one last year. But we are all into it now.

Mr. DANFORTH: My questions were based on the use of a bulldozer, and they were brought to my attention because of the big backhoes and blades which are available now for practically every type of tractor, and I felt that this might not be beyond the realm of possibility owing to the amount of money involved.

Mr. MACFARLANE: In most cases in our area a small bulldozer or a small backhoe would not be adequate. It would have to be a large dragline.

Mr. PARKER: I had a bulldozer at my place, but it did not do a good enough job. So I got a backhoe in, and I managed to get through the summer. That was in June. But in September we had a terrific blow and the silt came in and filled in what the backhoe and bulldozer had done. So I had to get out and dig out the silt and sand in front of it before I could be assured that I would have a full season without any trouble.

Mr. DANFORTH: I asked this line of questions owing to the fact that in this whole matter you gentlemen are requesting immediate assistance. I can anticipate public works obtaining a dredge or special equipment and sending it in, but it would be at a prohibitive cost. My question was to determine if for a much smaller sum of money directed to this important constructive matter—smaller equipment might not serve the purpose. That is why I asked if an investigation had been made along this line, and the answer was "no" to Mr. Smith's question about prohibitive cost of such equipment. So I take there has been no investigation in this area, or could you give the committee any idea of the costs involved?

Mr. MACFARLANE: No. Each individual person in our association submitted his estimate to us in his particular case, and the table evolved anywhere from \$200 up to the largest figure. There was quite a variance in the figures.

Mr. SMITH: I do not like to make too many speeches, but in the proposition proposed by Mr. Danforth for co-operative work with small equipment designed primarily for other jobs, I might say that this has been tried on lake Simcoe, when marina operators got together to use local equipment, and it was found to be unsatisfactory. What they had to do in the end was to wait

for the time when the federal government had dredging equipment or sand-sucking equipment on the lake, and then to try to make a deal with the operator or owner of that dredging equipment at the end of the government contract and to say "Can you come across for two days and clean out our marina"? Or the town can get them to clean out their marina at a reasonable rate, having the equipment. But the experience has been that home made equipment or equipment designed primarily for another job does not do satisfactory work with the problems which are being presented here today.

The CHAIRMAN: I have Mr. Legault, Mr. Aiken, and Mr. Ryan.

Mr. LEGAULT: My question has been practically dealt with by Mr. Danforth concerning the economic possibility of doing this dredging. But the problem faces us all the time and it could last for quite a few years. I wondered if it could be maintained for a certain length of time in order to justify the operation economically. The second question comes up in connection with road construction. Does that mean private roads, or roads which could be placed under the responsibility of the township?

Mr. AIKMAN: I should have said approaches rather than roads. I mean approaches to launching sites, or something like that. I was thinking of a particular instance where I put in some fill in order to have a rocky formation where I could have satisfactory launching. I really meant to say approaches.

Mr. MACFARLANE: In my particular case it would be the construction of a causeway, rather than of a road.

Mr. LEGAULT: You mean a causeway in order to reach a wharf?

Mr. MACFARLANE: It is designed not for general traffic, but rather for the launching of boats.

Mr. LEGAULT: That would be a private road for the operation of the camp?

Mr. MACFARLANE: Yes.

Mr. LEGAULT: How were you affected seven or eight years ago when there was a condition of high water, and when we had flooding all along the French river? Were you adversely affected by it?

That would affect the operations.

Mr. MACFARLANE: No, we do not have anything like that.

The CHAIRMAN: Mr. Aiken?

Mr. AIKEN: Mr. Chairman, I would like to ask one of the witnesses, perhaps Mr. Aikman, a question on recommendation 1, "Financial grants from the government" which I take to be assistance in restoring your approaches to the water. Do you have any specific proposals as to the type of work, the people who would be involved and the inspection services and the amounts and so forth that you could put before the committee?

Mr. AIKMAN: If I might answer that; our proposal, Mr. Aiken, would be to restore reasonable navigational facilities for private operators who depend on water access for their business. That would be done by dredging, dock extension, approaches for launching. I could give you a figure. I would say that the average would be below \$5,000, well below \$5,000 and may be quite a lot below it. I do not think in any instance it would go over \$10,000. I have one in here of \$13,000 but a lot of that has been done. If the set-up were handled by the district marine agent or an official of the Department of Public Works they would analyse, do the checking out of the installations. Ed. has a problem, the problem is common but at opposite ends. I am a digger. He is a filler. That is what it is. The sensible approach to Ed's, would be a causeway. The sensible approach to mine would be clearing. There is a lot of sand to be cleared.

Mr. AIKEN: Your suggestion would be then that there would be some sort of program set up by the government, a program of assistance where an inspector from transport or public works would look at the need for some navigational assistance and report on it and then some governmental assistance would be given; is that correct?

Mr. AIKMAN: That is correct, Mr. Aiken.

Mr. AIKEN: What about the question of the amount: would you see the government providing the whole assistance or part?

Mr. AIKMAN: Well, we would naturally like to see the government provide it all, but being businessmen, we realize these things and we would be happy to settle for the government sharing on a percentage basis or matching us dollar for dollar. We realize that this is our problem. We are not just dumping it but we just cannot handle the problem. We feel the industry is important enough that the government should recognize that we are a disaster area and help us out in this.

Mr. AIKEN: You are asking, as I take it, merely for navigational assistance; in other words approach to the water for those who normally would have water at their doorstep.

Mr. AIKMAN: That, of course, includes Mrs. Jones, the cottager who comes in for her mail every morning. When we are talking of navigational, we are talking about the people whose patronage has built our business and who come by water.

Mr. AIKEN: Regardless of how they get there, these are the people who get there by water. Thank you.

The CHAIRMAN: Mr. Ryan.

Mr. RYAN: I would like to ask Mr. Aikman, would it be feasible to build your facilities along the side of coves in deeper water rather than at the head of the coves where they are and use the floating dock system that is used on the east and west coast and in the gulf of the St. Lawrence and in tidal waters, docks that go up and down on driven piers. Would that be possible?

Mr. AIKMAN: You have asked one of the few members that is not at the bottom of a cove. Ed. spoke in general on the location. Mine happens to be almost a semi-point on Sand bay. Fortunately, in my particular experience, my store, recreation room and post office are built almost on a point with sand in front of it. I happen to be in the most logical spot. I have, as I mentioned, docks that are put in each spring and taken out each fall and they are supported on a series of pipes that I can adjust for height. Floating docks are out as far as I am concerned. Because of the wind and the bows that come up, the adjustable pipe does answer them because it does present resistance to the water. The main thing is I am now faced with the point where my main dock that I anchor everything to is approximately 150 feet back from any water and I just had to extend this.

Mr. RYAN: Your position is a little unique.

Mr. AIKMAN: Mine is a little different.

Mr. MACFARLANE: To continue the answer to your question, it would be a very good idea if a fellow could pick up his whole operation and move it down from the point. In my area this is all private land. For me to move down one shore—I have a farmer on one shore, we call them farmers, but they are all rocks and Christmas trees and he has turned down \$50,000 for his place and I am sure that I could not possibly buy any of this property.

Mr. RYAN: There is deer hunting on this point?

Mr. MACFARLANE: Oh, yes, very good.

The CHAIRMAN: I see no further hands up.

Mr. HAHN: I just wanted to ask Mr. Aikman if your businesses are totally summer marina type business? Do you have any off-season activity or off-season business?

Mr. AIKMAN: I most certainly have. I have had to put my off-season earnings in to support the resort business. I work in Toronto in the winter-time.

Mr. HAHN: Your resort—

Mr. AIKMAN: The resort is my main occupation. That is where my investment is.

Mr. HAHN: This is strickly a summer activity.

Mr. AIKMAN: It is a summer activity.

Mr. HAHN: Is there any possibility of developing these resorts into a winter occupation? I guess there are no hills for skiing?

Mr. AIKMAN: Our area does not lend itself to skiing.

The CHAIRMAN: I see no more hands up. I am very pleased on behalf of the committee to thank you for your evidence and coming here to testify before the committee. You all know we have a meeting Thursday afternoon. It may be a double meeting. We were informed that Mr. Patterson, who we expect will be longer that the normal two and a half hour period, may have to be heard at night because he cannot be here the following Tuesday.

Mr. SMITH: Could we remind the members there are pictures here they may look at.

Mr. LEGAULT: Mr. Chairman, I feel personally we will not be reaching the solution which is required immediately for these gentlemen because the study of this committee will take a number of years and the study is on the level of water. The problem brought by these gentlemen needs some immediate attention. I think the report of this particular meeting should be brought to the attention of either the Minister of Industry or somebody who can direct immediate attention to the problem that exists, otherwise I feel our study will take seven or eight years before anything concrete or any help would come from the findings of this committee and this will be too far off to be of any benefit to these witnesses and to this association.

The CHAIRMAN: The Chair felt from the beginning this testimony was not basically relevant to the problems of the levels of the great lakes. The committee has no order of reference by which it can recommend subsidies and loans. I am pleased that the member, Mr. Legault, brought this to the attention of the Chair. I presume that I will submit to the steering committee the fact that we heard quite a bit of evidence pertaining to financial assistance which is not in the order of reference of the committee.

Mr. SMITH: We could submit an interim report.

The CHAIRMAN: We could report the information received to some department where it could be reviewed.

Mr. LEGAULT: Mr. Chairman, I would submit that there probably should be an excerpt of this committee's proceedings sent to the Minister of Public Works, the Minister of Transport, the Minister of Industry and the Minister of Trade and Commerce.

The CHAIRMAN: Yes; I do not suppose it would be ultra vires to do that, because I do not think that on the final report of this committee we will be able to deal with these matters of finances, and loans, and we would find no order of reference to do so.

Mr. SMITH: I do not think we would be excluded from making such recommendations, though. Mr. Hahn and I have been on the defence committee a long time, and I do not think the minister involved would take it amiss if we did, because I am sure they are as much obsessed and interested in getting a solution to these problems as we are.

Mr. ROCK: Mr. Chairman, the problem is a temporary one, we hope, and it would need immediate attention, because it is not in the months of May or June that this should be brought to the attention of the departments concerned, and I think the Department of Industry is interested in the maintenance of this type of business.

Mr. HAHN: I submit that Mr. Legault is a pessimist if he thinks this committee is going to take seven years to make a report.

Mr. LEGAULT: Mr. Chairman, I am quite interested in the case these people present. I think we will be in error if we assume that they are the only persons who are going to make submissions on the damage the water has caused. I think that there may be others who are not in the same situation but who are damaged to some extent, such as elevator operations, or people who have shipping problems, where the low water level has caused difficulties.

We are asked to look into the problems of low waters on the great lakes, and I am sure that this is one of the problems, and while I would like to see an immediate report made, I would like to see it held until we have completed our hearings.

I would like to see an interim report, at least on the problems of damage results, but I think the steering committee has not yet finished its program.

I do not know who else may want to appear, but I think we should leave it until our first report, to include this.

The CHAIRMAN: Yes, I believe that is quite correct. So would you leave the problem now that some explanation has been given. The steering committee will check it over.

Some hon. MEMBERS: Agreed.

Mr. AIKMAN: I would just like to add a word. From early May our association did enter into correspondence with various departments of the government, and we were shoved around quite a bit until finally we started addressing all our correspondence to the Hon. L. B. Pearson, and he did definitely say that this committee was the place, and he would see that we had a hearing.

So you have the word of Mr. L. B. Pearson that you are in good order to consider this. That ended our correspondence. It was passed to you fellows, and I would just like to say that I know I speak for the other two chaps here, when I say that we certainly appreciate the fact that you let us sit up here, and you made it easy for us. There were no loaded questions, and we are not too smart or we would not be in this business, but we just appreciate what you fellows have done, and the time you have given in listening to us. Thank you.

The CHAIRMAN: Thank you, Mr. Aikman. The meeting is now adjourned.

THURSDAY, November 26, 1964.

The CHAIRMAN: Gentlemen, may I call the meeting to order.

We have with us today Mr. T. M. Patterson, director, water resources branch, Department of Northern Affairs and National Resources. I have the pleasure of introducing to you the persons who are assisting Mr. Patterson today: Mr. R. H. Clark of the hydraulics division of the department and Mr. Morton of the Cornwall office.

Before we proceed, perhaps I should let you know that Mr. Tom Kierans, the engineer promoting the Grand canal idea, has sent to me a copy of his

most recent work which I assume he intends to present to the committee when he is invited. He has indicated to me there is no charge to me for the copy I have received, but he advised that he could not make additional copies available for less than \$5 each, because they are quite elaborate and contain pictures and charts. If this document is presented by him, of course it will appear in our Minutes of Proceedings and Evidence.

Mr. SMITH: I think some copies should be made available to us. When we have another meeting, I think we should perhaps recommend payment for a number of copies.

Mr. TURNER: That is agreeable.

The CHAIRMAN: I am pleased to introduce to you Mr. Patterson.

Mr. T. M. PATTERSON (*Director, Water Resources Branch, Department of Northern Affairs and National Resources*): Mr. Chairman and members of the committee, it is a pleasure for me to be here today.

Before I initiate my statement, I would like your indulgence, sir, to allow me to correct a few figures in the testimony which is credited to me on the occasion on which my minister, the hon. Mr. Laing, was in the witness chair. You will recall that on that occasion I was once or twice called upon to speak from the side of the room and I did not have a microphone in front of me. I think, probably, that accounts for some of these figures being erroneous.

First, I would call to your attention page 23 in Minutes of Proceedings and Evidence No. 1. At about one third of the way down the page, in the second sentence of my testimony appears the following:

The court ordered that Strom could divert 1,500 second feet through the canal plus the requirement for the domestic pumpage.

The word "Strom" should be Chicago, and Chicago in this sense is the Chicago sanitary district. Then in the following sentence the total of the figures 1,500 and 1,700 is given as 13,200; this obviously should be 3,200.

On page 27 of the same proceedings, in the second paragraph from the top page it reads:

The amount of water that flows through the Niagara river that can be utilized by the power companies and the power commissions is settled by the Niagara treaty, which requires that in the winter months 5,000 c.f.s. must go to the falls and during the tourist time, the summer months, 1,000 c.f.s.

This should read:

The amount of water that flows through the Niagara river that can be utilized by the power companies and the power commissions is settled by the Niagara treaty, which requires that in the winter months 50,000 c.f.s. must go through the falls and during tourist time, the summer months, 100,000 c.f.s. must go over the falls.

Thank you, Mr. Chairman.

Mr. Chairman, I proceed to initiate the reading of this presentation. I have been having a little throat trouble, and if this starts to bother me I hope you will permit me to pass the reading on to Mr. Clark, and I will try to save my voice for the answers to some of the questions.

RESPONSIBILITIES OF THE WATER RESOURCES BRANCH

The basic function of the water resources branch is the measurement of surface water supplies and analyses of these data to improve our understanding of water as it occurs in and on the earth. The collection and compilation on

a systematic basis of streamflow and water level data for various rivers and lakes in Canada was commenced more than 50 years ago by the branch. In the great lakes basin the branch, in co-operation with the province of Ontario, maintains 168 streamflow stations on various tributaries draining into the great lakes. Ninety of these stations are equipped with automatic water level recorders, 68 are manual gauges and the flows at 10 stations are determined from hydro power plant records. The locations of these stations are shown on the map in Figure 1. The period of record available for these stations varies from 1 to 50 years and the data are published in the branch's water resources papers. The branch also has the responsibility for streamflow measurement work on the connecting rivers of the great lakes.

Canadian hydrographic service, Department of Mines and Technical Surveys, maintains and operates water level stations on the great lakes and their connecting rivers in Canada. In the United States, the United States lake survey maintains and operates water level gauges on the great lakes and their connecting rivers, whereas United States geological survey maintains and operates the streamflow stations on the streams tributary to the great lakes. The Hydro-Electric Power Commission of Ontario and the Power Authority of the State of New York maintain and operate water level gauges in the International Rapids Section of the St. Lawrence river and on the Niagara river. In that connection all these power entities, under the orders of the International Joint Commission, are required to supply these data. The records are checked by our own branch on this side and by the United States lake survey on the other side of the line.

Co-ordination of Data

Prior to 1953, data pertaining to the hydraulic and hydrologic factors of the great lakes and St. Lawrence river were compiled independently by the responsible government agencies in Canada and the United States with only superficial and informal correlation of some of the data. As a consequence, the data in many instances were developed on different bases and were divergent in many respects.

With the immediate prospect of a start on the power and navigation development of the St. Lawrence river and the international studies initiated as a result of the exceptionally high lake levels in 1951-52, it was realized that continued independent development of the basic data was illogical and that early agreement upon hydraulic and hydrologic factors was of paramount importance. Officials of the pertinent Canadian and United States agencies met in early 1953 and formed the co-ordinating committee on great lakes basic hydraulic and hydrologic data. Representatives of the Departments of Mines and Technical Surveys, Transport and Northern Affairs and National Resources form the Canadian section of this committee. The director of the water resources branch is the chairman of the Canadian section.

The co-ordinating committee has made substantial progress over the past 10 years in arranging for the preparation of basic flow and water level data acceptable to the pertinent agencies in both countries. This committee has been responsible for:

- (a) the institution of the international great lakes datum;
- (b) the computation of outflows from lake Ontario from 1860-1954;
- (c) recommending lake level gauging networks on the great lakes;
- (d) the determination of crustal movement rates.

This committee has undertaken:

- (e) a review of outflows from lake Erie;
- (f) a review and recomputation of outflows from lake Huron;
- (g) a review and recomputation of outflows from lake Superior;
- (h) a determination of areas, shoreline lengths, etc., for each of the great lakes.

International Studies

The branch has been involved in most of the international waterway studies carried out under the direction of the International Joint Commission. Within the past 10 years, this has involved branch membership and substantial participation in the associated studies of the: International Lake Ontario Board of Engineers and the International Niagara Falls Engineering Board. The director of the water resources branch is the Canadian member of the International Lake Superior Board of Control and the Chairman of the International St. Lawrence river board of control and the international Niagara board of control each of which is responsible to the Commission. He is also the Canadian member of the international Niagara committee which is responsible to the governments in connection with the maintenance of the treaty stipulated flows over Niagara falls. In the case of these control boards, the computation and administrative requirements are carried out by branch staff. Many of the hydraulic and hydrologic studies of the great lakes basin are performed at the branch's great lakes-St. Lawrence study office at Cornwall. This office also carries out the responsibilities of the Canadian section, international St. Lawrence river board of control in the project area.

General Hydrologic Studies

In carrying out its function of analyses of basic hydrologic data to improve our understanding of water as it occurs on the earth, the branch conducts detailed hydrologic studies, as availability of staff permits. Such a study of the southern Ontario region is almost completed and similar studies are being carried out for the Ottawa river basin. A comprehensive report on the "Hydrology of Lake Ontario" by F. I. Morton and H. B. Rosenberg, senior hydraulic engineers of the branch was published in the Transactions of the American Society of Civil Engineers, 1960. A similar study for lake Superior has been drafted for publication. The results of these studies provide valuable background in analyzing the various components affecting great lakes variation.

Hydraulics and Hydrology of the Great Lakes System

The great lakes are part of a large river system and react to natural forces in much the same way as the neighbouring rivers. However, the surface areas of the great lakes are so large that water level and discharge variations become out of phase with the forces producing them thereby masking the similarities with other rivers. For an understanding of the water level variations it is essential to understand both the effects of the natural forces and the effects of the surface areas. The principles underlying the effects of the surface areas are the same for all the lakes although the magnitude of the effects are dependent on both drainage area and lake surface area. In this exposition attention will be focused on lake Michigan and lake Huron which together have the greatest influence on the water levels and outflows of the great lakes-St. Lawrence river system.

Description

Lakes Michigan and Huron have an average elevation of 578.8 feet. They are connected by the strait of Mackinac which is so wide and deep that there

is no perceptible difference in the water levels of the two lakes. Therefore, any factor that affects the water levels of one lake affects the water levels of the other. Since lakes Michigan and Huron behave as one lake, they are treated as one lake in hydraulic studies.

The total area draining into lake Michigan-Huron is 220,500 square miles. Of this total, 80,000 square miles are drained by way of lake Superior and the St. Mary's river, 95,100 square miles are drained by small tributaries that flow directly into the lake and 45,400 square miles are the water surface of the lake itself.

Lake Michigan-Huron is drained into lake Erie by the St. Clair river, lake St. Clair and the Detroit river. The rate of flow in this outlet system is dependent primarily on the water levels of lake Michigan-Huron. However, since there is a drop of only 7 to 9 feet in the 84 miles between lake Huron and lake Erie, the water levels of lake Erie also have some effect on the flow.

Causes of Water Level Variations

The variations in water levels due to natural causes may be classified in three ways:

- (1) Transient variations in water levels due to wind and barometric pressure changes. Daily and even hourly fluctuations resulting from unbalance or tilting of the lakes surface caused by winds and differential barometric pressures may cause serious damage when superimposed on a low or a high average lake level. The severity of these depends not only upon the wind velocity and barometric pressure gradient but also upon the orientation and depth of the lake. Such variations are uncontrollable.
- (2) Hydrologic variations in water levels caused by the differences between the inflows and the outflows of the lake. If the inflow exceeds the outflow, the lake level rises and if the outflow exceeds the inflow, the lake level falls. The magnitude of the rise or fall is dependent on the inflow-outflow difference and the size of the lake. With a large lake the rise or fall will be less than with a small lake assuming the same inflow-outflow difference. These hydrologic variations can be subclassified into seasonal variations, which occur every year, and long-term variations. These seasonal and long-term variations are the most important of the water level variations.
- (3) Geologic variations in water levels caused by movement of the earth's crust after being pressed down by the glaciers thousands of years ago. These variations are not noticeable during one generation but the effects can accumulate over the centuries.

Source of Water Supply

The only natural source of water supply to lake Michigan-Huron is the rain and snow that falls on its drainage basin. For the period from 1900-1963, the average rain and snow on the lake Michigan-Huron drainage basin has approximated 30.5 inches of water per year. This does not appear to be very much water but when consideration is given to the large area on which it falls, the figures become astronomical. With one square mile equal to 27.88 million square feet, 30.5 inches on an area of 220,500 square miles is equal to 15.7 million million cubic feet or 98 million million Imperial gallons. With one year equal to 31.54 million seconds, this volume, if undiminished, represents a flow of 500,000 cubic feet per second for one year.

The average monthly precipitation on the drainage basin of lake Michigan-Huron expressed in terms of cubic feet per second for one month is shown on Figure 2.

The water supply to lake Michigan-Huron which becomes available to the lower lakes is computed by adding to the measured discharge of the St. Clair river the amount of water stored on the lake as measured by the change in water level during the period considered. One foot on 45,400 square miles, the combined area of lakes Michigan and Huron, is equivalent to a discharge of 40,000 cubic feet per second for one year (approximately one year's flow of the Ottawa river past the parliament buildings) or 482,000 cubic feet per second for one month. This latter figure is used to convert changes in water levels to cubic feet per second in the computations of the monthly supplies. The average monthly supplies for the years 1900 to 1963 are shown on Figure 2. These figures have been derived from data which have not yet been co-ordinated.

The mean supply to lake Michigan-Huron for the period from 1900 to 1963 was 177,000 cubic feet per second or approximately 11 inches on the drainage basin per year. The difference of 323,000 cubic feet per second or 19.5 inches per year between the water supply and the precipitation is due primarily to evaporation from the surface areas of lakes Superior, Michigan and Huron and to evapotranspiration from soil surfaces and leaf surfaces of trees, grasses and crops in the drainage basin. The difference also includes the diversion into and out of the basin during this period which had an effect of considerably less than one inch per year.

The seasonal variations in the water supplies to lake Michigan-Huron shown in Figure 2 can be explained by:

- (1) The seasonal variations in the precipitation (Figure 2).
- (2) The seasonal variations in the inflow to the lakes from lake Superior (Figure 2).
- (3) The accumulation and occasional melting of snow during the months of December, January and February.
- (4) The melting of the accumulated snow in March and April.
- (5) The seasonal variation in the evapotranspiration from the soil and vegetation in the drainage basin. During the winter months this loss of water is very small, whereas during the summer months it is very high.
- (6) The seasonal variation in the evaporation from the water surfaces of lakes Michigan and Huron. This loss of water has a minimum value during late spring and early summer when the water temperature is much colder than the air temperature and reaches a maximum value in the late fall and early winter when the water temperature is warmer than the air temperature and there is no ice cover to inhibit evaporation.

Outflows

The water supply to lake Michigan-Huron drains naturally into lake Erie by way of the St. Clair river, lake St. Clair and the Detroit river. Since the distance between the two lakes is approximately 84 miles and the difference in water level only 7 to 9 feet, the amount of water flowing in the river system is dependent upon both the water levels of lake Michigan-Huron and the water levels of lake Erie. However, the effect of the water levels of lake Erie on variations in the outflows of lake Michigan-Huron is usually quite small compared to that of the levels of lake Michigan-Huron and can be ignored in all except precise computations. When generalizing about the effects of lake Michigan-Huron and the St. Clair and Detroit rivers on water levels in the great lakes system it is sufficiently accurate to assume that a change of one foot in water levels of lake Michigan-Huron change the outflow by 17,000 cubic feet per second.

Ice formation in the St. Clair and Detroit rivers during the winter months restricts the flows and increases the differences between lake Michigan-Huron and lake Erie water levels. This reduction varies from year to year depending on meteorological conditions.

The monthly distribution of the average outflows from lake Michigan-Huron for the period 1900 to 1963 is shown on Figure 2. The annual average for the period was 177,000 cubic feet per second.

Relationship between Storage Capacity and Discharge Capacity

An understanding of the interrelationship between the storage capacity of lake Michigan-Huron and the discharge capacity of the St. Clair and Detroit rivers is essential to an understanding of the water level and discharge variations. For example, one foot on lake Michigan-Huron contains 482,000 cubic

feet per second for one month or $\frac{482,000}{177,000} = 2.7$ months of average flow in the

St. Clair river. However, one foot on lake Michigan-Huron changes the flow in the St. Clair and Detroit rivers by 17,000 cubic feet per second which is less than 10 per cent of the average flow. Simple arithmetic indicates that the effect of any inflow variation on the water levels and outflows will persist for $\frac{482,000 \text{ cfs months per foot}}{17,000 \text{ cfs per foot}} = 28$ months. Complicated mathematics indicate

that after 28 months only 63 per cent of the effect will have been dissipated. Similarly, it can be shown that if the inflow to the lake is increased continuously by 17,000 cubic feet per second, the water level of the lake will eventually be increased above what it otherwise would have been by one foot. The simple arithmetic indicates that this would take 28 months to accomplish whereas the complicated mathematics indicates that after 28 months the water level of the lake would be only 0.63 foot higher than it otherwise would have been.

Because of the restricted capacity of the St. Clair and Detroit rivers, the outflow from lake Michigan-Huron cannot follow the wide variations in the water supplies to the lake. Whereas between 1900 and 1963 the monthly mean water supplies varied from a maximum of 659,000 cubic feet per second down to a minimum of -126,000 cubic feet per second (the negative sign indicates that the evaporation from the lake exceeded the rainfall on the lake plus the inflow from the St. Mary's river and all tributaries to the lake), the monthly mean outflows have varied from a maximum of 231,000 cubic feet per second to an open water minimum of 142,000 cubic feet per second and winter minimum of 99,000 cubic feet per second. During periods of high supply, the outflows are less than the supplies so that the water levels rise and during periods of low supplies the outflows remain higher than the supplies so that the water levels fall. The difference between the ranges of outflows and water supplies for the period 1900-1963 resulted in a 5.3 foot range in water levels.

The restricted capacity of the St. Clair and Detroit rivers and the storage on lake Michigan-Huron by restricting the range of outflows do much to limit the range in levels of the lakes downstream.

Seasonal Variations in Water Levels

The causes of the seasonal variation in water levels can be illustrated by figure 2, which for lake Michigan-Huron during a 64-year period shows the monthly averages of precipitation on the drainage basin, water supplies,

St. Clair river outflows and St. Mary's river inflows. During the late winter, spring and early summer months the water supplies exceed the outflows and this is reflected in the increase in water levels during these months, whereas during the late summer, fall and early winter months, the outflows exceed the water supplies thus causing the water levels to fall. The differences between the average water supplies and the average outflows during each of the repletion and depletion periods is equal to 482,000 cubic feet per second for one month and this is equivalent to one foot, the average seasonal range of stage.

The seasonal pattern of water supplies to lake Michigan-Huron bears a close resemblance to the seasonal pattern of flows in the neighbouring rivers. The seasonal pattern of water level variations also resembles the seasonal variations of water levels on neighbouring rivers although because of the restricted outlet and large storage capacities it lags by approximately two months.

Long-Term Hydrologic Variations in Water Levels

Although the average seasonal variation in water levels is only one foot, the range of water levels during the years from 1900 to 1963 has been 5.3 feet. The difference between these two figures may reflect in minor degree the difference between average and individual seasonal variations, but the chief causes of the dissimilarity are the long-term variations in water levels. These long-term variations in lake levels are the results which the restricted outlet capacity and the large storage capacity of the lake have in accumulating the effects of persistent excesses or deficiencies in water supply to the lake.

The cause of the long-term variations in water levels can be illustrated by the effects of a persistent reduction in the water supplies to lake Michigan-Huron of one inch per year on the drainage basin. Such a reduction could happen naturally by a decrease in precipitation or an increase in evaporation or evapotranspiration losses. Since 30.5 inches of water on the drainage basin has been shown to be 500,000 cubic feet per second for one year, one inch would equal 16,400 cubic feet per second. A reduction in the supply of this magnitude would eventually reduce the outflow by the same amount so that

16,400 cfs

the eventual decrease in water level would be $\frac{16,400 \text{ cfs}}{17,000 \text{ cfs per foot}} = 0.96$ foot, or 1.0 foot, approximately. However, this decrease would not occur all at once but would accumulate over the years as shown below.

Time in Years	Water Level Reduction in Feet
t	
1	0.35
2	0.58
3	0.72
4	0.82
5	0.88
6	0.92

If the water supplies were increased by one inch per year the increases in the water levels would be the same as the decreases shown on the foregoing tabulations. Increases or decreases of different magnitudes would be proportional.

Figure 3 has been prepared to show the effects of precipitation on long-term variations in water supplies. The solid lower line shows the monthly mean water levels of lake Michigan-Huron for the period from 1956 to date. The dashed lower line shows the average monthly water levels for the period 1900 to 1963 and therefore represents the average seasonal variation of water levels.

It is not shown as a dash line on the chart; it is shown as a solid blue line. Therefore, the differences between the solid and broken line is the long-term variation in water levels.

The upper solid line on Figure 3 is the accumulated deviation of the precipitation on the drainage basin from normal (the average monthly value for the period 1900 to 1963). If the line is rising the precipitation is higher than normal; if the line is horizontal the precipitation is equal to normal; and if the line is falling the precipitation is less than normal. The similarity of this line to the difference between the lower solid and broken lines show how precipitation excesses or deficiencies cause long-term variations in water levels.

Cycles in Water Levels

The seasonal variations of water levels are cyclical since they are due to natural causes that occur almost every year. The long-term variations of water levels also give the appearance of being cyclical since there are many consecutive years of water levels that are either higher than normal or lower than normal. As has been shown in the previous section, this is due to the restricted outlet and large storage capacities which cause the effects of consecutive years of above normal or below normal precipitation to accumulate. An analysis of the precipitation records on the lake Ontario drainage basin since 1870 indicates that there are many consecutive years of above normal or below normal precipitation which can be attributed to chance rather than to any predictable cyclical factors.

Trends in Water Levels

Natural long-term trends in water levels could be caused by:

- (i) A climatic trend to lower or higher precipitation on the drainage basin. An analysis of the rainfall records for the period from 1870 to date provides no evidence for a trend to either higher or lower water levels.
- (ii) A climatic trend to lower or higher evaporation and evapotranspiration losses in the drainage basin. Such trends could be caused by clearing of the land and by increased urbanization. At the present time, there is no conclusive evidence available to show whether or not such trends exist. However, the occurrence of the highest levels since 1900 in 1952 and the lowest levels since 1900 in 1964 would indicate the difficulty in detecting such trends.
- (iii) A climatic trend that would result in increased or decreased ice formation in the St. Clair and Detroit rivers thus changing the discharge capacity of the rivers and the water levels of lake Michigan-Huron.
- (iv) Geologic trends that result from the movement of the earth's crust after being pressed down by the glaciers thousands of years ago. There is evidence to indicate that the movement is proceeding at a faster rate to the north-east than in the south-west and this causes the water levels to decline with respect to the land at any point on the shoreline to the east and north of the St. Clair river and to increase with respect to the land at any point to the west and south of the St. Clair river. For example, it appears as though the water levels around Georgian bay are decreasing with respect to the land at a rate of approximately 3 inches every 100 years. This effect water levels around Chicago are increasing with respect to the land at a rate of approximately 3 inches every 100 years. This effect is cumulative and natural lake level variations would be superimposed upon it.

THE GREAT LAKES

Lake Superior

Lake Superior, with its surface at an average elevation of 600.61 feet above sea level and with a water area of 31,800 square miles, is the uppermost and the largest of the great lakes. The land area naturally tributary to the lake comprises 48,200 square miles, of which 31,685 square miles are in Canada and 16,515 square miles are in the United States. In nature the net supply to this total basin of 80,000 square miles was controlled by and discharged through the St. Mary's river, where in a length of 41 miles and a total fall of 21.8 feet, largely concentrated in the rapids at Sault Ste. Marie, the lake outflow was delivered to lake Huron.

Lake Superior, with a maximum known depth of 1,333 feet is the deepest of the great lakes extending 733 feet below sea level. One foot of depth at its surface area provides storage equal to $5,525 \times 10^9$ Imperial gallons of water or the equivalent of a flow of 337,000 cubic feet per second for one month. In other words, if 5,000 cubic feet per second could be continuously diverted into lake Superior and none of it allowed to spill through the St. Mary's river, it would take over 67 months or $5\frac{1}{2}$ years to raise the lake level one foot. It would take a similar length of time to lower the lake one foot artificially by increasing the outflow by 5,000 cubic feet per second.

The normal seasonal variation of the monthly levels of lake Superior, that is the average change in level within any year, is about one foot. The range of monthly mean levels between the low and the high over the period of recorded levels is 4.1 feet or the equivalent of about $1\frac{1}{2}$ million cubic feet per second for one month. The equivalent range of outflows is from 127,100 cubic feet per second (August 1943) to 40,900 cubic feet per second (September 1955). The annual mean outflow of the lake is 75,000 cubic feet per second or 12.6 inches on the total drainage basin. The difference between this and the average annual precipitation of 29.3 inches (1900-1963) is a measure of the average evaporation and transpiration which takes place within the watershed.

The cities of Superior, Wisconsin, Duluth, Minnesota, Fort William and Port Arthur, Ontario, have developed on these shores, and offer port facilities for the large iron ore and grain shipments from the lakehead. At the outlet end, the twin cities of Sault Ste. Marie border each shore of the St. Mary's river.

Mr. TURNER: Mr. Chairman, the members of the committee would not mind if Mr. Clark relieved Mr. Patterson, if he cared to, at any time.

Mr. R. H. CLARK (*Chief Hydraulics Engineer, Water Resources Branch, Department of Northern Affairs and National Resources*):

The rapids in the river at Sault Ste. Marie which provided the natural control of the outflows and levels of lake Superior presented an obstacle to navigation and as early as 1798 steps were initiated to by-pass the rapids. The navigation facilities constructed prior to 1887 are considered to have had negligible effect upon the natural flow conditions in the river. In 1887 and 1888 an international bridge was constructed across the river at the head of the rapids. The piers and approaches of the bridge had the effect of reducing the natural discharge capacity. Subsequently, there were several changes to the natural control resulting from power developments and navigation improvements some of which reduced the discharge capacity and some of which increased the discharge capacity. The net effect of these works, was to provide a

greater capacity of outflow from lake Superior than existed prior to 1887. With the completion of the compensating works in August 1921, the outflow from lake Superior became completely controlled.

In May 1914, the International Joint Commission issued two orders of approval for the obstruction, diversion and use of the waters of the St. Mary's river in connection with power developments on both sides of the international boundary. The works approved included a gated dam, known as the compensating works, across the river at the head of the rapids, as well as the power diversion facilities. The location of these works are shown on figure 4. The orders of approval specified that the control and operation of the compensating works would be under supervision of the international lake Superior board of control created for that purpose. The duties of this board of control are to formulate rules under which the compensating works and power canals and their head gates and by-passes shall be operated so that the level of lake Superior shall be regulated between elevation 600.3 and elevation 601.8, as nearly as may be, and in such a manner as not to interfere with navigation. Since completion of the compensating works in August 1921, the outflow from lake Superior has been completely controlled under the direction of that board. A comparison of the hydrographs of recorded lake levels and computed levels for natural outlet conditions is shown in figure 5.

For the period 1888-1921, a comparison of recorded outflows from lake Superior with outflows computed for natural conditions of the outlet indicates that, on the average, the actual outflow was slightly less than the natural. The comparison indicates that the actual outflow was less than natural during 20 years of the 34-year period and greater than natural during 14 years. The maximum differences from natural, plus and minus, were somewhat smaller than have occurred since the outflows were completely regulated, and had smaller effects on the levels of the lower lakes than those due to the regulation of lake Superior.

As previously noted, lake Superior has been completely regulated since August 1921. Under regulation, the outflow from lake Superior has frequently been increased above and decreased below what the natural flow would have been. The maximum increase in discharge from lake Superior over natural conditions was 25,000 cubic feet per second in October 1925 and the maximum decrease in discharge below natural flows was 32,000 cubic feet per second in February 1929.

The equalizing effect of the large area and storage capacity of lake Michigan-Huron has absorbed the rapid fluctuations of discharge from lake Superior and has distributed the effect of each of these changes over longer periods of time. The result has been that the flow from lake Huron is either above or below the discharge that would have occurred if lake Superior had not been regulated, for several years in succession but with the maximum variations materially reduced. Thus, the maximum increase in discharge from lake Huron over the natural discharge was 8,400 cubic feet per second in June 1926, corresponding to a rise of 0.5 foot, and the maximum decrease in discharge below natural was 5,500 cubic feet per second, or a lowering of 0.3 foot, in January 1932. The storage capacity of lake Erie reduced these effects still more so that the maximum increase in flow from that lake due to lake Superior regulation was 7,100 cubic feet per second (0.3 foot) in September 1926 and the maximum decrease was 5,200 cubic feet per second (0.2 foot) in March 1932. The additional storage effect on lake Ontario modified these values so that lake Superior regulation resulted in a maximum increase in St. Lawrence river flows of 6,400 cubic feet per second (0.3 foot) in December 1926 and maximum decrease of 5,000 cubic feet per second (0.2 foot) on lake Ontario in June 1932.

Lake Huron and Lake Michigan

Lakes Huron and Michigan, with surface areas of 23,000 square miles and 22,400 square miles, respectively, are in effect one lake. They stand virtually at the same level, an average elevation of 578.8 (at Goderich, Ontario), since they are connected by the broad and deep straits of Mackinac through which there is no perceptible flow. The land area tributary to these lakes totals 95,100 square miles, of which 49,600 is tributary to lake Huron and 45,500 is tributary to lake Michigan. Lake Michigan and its tributary drainage lie wholly within the United States, in addition to about 16,000 square miles of the land area tributary to lake Huron.

The bottom of the deepest parts of these lakes also falls below sea level. In lake Michigan where the maximum recorded depth is 923 feet, the bottom is some 343 feet below sea level, and in lake Huron where the maximum recorded depth is 750 feet, it is some 170 feet below sea level. The storage in one foot of water over the combined lake surface of 45,400 square miles would provide 482,000 cubic feet per second for one month or 3,200 cubic feet per second for 12½ years.

There is a range of 6.5 feet between the highest and lowest monthly mean level of lake Michigan-Huron, equivalent to 3.1 million cubic feet per second for one month, although the seasonal variation of monthly mean levels is only about one foot. The mean outflow during the period of record is 189,000 cubic feet per second. This is equivalent to a yield of 11.6 inches on the total drainage area, including that of lake Superior. The corresponding average precipitation is about 30.5 inches.

A number of cities have developed large port facilities on these lakes. At the outlet of lake Huron, the cities of Port Huron, Michigan and Sarnia, Ontario, border each shore of the St. Clair river.

The outflow from lake Huron moves through the St. Clair river, lake St. Clair and the Detroit river into lake Erie, a distance of about 84 miles in which the fall is about 8 feet.

The St. Clair river has a total length of about 40 miles and flows through a sand and gravel bed with no stable control section. Since the total fall, or difference in water levels between lake Huron and lake St. Clair is only about five feet, the discharge of the river and, consequently the levels of lake Huron are affected by variations in the levels of lake St. Clair. During the winter, the flow is retarded by severe ice jams that build upstream from lake St. Clair. This lake has an area of about 430 square miles. It is very shallow with a maximum depth of approximately 30 feet. Because of its relatively small size it may be considered as a widening of the St. Clair river.

The Detroit river is 28 miles in length. Its upstream section is relatively deep but the downstream section is wide and shallow. Since the total fall in the river is less than 3 feet, most of which occurs in the downstream section, the water level of lake Erie affects the discharge of the Detroit river and, consequently, the levels of lake St. Clair, the St. Clair river and lake Huron.

Dredging has been carried out in the St. Clair-Detroit river system, especially at the head of the St. Clair river where it leaves lake Huron. Much of the dredging was in earth clay and boulders but long sections of channel were constructed through ledge rock in the lower Detroit river. The larger part of the dredging was for the improvement of navigation. There was, however, a large amount of material taken from the St. Clair river near Point Edward between 1904 and 1928 for the sand and gravel supply of private contractors. Much of the material dredged from the Detroit river for navigation purposes was replaced in the river in a different location to compensate partially for the effects on water levels of its removal from the original location.

The effects of channel changes in the St. Clair and Detroit rivers have been studied by a number of different agencies and individuals such as the board of engineers on deep waterways in 1900 and the joint board of engineers on the St. Lawrence waterway project in 1926. The results reported by these different authorities vary widely which is not surprising when the complicated hydraulics of the St. Clair and Detroit rivers and the paucity of adequate data, particularly prior to the year 1899, are taken into account. However, an inter-departmental committee, which was set up in 1961 to study the U.S. proposals for compensating sills concluded that the net lowering of the water levels of lake Huron due to all dredging operations is between one foot and one and one-half feet, of which between 0.3 and 0.4 foot has resulted from the dredging for navigation since 1933. These operations caused slight temporary variations in the supply of lakes Erie and Ontario but, once a change was made, conditions gradually stabilized and the ultimate effects downstream were insignificant.

Lake Erie

Lake Erie is the shallowest of all the great lakes and considerably smaller than lakes Superior, Huron and Michigan. It has an area of 9,910 square miles and local tributary land area draining into the lake of 30,000 square miles (which includes lake St. Clair and its local drainage area). About 8,800 square miles of the local tributary land area lie in Canada.

The lake averages about 90 feet in depth with a maximum depth of about 210 feet so that, since its surface is at an average elevation of 570.7, its bottom is considerably above sea level. There is a range of 5.4 feet between the highest and lowest mean monthly level of lake Erie. Each foot of this range is equivalent to a flow of 105,000 cubic feet per second for one month. The monthly mean outflow has ranged from a maximum of 251,000 cubic feet per second to a minimum of 117,000 cubic feet per second. The annual mean outflow from the lake is 205,000 cubic feet per second, of which 16,000 is contributed by the local drainage area. The outflow of 205,000 cubic feet per second is equivalent to 10.6 inches on the whole of the great lakes basin above the Niagara river. A comparison of this figure with that of 31.0 inches, the average precipitation over the same drainage area, indicates the evapotranspiration losses.

Although the long-term range of monthly levels is 5.4 feet, and the normal seasonal variation is about 1.2 feet, the effect of winds and barometric changes described in the preceding section can cause great fluctuations owing to the orientation and relative shallowness of this lake. For example, in March 1964, the water level at the Fort Erie gauge varied from a peak elevation of 575.10 on 5 March to a low of 565.00 on 10 March, or 9.5 feet.

The shore of Lake Erie varies from sparsely populated agricultural and undeveloped areas to the more developed sections in and adjacent to such centres as Detroit, Cleveland, Buffalo, Windsor, St. Thomas and Port Colbourne.

The natural outlet for the discharge from lake Erie is through the Niagara river into lake Ontario, about 326 feet lower than the level of lake Erie. Approximately 310 feet of the difference in elevation between lakes Erie and Ontario occurs in the reach of the Niagara river extending from the head of the Cascades upstream from Niagara Falls to the lower end of the Whirlpool rapids, 6½ miles downstream of the falls, with about one-half of the difference in a sheer drop at the falls. Water from lake Erie also reaches lake Ontario by way of the Welland canal and DeCew falls power plant tail-race and the New York state barge canal. These diversions average about 7,000 cubic feet per second and 700 cubic feet per second respectively, and lower the levels of lake Erie by about 0.37 foot.

The unusually uniform flow in the Niagara river, resulting from the vast storage capacity of the upper great lakes, coupled with the concentration of falls at Niagara have created an unusual scenic spectacle and a hydroelectric power source of great value to both countries.

In the Boundary Waters Treaty of 11 January 1909, the two countries agreed to permit diversion of up to 56,000 cubic feet per second of the Niagara river flow for power purposes. An international board of control was constituted to supervise this diversion and this board later formed the nucleus of a "special international Niagara board" to investigate means of preserving the scenic beauty of Niagara Falls. This latter board recommended redistribution of the available flows along the crest of the Horseshoe falls and to the American falls, to be followed by a program of test diversions. However, the economic conditions of the thirties prevented adoption of the recommendations at that time.

With the urgent need for power associated with world war II, the governments of Canada and the United States concluded agreements in 1940 and 1941 to utilize on a temporary basis an additional 26,500 cubic feet per second of Niagara flow for power purposes. Pursuant to these arguments a part of the remedial measures recommended by the special international Niagara board was accomplished by construction of a submerged weir in the Niagara river about one mile above the Horseshoe falls during the period 1942 to 1947. The weir substantially compensated for the lowering effect of the power diversions on the Chippawa-Grass island pool and greatly increased the flow over the American falls; but it did not improve the conditions on the flanks of the Horseshoe falls.

In 1944 and 1948 the earlier agreements were modified to provide for small additional temporary diversions and discussions, which led to the treaty of 27 February 1950, were commenced. By means of this treaty the two governments put into effect a revised permanent schedule of permissible power diversions under which the flow over the falls may be reduced to not less than 100,000 cubic feet per second during the daylight hours of the tourist season and to not less than 50,000 cubic feet per second at any other time.

In accordance with Article II of the 1950 treaty and the reference of 10 October 1950, by the governments of Canada and the United States to the International Joint Commission, the remedial measures recommended by the commission were accomplished by construction of the Chippawa-Grass island pool control structure (immediately downstream of the submerged weir which was later removed) and excavations in the Horseshoe cascades to provide a more uniform distribution of the flow over the falls. The locations of these works are shown on Figure 6.

The remedial works were completed in July 1957 and met the required objectives. However, the abandonment of the Schoellkopf plant on the United States side of the river and the reallocation of its water to the new plant being constructed by the power authority of the state of New York made it desirable to lengthen the control structure to hold the level of the Chippawa-Grass island pool at the levels prescribed by the board of control under all conditions. Five additional sluiceways, bringing the total number of sluiceways to 18, were completed in 1963. This control structure now extends from the Canadian shore to Tower island, just across the international boundary. The total installed capacity of the hydroelectric plans using the flow and head of the Niagara river is 3.19 million hp for the Canadian plants and 2.93 million hp for the United States plants.

With regard to the use of the water diverted by Canada into lake Superior, it is pertinent to note that article III of the Niagara treaty of 1950 states "Waters which are being diverted into the natural drainage of the great lakes systems through the existing Long Lac-Ogoki works shall continue to be governed by the notes exchanged between the Government of the United States of America and the Government of Canada at Washington on October 14 and 31 and November 7, 1940, and shall not be included in the waters allocated under provisions of this Treaty". The waters, other than these diversions and those required by treaty over the falls, are allocated equally between the two countries. A description of these diversions is given in a subsequent section.

Mr. PATTERSON:

Lake Ontario

Lake Ontario, the lowest in the great lakes chain, is also the smallest. Its surface of 7,550 square miles stands at an average elevation of 244.8 feet above mean sea level. Like the three upper lakes, lake Ontario is characterized by great depth. The deepest spot is 778 feet below the surface, placing the bottom 534 feet below sea level. The drainage area immediately tributary to lake Ontario is 34,800 square miles, of which 16,000 square miles lie in Canada.

The shoreline of the lake is about 590 miles in length, of which 334 miles are in Canada. The shore varies from sparsely populated agricultural and woodland areas to the more developed sections in and adjacent to localities such as Rochester and Oswego, New York, and Toronto, Hamilton and Cobourg, Ontario.

Prior to the regulation of lake Ontario provided by the construction of the St. Lawrence power project near Cornwall, the long-term range between the maximum and minimum monthly mean lake levels was 6.6 feet, each foot of which would sustain a flow of 80,000 cubic feet per second for one month. The normal seasonal variation was 1.5 feet.

The St. Lawrence river is the natural outlet for the 295,200 square mile drainage basin. Its flow is remarkably steady because of the natural regulatory influence of the great lakes. The mean flow of the St. Lawrence river at the outlet from lake Ontario is 241,000 cubic feet per second and has ranged from a maximum of 314,000 cubic feet per second in May 1870 to a minimum of 154,000 cubic feet per second in February 1936. The mean outflow of 241,000 cubic feet per second is equivalent to 11.1 inches on the drainage basin above the outlet of lake Ontario. A comparison of this figure with that of 31.2 inches, the average precipitation over the same drainage area indicates the evapotranspiration losses.

The natural hydraulic control of the levels of lake Ontario was formed by the Galop rapids, about five miles downstream from Prescott, Ontario. Since 1846 when the first Galop canal was built in order to by-pass the rapids, several navigation improvements were made in the Galop rapids reach of the river which have affected the levels of lake Ontario. These improvements which were carried out by the government of Canada during the period 1880-1909 included the reconstruction of the original Galop canal, the dredging of a navigation canal in the Canadian Galop rapids, the construction of the North channel improvement and the closure of the Gut channel by the structure known as Gut dam. In January 1953, Gut dam was removed. With the construction of the St. Lawrence seaway and power project, the control of lake Ontario since July 1958 has been provided by the power works at Cornwall, with alternative control provided at the Iroquois Dam, 27 miles upstream.

These works are regulated in accordance with the orders of approval of 29 October 1952 and 6 July 1956. The range of lake Ontario levels approved for regulation is from a minimum monthly mean elevation of 242.77 feet during the navigation season to a maximum monthly mean elevation of 246.77 feet as nearly as may be. Since the commencement of regulation under an approved plan in April 1960 the range of monthly mean water levels (navigation season only) to October 1964 has been 3.16 feet. The maximum and monthly mean flows under the currently approved regulation plan 1958-D are 310,000 cubic feet per second and 188,000 cubic feet per second respectively. In its report of 5 April 1961 to the governments on this matter, the international joint commission stated:

"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, . . . will provide conditions which, for all affected interests in both countries, will be as good 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."

St. Lawrence river (National Reach)

Lake St. Francis, at the upper end of the national reach, is actually a widening of the St. Lawrence river, having a surface area of about 100 square miles. With the exception of a small area at the upstream end, this lake lies within Canada. At the lower end of the lake are the Beauharnois and Cedars powerhouses, having a combined capacity of 2.4 million hp, and the St. Lawrence seaway locks which by-pass the power plants.

Lake St. Francis discharges into lake St. Louis which has a surface area of 56 square miles and in addition to the flow of St. Lawrence river, receives a portion of the runoff of the Ottawa river. The percentage of the total Ottawa river flow discharged into lake St. Louis varies from about 50 per cent under high flow conditions to about 20 per cent under low flow conditions. The remainder of the flow is carried to the north of Montreal island through the *rivière des Mille-Îles* and *rivière des Prairies* to be emptied into the St. Lawrence river downstream from Montreal harbour. This flow also affects Montreal harbour indirectly. While there is a great amount of storage in the Ottawa river basin, over 11 million acre-feet, the flows are not nearly as uniform as those of the St. Lawrence river and, therefore are an important consideration in the fluctuations of the water levels of lake St. Louis and downstream.

A comprehensive report "Hydrological Investigations of the Ottawa River Basin" with three appendices was prepared by the branch in 1962 to summarize existing hydrologic information in the basin and to present the results of preliminary flow forecasting studies carried out by the Branch.

There is a fall in the river of about 47 feet from lake St. Louis to Montreal harbour, through the Lachine rapids, so that a considerable amount of hydroelectric power potential still exists in this reach of the river. The St. Lawrence seaway canal and locks by-pass the rapids. An ice control structure is being built in the lower part of this section in conjunction with the construction of the world's fair site.

Water levels in Montreal harbour during the navigation season vary with the flows of the St. Lawrence and Ottawa rivers and are affected to some extent by winds and tides. Downstream from Montreal harbour to below Quebec City, tidal effects increase with distance.

The interests concerned with water levels and flows in the national section include domestic water supply, navigation, recreation, hydroelectric power, fish and wildlife and industrial water supply. Deficiencies or surpluses in the water supplies to the great lakes can cause considerable variation in the flows and levels of the St. Lawrence river, and may result in harmful effects to one or more of these interests. Recognizing the importance of the water resources of the Ottawa river, particularly the effects of its fluctuations in flow, the governments of Ontario, Quebec and Canada agreed in 1962 to establish the Ottawa river engineering board to carry out an investigation of the Ottawa river basin and of the existing regulation of its waters to establish procedures whereby accurate and timely data could be made available to the users of such data on the Ottawa river and also on the St. Lawrence river to the degree applicable. The board is also asked to consider the present regulation of the Ottawa river and whether improvements in regulation are possible, taking into account the various uses of water. The chairman of the board is the director of the water resources branch and Ontario and Quebec are each represented by a member. The Board has been asked to submit its report by 31 December 1964.

Diversions

Superimposed upon the natural variations of the water levels of the lakes and upon the effects of alterations in the control of the outlet channels, are the effects of diversions into and out of the great lakes basin.

Diversions out of lake Michigan, which reduce the water supply to that lake and lakes Huron, Erie and Ontario and the St. Lawrence river commenced prior to the period of lake level record in 1860. Diversions into lake Superior, which increase the water supply to the downstream lakes and the St. Lawrence river commenced in 1939 and 1943. Since these diversions into and out of the great lakes basin have not been constant during the periods of their existence, they have had a variable effect on the supplies to the great lakes and thus on the lake levels and outflows. The full effect of a diversion is not attained immediately but builds up progressively over a period of time related to the storage and outlet capacities of the lake or lakes involved. For example, the full effect on lake Ontario of a continuous diversion from lake Michigan-Huron is not realized until about 15 years from the commencement of the diversion.

There have been four diversions of water into or out of the great lakes basin which have affected the water levels of some or all the great lakes. These diversions are: the Illinois and Michigan canal, the Chicago sanitary and ship canal, the Long lake project and the Ogoki project. The first two named have been diversions out of the basin and the last two, diversions into the basin. The locations of these diversions are shown on figure 7.

The Illinois and Michigan canal extended 97 miles from the south branch of the Chicago river at Chicago, southwesterly to La Salle, Illinois, where it entered the Illinois river. Construction of the canal began in 1836 and was completed in 1848. The canal was fed in part by water pumped from the Chicago river and in part by water diverted from the Calumet river through a feeder canal in addition to water supplied from the Mississippi river drainage basin. The water pumped from the Chicago river was intended initially to help obtain navigable depths in the canal but later, after it had been noted that the polluted Chicago river was perceptibly cleaner due to the diversion, additional quantities beyond the navigation needs were diverted in the latter interest. After construction of the Chicago sanitary and ship canal in 1900, the Illinois and Michigan canal fell into disuse and was abandoned in 1910. The average annual diversion into the canal increased until between the years

1871 to 1883 it was about 300 cubic feet per second. From 1883 until it was abandoned in 1910 the average annual diversion varied between 500 and 1,000 cubic feet per second.

The Chicago sanitary and ship canal between the Chicago river and the Des Plaines river forms a portion of the Illinois waterway connecting lake Michigan and the Mississippi river. Construction of the Chicago sanitary and ship canal began in 1892 and the canal was first opened for the diversion of water in January 1900. The flow of water in the canal is controlled by a dam and gates at Lockport, Illinois. From the time of its completion, the diversion of water from lake Michigan was increased progressively until a maximum annual average of about 10,000 cubic feet per second was reached in 1928 and was then decreased progressively from 1929 through 1938. The annual average diversion from lake Michigan through the Chicago sanitary and ship canal is now limited, by the decree of the United States Supreme Court issued on 21 April 1930, to 1,500 cubic feet per second in addition to domestic pumpage. The annual average diversion rate of 1,500 cubic feet per second, specified for the period since 31 December 1938, has not been exceeded except during five years, 1940, 1942, 1944, 1956 and 1957, when the average rates were, respectively, 1,681, 1,528, 1,531, 1,699 and 2,387 cubic feet per second. In 1940, the United States Supreme Court authorized an additional diversion for ten days in the interest of pollution abatement. In 1942 and 1944, additional amounts were diverted as war emergency measures in the interest of navigation. From 17 December 1956 to 28 February 1957, additional amounts were permitted by the United States Supreme Court to alleviate an emergency in navigation caused by low water in the Mississippi river. When the above increased diversions are considered, total diversions, including domestic pumpage, average about 3,200 cubic feet per second since 1938. Part of the Chicago diversion is used for generation of electric power at Lockport and Marseilles, Illinois.

Diversions into lake Superior from the Hudson Bay watershed via the Long Lake project and the Ogoki project began in 1939 and 1943 respectively. Water diverted from the Ogoki river, which has averaged about 3,700 cubic feet per second, is retained in lake Nipigon until required for generation of power at hydroelectric plants on the Nipigon river. The water diverted from Long Lake, averaging about 1,300 cubic feet per second, is used at a power development on the Aguasabon river. The sum of these diversions has averaged about 5,000 cubic feet per second during the period since 1945. During June and July 1952, when the levels of all the lakes were very high, the Ogoki diversion was stopped. The effect of this action was not, of course, felt on the lower lakes for many months, or until the levels of these lakes had begun to recede.

In computing the effect of these diversions on the lower lakes, it has been assumed that they were made directly into lake Michigan-Huron. The Ogoki river diversion is into lake Nipigon, the outlet of which is controlled. Water from this lake, including the diversion from the Ogoki river is discharged into the Nipigon river, which flows into lake Superior to meet the requirements of the Nipigon river power development. The extent to which the diverted water is stored temporarily in lake Nipigon or passed directly through the lake into the Nipigon river cannot be readily determined. The water diverted at Long Lake flows through a series of small lakes and channels directly into the Aguasabon river, tributary of lake Superior. Thus, the Ogoki and Long Lake diversion quantities are affected to some extent by storage before reaching lake Superior. Also, the limits of regulation of lake Superior are unaffected by the diversions since the rule curve for regulation of the lake was altered to pass the increased supplies.

The effects of the Ogoki-Long lake and Chicago diversions on lake Ontario water levels were studied in detail by the international Lake Ontario board of engineers and presented in the report dated 15 March 1956 "Effect of Diversions on lake Ontario water levels" to the International Joint Commission.

The report on diversions presents the effects of the recorded diversions into and out of the great lakes basin on the water levels and outflows of lake Ontario. The maximum lowering of lake Ontario levels due to the diversions was reached during the period from 1930 to 1935 when lake Ontario levels on the average were about 0.43 foot lower than they would have been without the diversions. In November 1934, when the minimum monthly mean level of record was reached on lake Ontario, the effect of diversions of lake Michigan was to lower the level of lake Ontario by about 0.42 foot. There was no rise in lake Ontario levels prior to 1947 due to the net diversion quantity. In that year the raising effect on lake Ontario levels of the Ogoki and Long lake project diversions into lake Superior about equalled the lowering effect of the Chicago sanitary and ship canal diversion out of lake Michigan. In June 1952 when the maximum monthly mean level of record was reached on lake Ontario, the level was 0.06 foot higher than it would have been without the diversions. The ultimate effect on lake Ontario water levels, at an average elevation of about 246.0 feet, of the three existing diversions is a rise of about 0.09 foot under outlet conditions existing prior to construction of the St. Lawrence seaway and power projects.

The maximum effect of the Illinois and Michigan canal diversion was reached during the period 1888 to 1892 and resulted in about 0.04 foot lowering of lake Ontario levels. The Chicago sanitary ship canal maximum diversion effect produced a maximum lowering on lake Ontario levels of about 0.43 foot in the period 1930 to 1935. During that period the effect of the Illinois and Michigan canal diversion had become zero and the Ogoki and Long lake project diversions had not commenced. The maximum effect of the Ogoki and Long lake project diversions to the end of 1964 was reached in 1951 and caused a rise in lake Ontario water levels at medium stages of about 0.22 foot.

The change in lake levels resulting from a given constant diversion will reach a certain ultimate value, because such a diversion ultimately changes the rate of net total supply to each of the lakes by the magnitude of the constant diversion and the lake level adjusts by the exact amount required to discharge the change in supply through the lake's outlet channel. Although the effects of the recorded diversions on the levels of lakes Michigan, Huron and Erie have not been computed month by month over the period of record, the ultimate effects of these diversions, assuming that their values have been reasonably constant for about 15 years, can be readily computed. The net diversion into the great lakes basin is 1,800 cubic feet per second, being made up of 5,000 cubic feet per second into and 3,200 cubic feet per second out of the basin. This net diversion would ultimately raise the level of lake Michigan-Huron by 0.11 foot and the level of lake Erie by 0.09 foot. Viewed in another way, the net diversion into the basin is roughly equivalent to an additional one-tenth of an inch of water annually on the lake Michigan-Huron drainage basin.

Over the past half-century, there have been a number of proposals for increasing the water supply to the great lakes by diverting water into the basin. Some of these have involved the diversion of waters naturally flowing into James Bay, while others have contemplated the diversion from the upper Mississippi basin into lake Superior or via Fox river into lake Michigan. Diversions from the Albany river of the James bay drainage have been studied quite extensively by Ontario Hydro for power purposes and the only changes

that have resulted from these investigations are the Ogoki and Long lake diversions into lake Superior and the Root river diversion into the Winnipeg river basin. A more recent proposal suggests the possibility of diverting the Harricanaw river, a Quebec resource, through Ontario to the great lakes.

Diversions into or out of the great lakes system cannot be controlled to provide effective relief from the adverse effects of *both* high and low water levels. This is due to the large surface area of the lakes and the restricted capacities of the St. Clair, Detroit and Niagara rivers. If diversions into the system were increased and diversions out of the system were decreased during a period of low levels, the full effect of the changes as reflected in increased water levels would not be felt for many years. It is quite possible, therefore, that the increases in water levels would not be completely effective until such time as the water levels were high once more so that the action taken to improve low water levels would contribute to flooding. Conversely, decreases in incoming diversions and increases in outgoing diversions during periods of high water levels would do little to reduce flooding but could contribute to lower water levels several years later.

If consideration is given to facilities for the control of the outflows from lake Michigan-Huron, consideration would also have to be given to: (a) an enlarged outlet for lake Huron (extending through to lake Erie); (b) navigation locks to by-pass the control works; (c) control facilities for the outflow of lake Erie; (d) an enlarged outlet for lake Erie; (e) control facilities for the outflow from lake St. Louis; (f) an enlarged outlet for lake St. Louis; and (g) extensive dredging in all seaway navigation channels. Such facilities could only be achieved at tremendous cost but would be essential to prevent the damage to downstream interests that could result from a regulated outflow regime from lake Michigan-Huron.

Since diversions into the great lakes will affect both high and low lake levels, they cannot in themselves be utilized to raise low water levels. Effective relief from the adverse effects of both high and low water levels by controlling rates of diversion is impractical. Regulation of the great lakes might provide the solution which could be adapted to any diversions contemplated. The capital costs of the control structures and channel enlargements required for this form of solution would be very great.

The CHAIRMAN: Thank you very much, Mr. Patterson. This has been quite a session.

Mr. TURNER: Mr. Chairman, I wonder what the committee feels it would like to do? There are members of the committee who were not able to be here today and before further questioning of Mr. Patterson, Mr. Clark and Mr. Morrow takes place would it be a good idea for the other members of the committee to have this documents circulated to them?

The CHAIRMAN: I think they have it.

Mr. LONEY: Yes, we received it some time ago.

Mr. TURNER: Are you referring to the blue document?

Mr. LONEY: Yes.

Mr. ROCK: Mr. Chairman, I think we should reconvene at 8 o'clock.

Mr. TURNER: But, if there were not sufficient members present this evening we would not be able to question the witnesses.

The CHAIRMAN: In any event, it is six o'clock and I think we should adjourn this session of the meeting. We have a meeting called for 8 o'clock this evening and we will make any necessary decisions at that time.

Was it your intention, Mr. Turner, to relieve Mr. Patterson from returning tonight?

Mr. TURNER: That was my intention, Mr. Chairman, unless we were assured of some possibility of getting a quorum. I was thinking of the three witnesses.

The CHAIRMAN: I will make arrangements to reach Mr. Patterson at 8 o'clock.

Mr. PATTERSON: We contemplated being available for you this evening, if you wish.

Mr. LONEY: I think we should meet.

The CHAIRMAN: Yes. All the members have received a notice to meet at 8 o'clock tonight.

Mr. ROCK: And, Mr. Patterson and the other gentlemen will be back at 8 o'clock then?

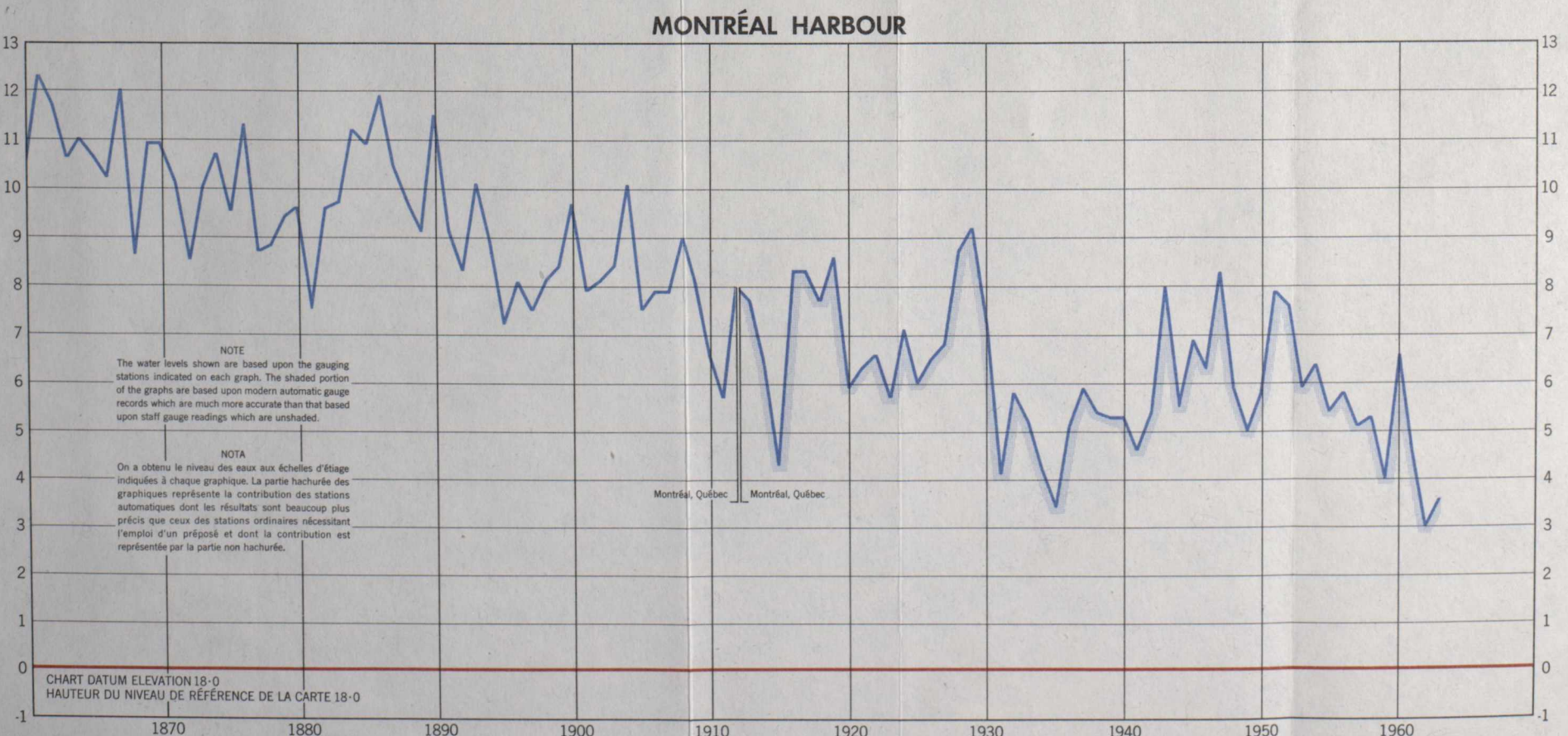
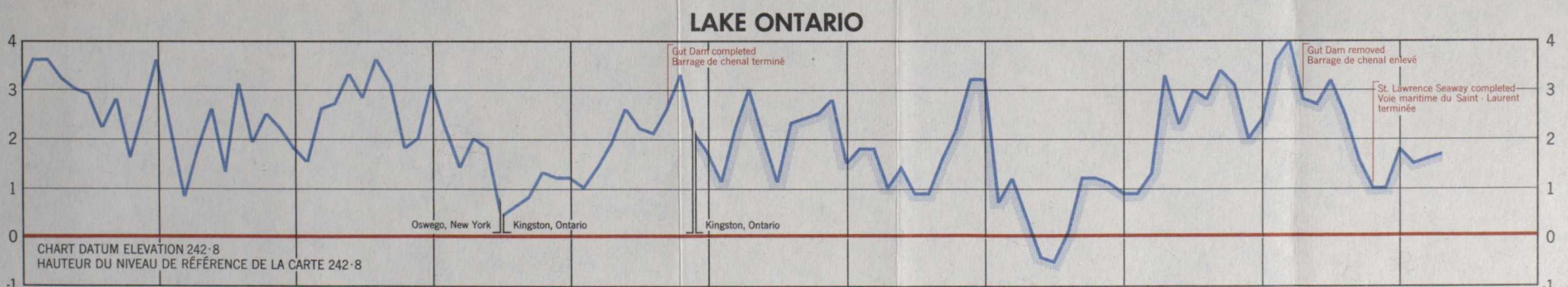
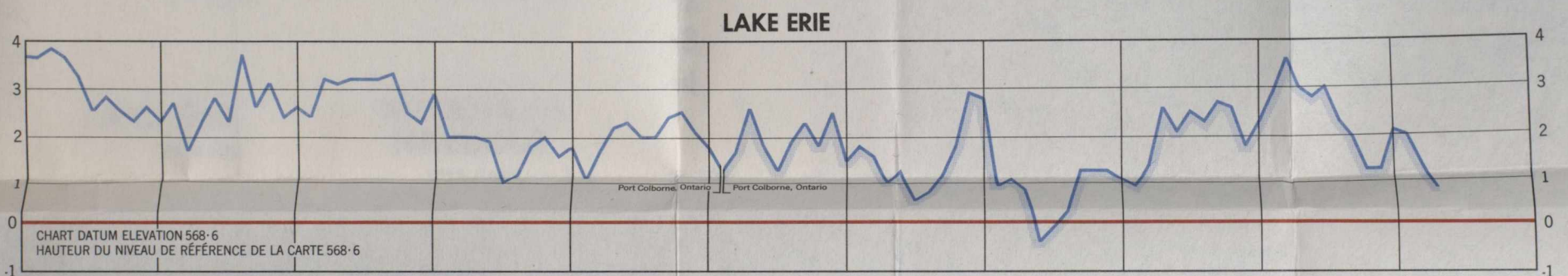
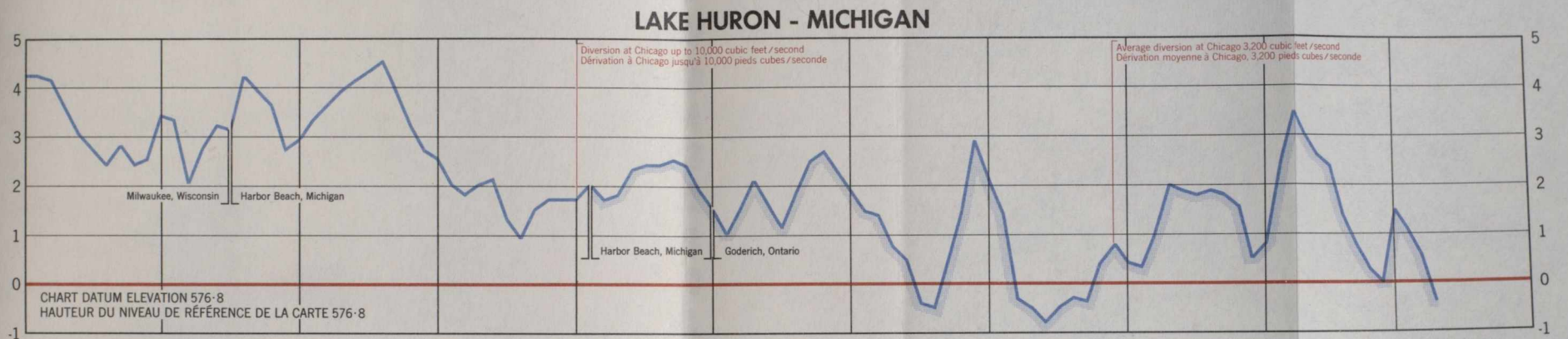
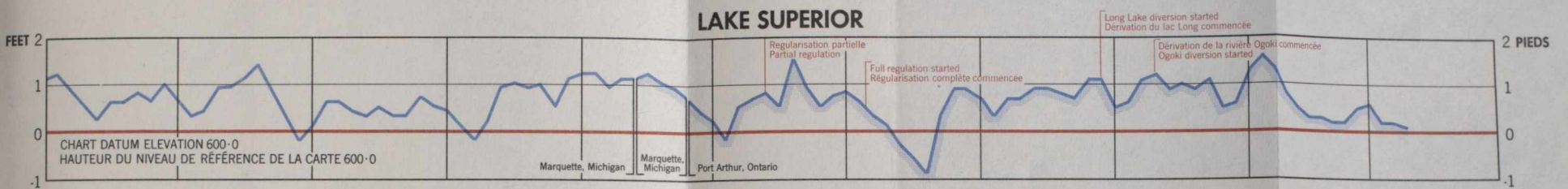
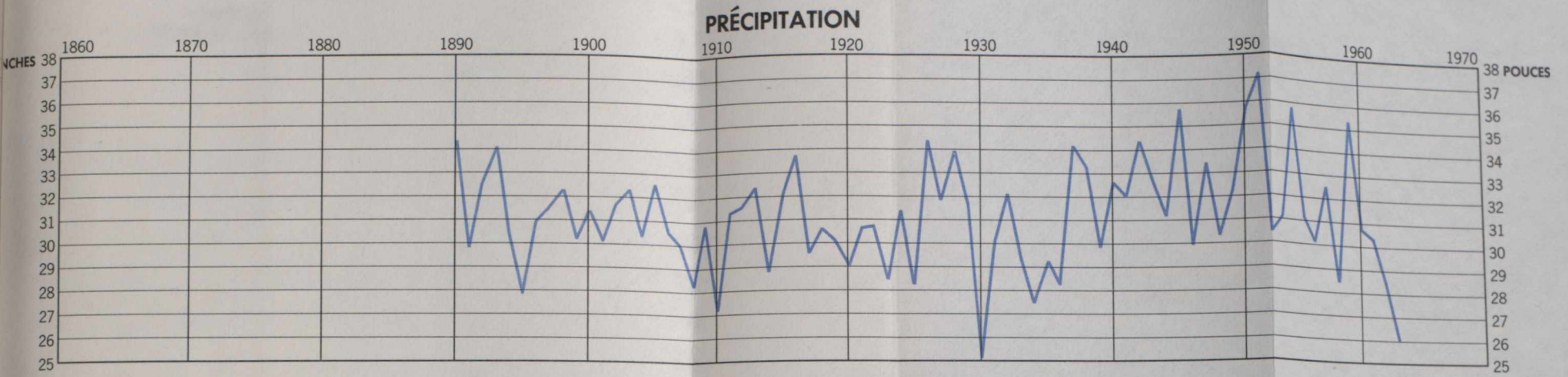
The CHAIRMAN: Yes.



GREAT LAKES WATER LEVELS

NIVEAU DE L'EAU DES GRANDS LACS

ANNUAL MEANS - MOYENNES ANNUELLES



Heights are in feet referred to Chart Datum
Les hauteurs sont en pieds calculés d'après le zéro de la carte

PREPARED BY THE CANADIAN HYDROGRAPHIC SERVICE
MARINE SCIENCES BRANCH
DEPARTMENT OF MINES AND TECHNICAL SURVEYS, OTTAWA

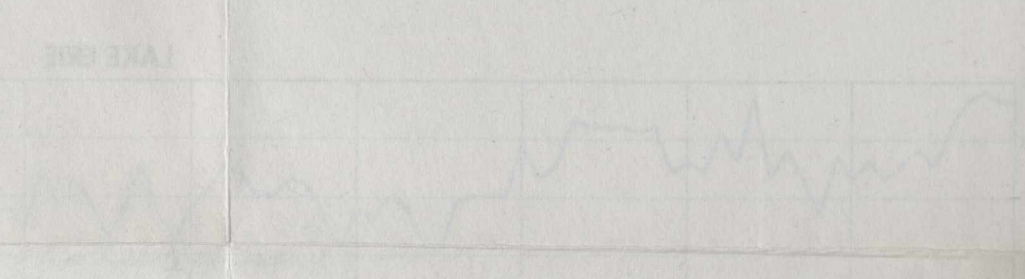
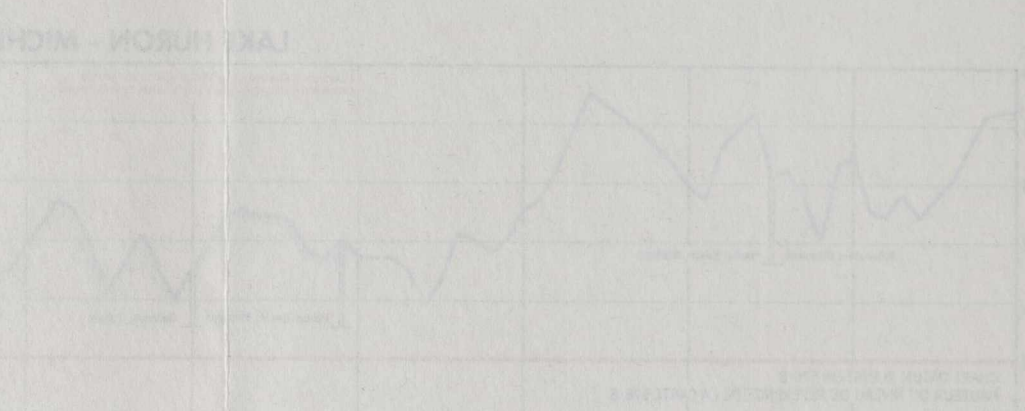
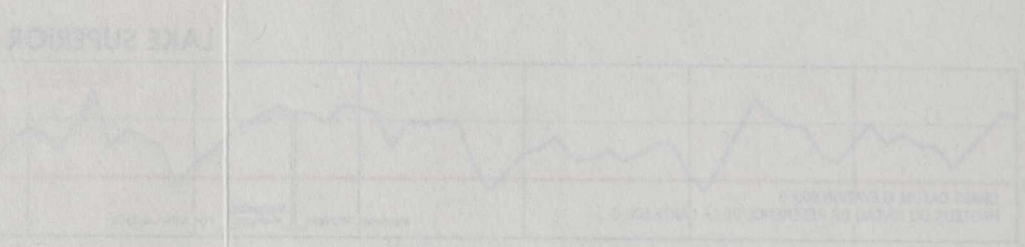
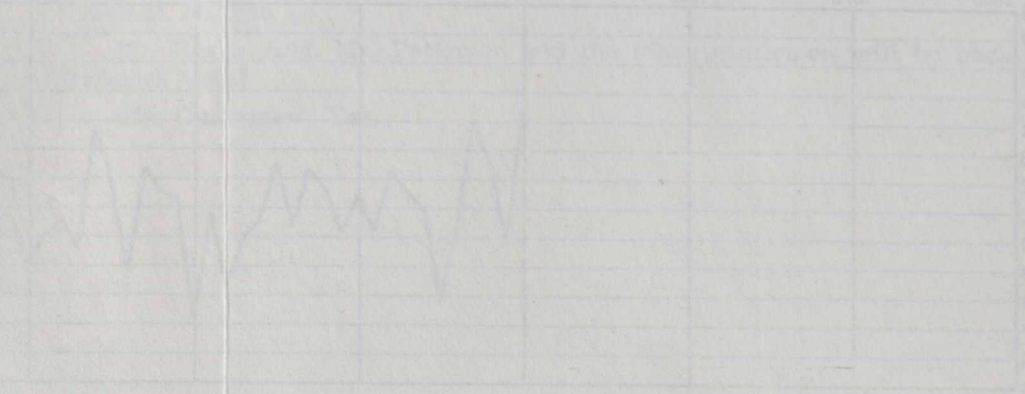
PRÉPARÉ PAR LE SERVICE HYDROGRAPHIQUE DU CANADA
DIRECTION DES SCIENCES DE LA MER
MINISTÈRE DES MINES ET DES RELEVÉS TECHNIQUES, OTTAWA

Elevations are in feet referred to International Great Lakes Datum, 1955
Les hauteurs sont en pieds calculés d'après le niveau de référence international des Grands lacs, 1955



GREAT LAKES WATER LEVELS
NIVEAU DE L'EAU DES GRANDS LACS
ANNUAL MEANS - MOYENNES ANNUELLES

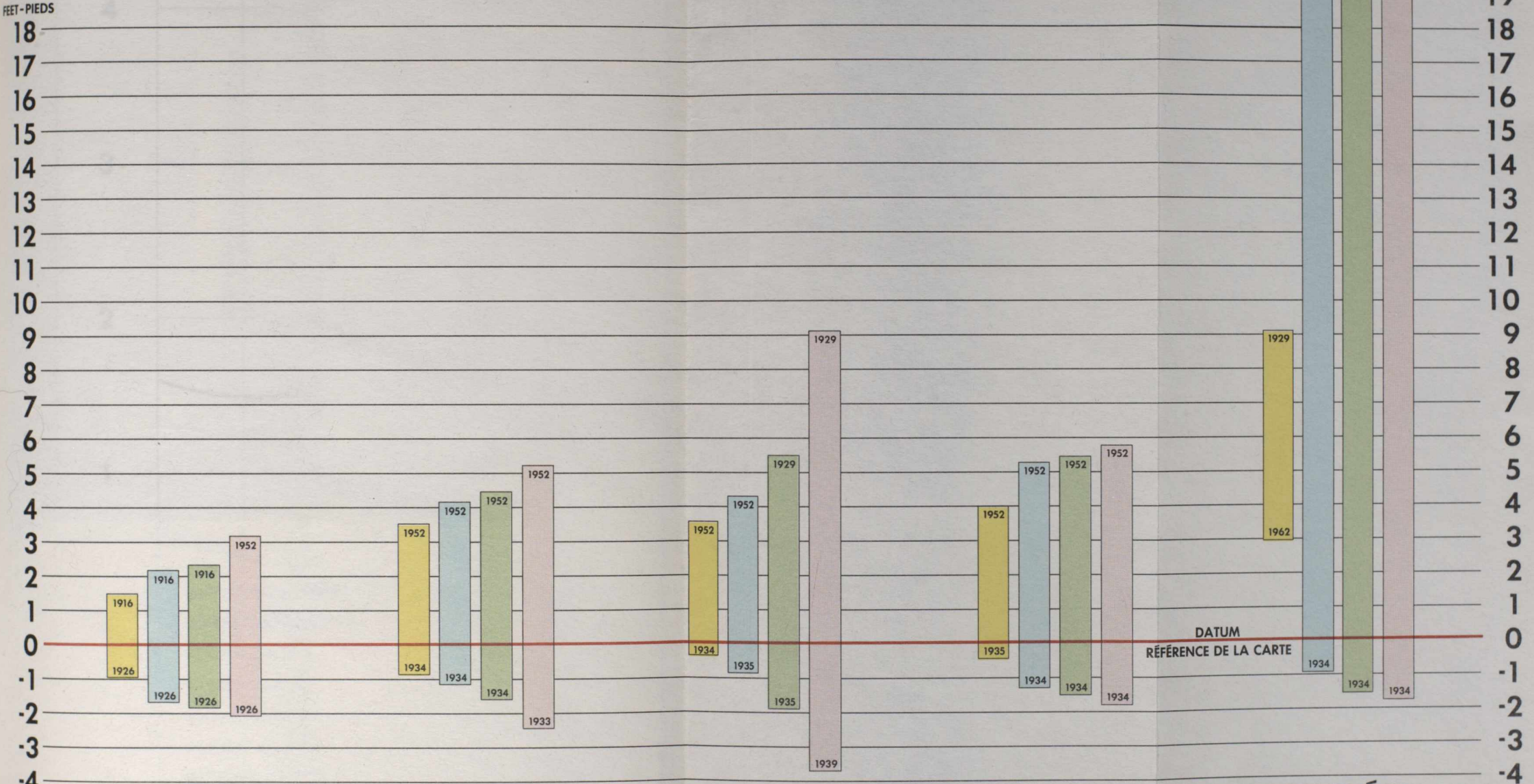
Scale of 100 feet = 30.48 meters
Scale of 100 feet = 30.48 meters



HIGHEST AND LOWEST RECORDINGS ENRÉGISTREMENTS EXTRÊMES, HAUTS ET BAS

ANNUAL MEAN MOYENNE ANNUELLE
MONTHLY MEAN MOYENNE MENSUELLE
DAILY MEAN MOYENNE QUOTIDIENNE
INSTANTANEOUS INSTANTANÉ

FEET - PIEDS



LAKE SUPERIOR
1915-1963

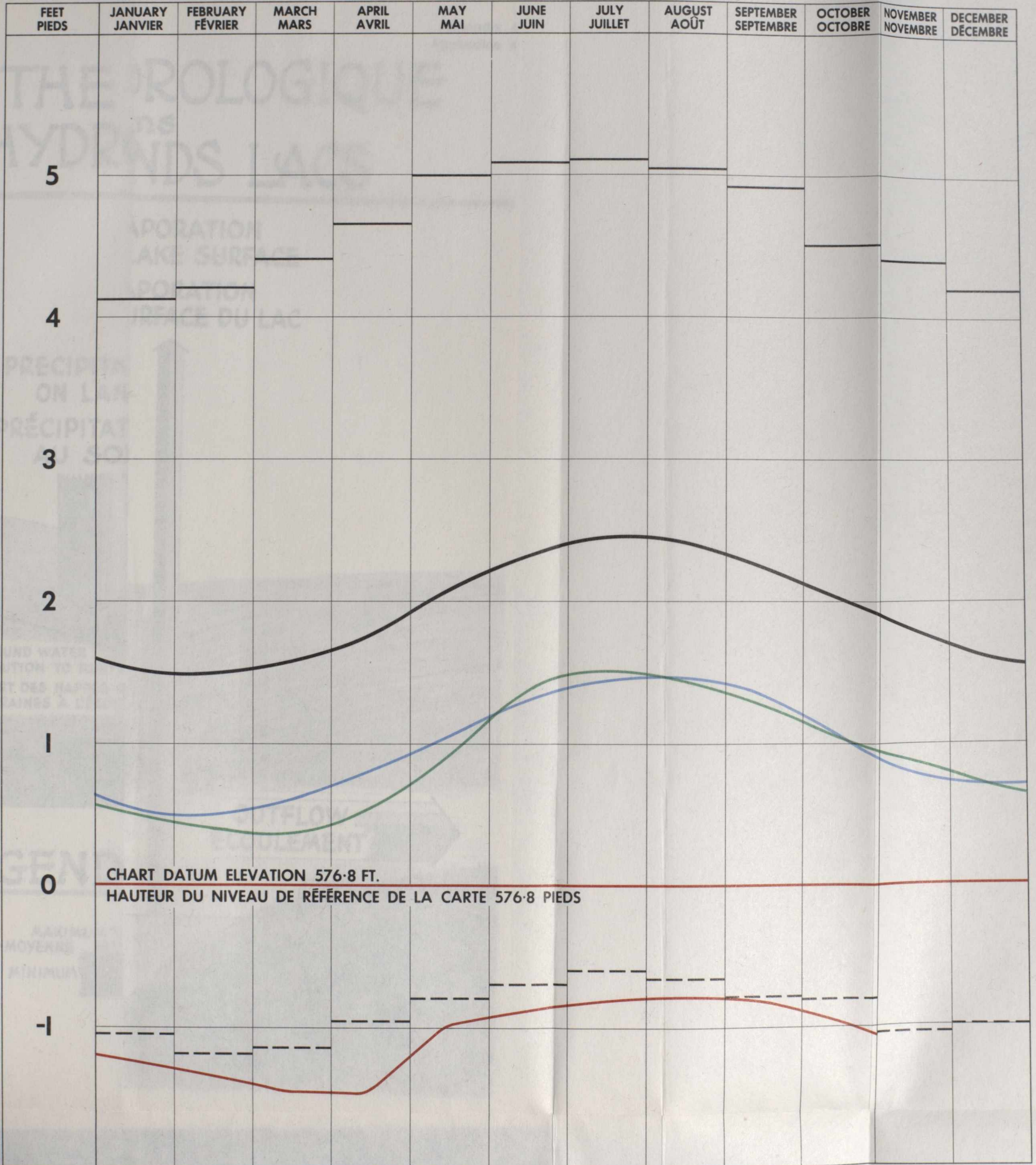
LAKE HURON
1912-1963

LAKE ERIE
1912-1963

LAKE ONTARIO
1909-1963

MONTRÉAL HARBOUR
1913-1963

LAKE HURON



MONTHLY MEAN LEVELS

RECORDED IN PRESENT YEAR

AVERAGE OF ALL RECORDS

MAXIMUM FOR ALL RECORDS

MINIMUM FOR ALL RECORDS

AVERAGE OF AUTOMATIC GAUGE RECORDS

AVERAGE OF LAST TEN YEARS OF RECORDS



NIVEAUX MOYENS MENSUELS

ENRÉGISSTRÉ CETTE ANNÉE

MOYENNE DE TOUS LES ENRÉGISSEMENTS

MAXIMUM DE TOUS LES ENRÉGISSEMENTS

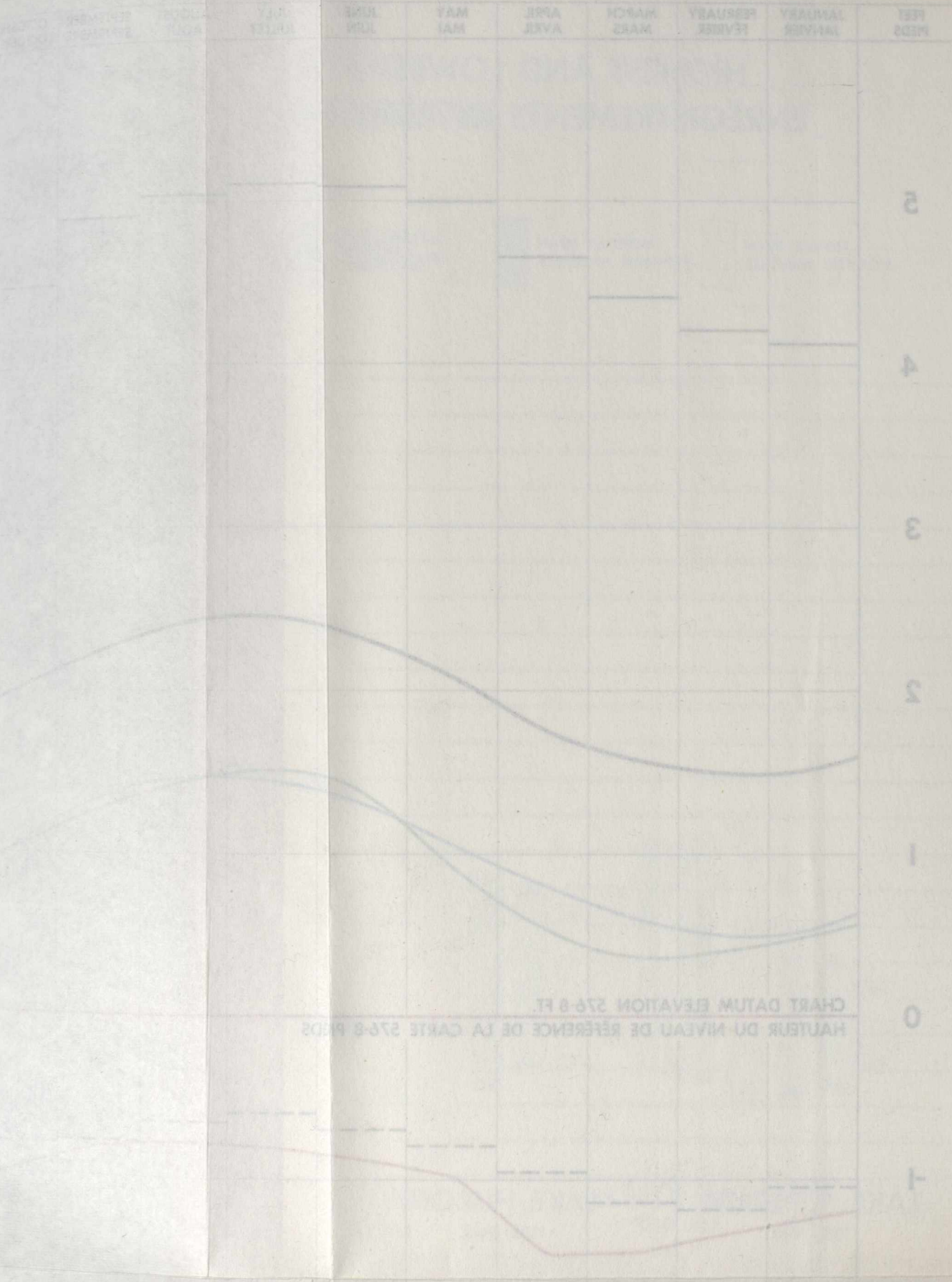
MINIMUM DE TOUS LES ENRÉGISSEMENTS

MOYENNE DES ENRÉGISSEMENTS D'ÉCHELLES D'ÉTIAGE

MOYENNE DES ENRÉGISSEMENTS DES DIX DERNIÈRES ANNÉES

LAKE HURON

UNITED STATES GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
LAKES AND RIVERS BRANCH



MONTHLY WATER LEVELS
LAKE HURON
1900-1905

MONTHLY WATER LEVELS
LAKE HURON
1900-1905

THE GREAT LAKES HYDROLOGICAL CYCLE

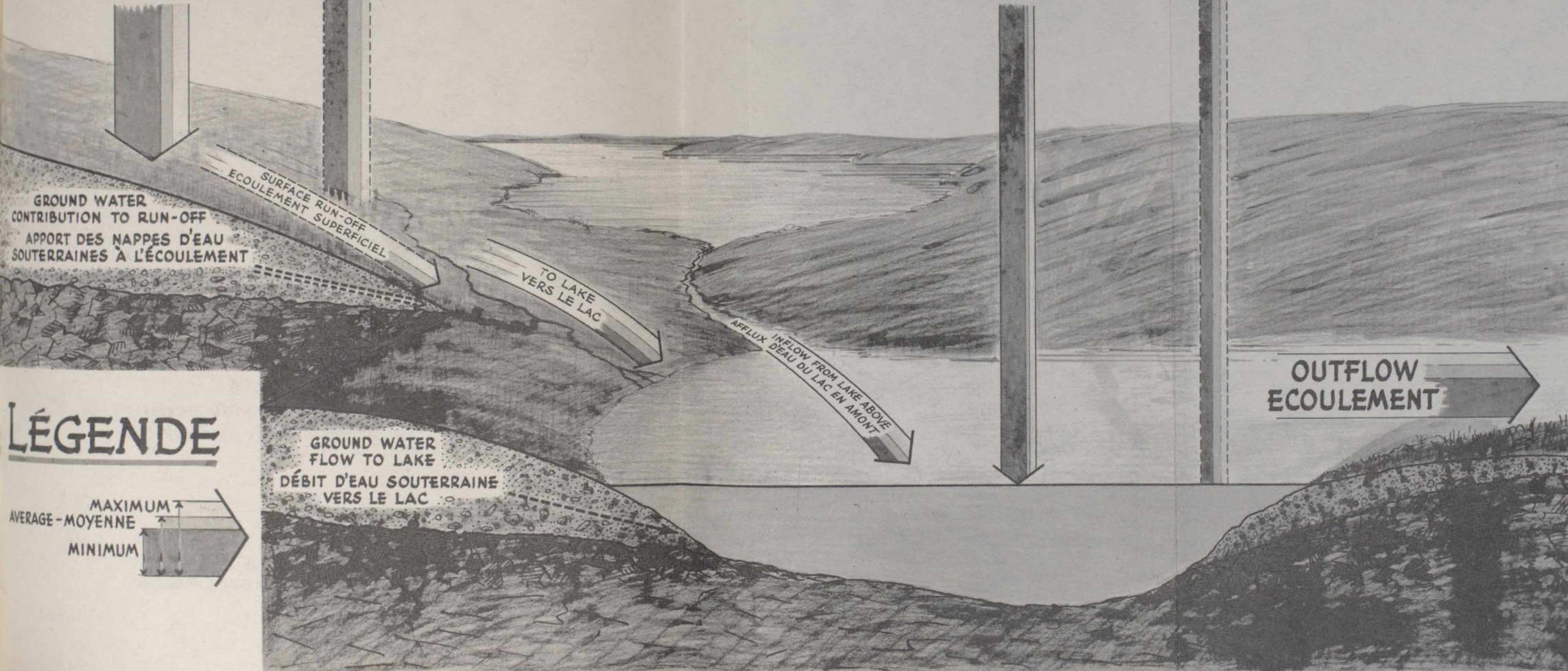
CYCLE HYDROLOGIQUE dans LES GRANDS LACS

EVAPORATION
FROM LAND
EVAPORATION
TERRESTRE

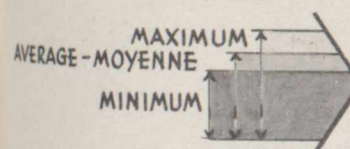
PRECIPITATION
ON LAND
PRÉCIPITATIONS
AU SOL

EVAPORATION
FROM LAKE SURFACE
EVAPORATION
À LA SURFACE DU LAC

PRECIPITATION
ON LAKE SURFACE
PRÉCIPITATIONS
À LA SURFACE DU LAC



LÉGENDE



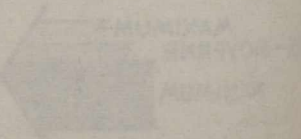
THE GREAT LAKES HYDROLOGICAL CYCLE

EVAPORATION
FROM LAND
EVAPORATION
TERRESTRE

PRECIPITATION
ON LAND
PRECIPITATIONS
AU SOL

WATER VAPOR
CONDENSES TO RAIN OR
SNOW AND FALLS DOWN
AS PRECIPITATION
ON LAND AND WATER

LEGENDE



GROUND WATER
FLOW TO LAKE
DRAINAGE BASIN
WATER

HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 6

TUESDAY, DECEMBER 8, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

WITNESS:

Mr. T. M. Patterson, Director, Water Resources Branch, Department of
Northern Affairs and National Resources.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias Godin

Vice-Chairman: Mr. Ian Watson

and Messrs.

Aiken,
Alkenbrack,
Berger,
Danforth,
Davis,
Dinsdale,
Flemming (Victoria-
Carleton),
Foy,
Grégoire,
Habel,
Hahn,

Harley,
Herridge,
Laprise,
Leboe,
Leduc,
Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,

Noble,
Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

(Quorum 10)

Gabrielle Savard,
Clerk of the Committee.
(ad hoc)

MINUTES OF PROCEEDINGS

TUESDAY, December 8, 1964

(9)

The Standing Committee on Mines, Forests and Waters met this day at 3.55 p.m. The Chairman, Mr. Osias J. Godin, presided.

Members present: Messrs. Aiken, Danforth, Davis, Dinsdale, Godin, Hahn, Herridge, Legault, Loney, McBain, Peters, Rock, Smith, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*), Whelan (16).

In attendance: Mr. T. M. Patterson, Director of Water Resources Branch, Department of Northern Affairs and National Resources.

The Committee resumed its consideration of the subject-matter of the water levels of the Great Lakes System.

The Chairman presented the Second Report of the Steering Subcommittee on Agenda and Procedure as follows:

Your Steering Subcommittee recommends:

1. That in view of the interest shown by the Committee in the proposal of Mr. Thomas W. Kierans, Consulting Engineer, Mining and Water Resources, of Sudbury, Ontario, entitled "The Great Replenishment and Northern Development Canal", 40 copies of his proposal priced at \$5.00 per copy be purchased for the use of the Committee;
2. That the witnesses listed hereunder be called in the following order:
 - (a) Thursday, December 10: Mr. Albert J. Meserow, Chairman of the Great Lakes Commission, Ann Harbour, Michigan;
 - (b) Tuesday, December 15: the representatives of the Montreal Port Council.
3. That the Committee continue its sittings in the afternoon at 3.30 p.m.;
4. That in order to complete its study the Committee make an interim report to the House before the Christmas recess recommending that it reconvene in the new year to continue its work;
5. That any member of this Committee who wishes to submit the names of prospective witnesses do so by writing to the Clerk of the Committee who, in turn, will take the matter up with the Steering Subcommittee on Agenda and Procedure for consideration.

On motion of Mr. Davis, seconded by Mr. Loney, the said Report was *unanimously* concurred in.

The Chairman referred to a letter from the Central Georgian Bay Tourist Association expressing appreciation to the Committee for the consideration received when they appeared before it on November 24th.

Mr. Patterson was introduced. He drew the attention of the Committee to the fact that the plates accompanying his brief have not been incorporated in the evidence of November 26th (issue No. 5).

On motion of Mr. Turner, seconded by Mr. Smith,

Agreed.—That the said plates (maps and charts) be printed as appendices to this day's proceedings. (*See Appendices "A", "B", "C", "D", "E", "F" and "G"*)

The witness was examined. The Committee requested that Mr. Patterson obtain certain information with regard to the interdepartmental advisory committee on water use policy.

At 4.55 p.m. the Chairman having to leave, invited Mr. Legault to take the Chair.

Mr. Patterson agreed to supply, in a condensed form, a presentation that will help the Committee understand the administration problem.

Questioning concluded, the Acting Chairman thanked the witness and the officials of the department, and at 6.00 p.m. the Committee adjourned to 3.30 p.m. Thursday, December 10th.

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

EVIDENCE

TUESDAY, December 8, 1964.

The CHAIRMAN: Gentlemen, I see a quorum. I would ask our witness to forgive us if we do a bit of committee work before we start with his testimony. I would like to bring to your attention the second report of the steering committee which met last Wednesday.

The steering subcommittee on agenda and procedure has agreed to present its second report. I presume I might read the five items mentioned unless you prefer to have me stop after each one, or unless you are agreed and are prepared to accept the committee's report. I would ask you to stop me if you would like to discuss one or other of the five recommendations which I shall now read as follows: (see *Minutes of Proceedings*).

You have heard the five items. Do I have a mover and seconder?

Mr. DAVIS: I move that the report of the steering committee be adopted.

Mr. LONEY: I second the motion.

Motion agreed to.

The CHAIRMAN: I have received only one letter by way of correspondence. I am sorry that I do not have it with me, because of the vote taken in the house just before we reached here. It was from the people who testified here on behalf of the Georgian Bay Tourist Association, as you will recall, a week ago, thanking the committee for its consideration, and indicating their appreciation of having the opportunity to testify before us.

As you know, I do not expect any introduction is necessary in the case of our witness, Mr. Tom Patterson, who is now before us ready to testify. We received his brief last week, or over a week ago, when he read it to the committee. I believe that all members have received the last printing of our report, and the brief of Mr. Patterson is included in that report. I received my own copy today. Are there any matters at all before we continue with the testimony? If not, I now call on Mr. Patterson. Possibly he might wish to make some remarks to add to the testimony he gave to the committee last time, or perhaps you are prepared to put questions to him.

Mr. T. M. PATTERSON (*Director, Water Resources Branch, Department of Northern Affairs and National Resources*): Mr. Chairman, perhaps the committee would like to proceed with its questioning. I do have one query to make. I notice in the reproduction, of which I have just received a copy, that the plates which accompanied my brief have not been incorporated in it. I do not know if this was an oversight or not.

The CHAIRMAN: Would a member request that the schedules following the remarks of Mr. Patterson at last appearance be introduced in our minutes?

Moved by Mr. Turner and seconded by Mr. Smith.

Motion agreed to.

The CHAIRMAN: You have heard the remarks of Mr. Patterson. If any member of the committee would like to receive further enlightenment on his remarks, he is welcome to do so. I have no names at the moment. Oh, now I have two. Mr. Davis will be first.

Mr. DAVIS: On the very last page, and the very last paragraph of your brief, there is contained a leading sentence which reads as follows:

Since diversions into the great lakes will affect both high and low lake levels, they cannot in themselves be utilized to raise low water levels.

This sentence appears previously, and there is an attempt to describe what is meant. I would appreciate it however if you would go over it again. It leaves the impression that diversion into the great lakes would not help to raise the low water levels. Is that true?

Mr. PATTERSON: What is meant to be conveyed there is that if you do have diversion into the lake, you will require other work than the mere diversion work in order to take care of the high water levels, which could eventuate in nature, and you would have additional water on top of that. So the statement that they cannot in themselves be utilized to raise low water levels is just made to pinpoint the fact that other works are going to be necessary to control the levels in the lakes after this additional water gets there, both from the point of view of holding it, and of releasing it, and getting it through the interconnecting channels between the lakes.

Mr. DAVIS: Are you saying that the problem of controlling the levels of the great lakes is such that you must first solve that problem before you can add water from outside?

Mr. PATTERSON: I think it would be a very dangerous thing to add water to the great lakes system if you did not know how you were going to control it after you got that additional water there.

Mr. DAVIS: In other words, there are very extensive works which would control the great lakes which would have to go in?

Mr. PATTERSON: That is right.

The CHAIRMAN: Now, Mr. Smith.

Mr. SMITH: As to inflow and outflow, if you increase the inflow you have to have some method to control the outflow by increasing or decreasing it.

Mr. PATTERSON: That is correct.

Mr. DAVIS: Thank you, that is fine.

Mr. SMITH: You were talking about moisture lost by evaporation, which I think is substantial, is it not? There are figures given here. You said, I believe, that there has been no close or accurate study made of whether the rate of evaporation from the lake surface is much greater than from the land or from a marsh surface. Is that so?

Mr. PATTERSON: There have not been any definite relationships established as to the rate of evaporation over a large water surface as compared to a marshy area. I do not know whether I am getting the significance of your question.

Mr. SMITH: Well, I suppose the significance of my question is directed to the development of more marshland storage, or storage outside to hold the water back from the flow into lake Huron, for example; would that decrease the rate of loss by precipitation?

Mr. PATTERSON: You mean by evaporation?

Mr. SMITH: I am sorry, yes, by evaporation.

Mr. PATTERSON: To some extent I think this would depend on the type of marshland. Transpiration through plant life is very substantial in the matter of disposing of water. I think there are times of the year when probably transpiration would dispose of more water than evaporation does, and other times when it would be the other way around.

Mr. SMITH: So it would be hard to say that there was any less evaporation over a period of time within a marshland storage than with open water storage?

Mr. PATTERSON: I think it would be difficult to be dogmatic about it.

Mr. SMITH: Are there any areas of the basin draining into lake Huron or into lake Superior where a substantial storage of water for the lake could be had? Has there ever been any study of rivers or areas of northern Ontario, which are relatively uninhabited, for water storage at certain times which could be held back and let into lake Huron in a measured way?

Mr. PATTERSON: Well, I think that the amount of this area and the volume that could be held that way is relatively small compared to the volume and capacity of the great lakes themselves. Most of the areas which are available for that sort of thing are now in nature doing a certain amount of storage and delaying. You mentioned lake Superior. Lake Nipigon is a very large body of water in that drainage, and it now stores a substantial amount of water, and it did it in nature. The Ontario Hydro is utilizing it to store an even greater quantity for power purposes.

Mr. SMITH: So there again it would be very doubtful whether there could be a significant amount of water stored by dams or otherwise which would contribute anything to the levels.

Mr. PATTERSON: I think it would be rather an insignificant amount. Undoubtedly, there are areas where some storage could be held. One problem about holding storage in shallower bodies of water than the great lakes is that the temperature of the water becomes higher and the evaporation rate increases.

The CHAIRMAN: Now, Mr. Turner.

Mr. TURNER: I understand that there is an advisory committee on water use policy?

Mr. PATTERSON: Yes, sir.

Mr. TURNER: The committee is currently chaired by the assistant deputy minister of your department.

Mr. PATTERSON: Yes, sir.

Mr. TURNER: It comprises representatives of external affairs, mines and technical surveys, fisheries, forestry, finance, trade and commerce, transport, public works, and national health and welfare. My understanding from previous testimony is that this department was set up in 1955—I should say this committee?

Mr. PATTERSON: Yes.

Mr. TURNER: How often does this committee meet?

Mr. PATTERSON: The committee does not have any regular schedule of meetings with the result that at times it meets in rather rapid succession, while there are other times when there are not pressing problems, when the period between meetings is longer. It has had several meetings this year, and there is one scheduled for this week.

Mr. TURNER: There are very few formal meetings of that committee? Is that right?

Mr. PATTERSON: Well, I do not know how you define formal there. Notices are sent out for holding meetings.

Mr. HERRIDGE: Could we be given the times that the committee has met and the persons who were in attendance?

Mr. TURNER: Since 1955 I think the committee would be very interested to know how many times this interdepartmental committee on water use policy has met. This year we had a water crisis, and last year the crisis was becoming quite apparent. How often has this committee met since 1955?

Mr. PATTERSON: I am sure, Mr. Chairman, that this information can be obtained for the committee. There was a secretariat appointed for this water use committee, but unfortunately it has had very poor success in maintaining personnel of the secretariat, and to some extent this has affected the regularity of meetings upon occasion. The secretariat positions at the moment are all vacant.

Mr. TURNER: On this committee?

Mr. PATTERSON: Yes, sir.

Mr. TURNER: I think we may take it that there has been a formal request, and perhaps at a later date Mr. Patterson might produce that information.

The CHAIRMAN: Could Mr. Patterson tell us where we could obtain it? Would he have knowledge of where we could obtain a schedule of the meetings held since 1955?

Mr. PATTERSON: Yes, sir, I could initiate the inquiry, if you so wish it. But if a request were addressed to the assistant deputy minister of the Department of Northern Affairs and National Resources, directed to the attention of Mr. MacDonald, the inquiry would be answered.

Mr. DAVIS: Why are the positions vacant? Do they not pay enough, or is there not enough work to do?

Mr. PATTERSON: We thought we obtained some very good people for the positions, but they have always found some better paying job to go to.

Mr. DAVIS: Would that be in the government service or elsewhere?

Mr. PATTERSON: Both. We lost one to an oil company, and another to Manitoba. These were the secretaries.

Mr. HERRIDGE: Could one also get information about the number of meetings held, the persons who were in attendance, and the departments represented? I would also like to get any representations made as a result of those meetings.

The CHAIRMAN: Yes, well, are you asking the question of the Chair or of the witness? The Chair would be prepared to do it.

Mr. HERRIDGE: I am asking through the Chair, for the evidence of this committee to be placed in our record.

The CHAIRMAN: Could this information be obtained, Mr. Patterson?

Mr. PATTERSON: I am sure that if you perhaps should address a letter to the chairman of the committee and incorporate that as part of the request, that he and his committee would deal with it.

Mr. AIKEN: I assume, in view of the fact there is no secretariat to this committee, that the material will have to be obtained through the department itself, rather than through the committee itself. Is that the case?

Mr. PATTERSON: I would think that in any event it could be obtained through the department, since the secretariat was associated or is associated with the department and is part of the department.

Mr. AIKEN: It seems unnecessary with Mr. Patterson here from the department that the committee should have to raise the question whether it could obtain the information. I suggest that he initiate it rather than the committee.

The CHAIRMAN: Well, is it in his power to do so?

Mr. PATTERSON: I could convey the request to the chairman of the committee, and I am sure that action could be taken.

Mr. WHELAN: Were you a member of this committee?

Mr. PATTERSON: No, sir. I attended many of the meetings of the committee. The membership comprised—that is, the official membership comprised—the deputy ministers of the various departments.

Mr. SMITH: All of whom had many other responsibilities, and were more interested in other things than they were in water levels, I suspect. That is a statement, not a question.

Mr. DAVIS: This committee would deal with more than the great lakes? It would have dealt with the Columbia river?

Mr. PATTERSON: Oh, yes, it dealt with many problems dealing with water across the country.

Mr. TURNER: This is not the only departmental committee of this kind dealing with water use. Is that right?

Mr. PATTERSON: It is the only committee I know of which deals with water use policy at that level. We have many committees, both international as well as national, dealing with water problems on the great lakes in connection with the control of the St. Lawrence, in connection with the control of Niagara, and in connection with reaching agreements on basic data for the great lakes system. These are international committees.

Mr. TURNER: When it comes to a committee which has the role of determining government policy, are there any other interdepartmental committees affecting water?

Mr. PATTERSON: Not directed to water policy.

Mr. TURNER: So when we talk about interdepartmental committees having to do with water, other than water use, this committee is the only one there is at policy level. Is that true?

Mr. PATTERSON: I believe so.

Mr. SMITH: In February of 1961 there was a paper prepared by a member of the national research council, Mr. H. A. Neu, which was presented to a symposium of departmental representatives, and it dealt specifically with water levels in the Montreal area, and particularly in the lake St. Peter area, and the low level there, and also the icing difficulties. Was that paper ever considered by the government or by this particular committee that we are speaking of?

Mr. PATTERSON: I have not any recollection, Mr. Chairman, that the paper mentioned came before the water use policy committee. I have no doubt that that paper was considered by the authorities who would be dealing with the improvement of levels and channels in the lake St. Peter area, and between there and Montreal.

Mr. SMITH: Do you know of the paper yourself?

Mr. PATTERSON: I have heard of the paper, but I have not studied it.

Mr. SMITH: So your department, or the department for which you are responsible, has never made any analysis or recommendation concerning it?

Mr. PATTERSON: Not as a department.

Mr. SMITH: Do you know whether any department of the government ever made any technical analysis of this paper?

Mr. PATTERSON: Not of my own knowledge, Mr. Chairman. I am sure that the ideas in the paper have been considered in connection with the studies that are going on in the river below Montreal.

Mr. SMITH: But you do not know of any specific study that was made either officially or unofficially. Do you know of any specific study that was made of this particular paper at all?

Mr. PATTERSON: I do not.

Mr. SMITH: Or that it ever was given technical consideration?

Mr. PATTERSON: I do not know of this.

Mr. TURNER: Speaking to that study and reconsidering the line of questioning in the paper having to do with the ship channel between Montreal and the open sea, that would fall I suppose more specifically under the Department of Transport. Would that be right?

Mr. PATTERSON: Yes, sir.

Mr. TURNER: So it would only be in your capacity as a member, or ex officio member, of the water use committee that you could have come in touch with that particular paper?

Mr. PATTERSON: Yes, sir.

Mr. TURNER: Now, we were informed by the deputy minister of the Department of Mines and Technical Surveys that his department had gauges over the great lakes system having to do with water levels. It is my understanding that the Department of Northern Affairs and National Resources has gauges over the great lakes systems having to do with water flow. Is there any reason why the same lake or same gauge mechanisms could not measure the flow and level at the same time, and be handled by the same department?

Mr. PATTERSON: Well, Mr. Chairman, in that connection we utilize wherever possible the levels that are obtained by the Department of Mines and Technical Surveys. But their gauge locations are not always in a position which is suitable for measuring the discharge. Our responsibility on the great lakes and connecting waters, as we exercise it, is in connection with the measurement of the flow and its action on the measurement of the flow, while the Department of Mines and Technical Surveys are operating gauges on the lakes, and the connecting channels. In addition to the gauges which they operate, there has been a requirement through the responsibility of the International Joint Commission that the power authority and the Ontario Hydro operate certain additional gauges which they have out on the lakes which are not suitable to the Department of Mines and Technical Surveys requirement. But there is no overlapping of gauging operations on the lakes themselves. We do not operate gauges where Department of Mines and Technical Surveys records will serve our purpose.

Mr. TURNER: According to the information that Mr. Arnold Heeny presented to this committee, he set forth machinery for the regulation of lake Ontario outflows, under the guidance of the international St. Lawrence river board of control. You are a member of that board, I understand?

Mr. PATTERSON: Yes, sir.

Mr. TURNER: We understood from Mr. Heeny that this regulation was carried out with the view to improving the levels of lake Ontario and the flow of the St. Lawrence river, having in mind a reconciliation of the various interests concerned within the terms of reference of the board. And when the deputy minister of the Department of Mines and Technical Surveys was before this committee—I refer to Dr. van Steenburgh—he indicated through the graphs supporting his evidence that Montreal harbour levels were as low as in any previous record, and that it looked as if they were going continuously down over the last 20 years. Can you explain that situation, and explain to us why, despite this regulation of lake Ontario, the Montreal water level has continued to go down?

Mr. PATTERSON: Well, Mr. Chairman, this matter is one that may be a little difficult to explain. We are responsible for the regulation of the lake, and the lake has been going lower and lower. This basically, of course, is

the result of the unprecedented low supply. But with regard to what we have achieved in the present year, for instance, I have some figures here which indicate that in the month of October of this year the level of lake Ontario was 242.96, and for October of 1934, which is the year to which Dr. van Steenburgh referred, the level was 241.79. This is lake Ontario and you are referring to Montreal harbour. So as compared with conditions in 1934, and the level of October 1934, the level in lake Ontario this year is over a foot higher than it was in October, 1934; and a similar condition was experienced in the month of November.

The outflow of lake Ontario in October of 1934 was 175,000 c.f.s., and the outflow in October of this year was 206,000. That means that we were discharging 31,000 c.f.s. more through the St. Lawrence river this past October than was passing down in October, 1934, and despite this fact, as Dr. van Steenburgh pointed out, the level of Montreal harbour in October of this year was practically as low as it was in October, 1934.

Mr. TURNER: Had the condition remained the same, what would that increased flow of 31,000 cubic feet per second have done to Montreal harbour?

Mr. PATTERSON: Montreal harbour should have been something over a foot higher than it was in October, 1934.

Mr. TURNER: Yet it is the same. What is the reason?

Mr. PATTERSON: The only other thing which can influence it so far as flow is concerned is the water coming in from the Ottawa river, and the flow in the Ottawa river in 1934 and this year was about the same, so this did not account for it. I believe it is recognized in the various engineering circles that the improvement that has been going on in the lower St. Lawrence river in respect of dredging the channel to a 35 foot depth has resulted in a lowering of the level of Montreal harbour. I believe the authorities in the Department of Transport recognize this. They have set up a model study on that section of the river with a view to developing depth by improving the levels down there and at the same time improving rather than deteriorating the levels in Montreal harbour.

This additional lowering and the fact that we are not showing a credit in Montreal harbour of over a foot in depth owing to the increased flow in the St. Lawrence, in my opinion, is due to the improvements made below Montreal in the channel.

Mr. TURNER: The dredging?

Mr. PATTERSON: The dredging and the straightening of the channels. The water is getting away faster. There is a considerable slope between Montreal harbour and the ocean. This slope is a result of the friction loss which occurs in getting that volume of water through the channel, and any improvement you make in the channel which reduces the frictional losses means you do not require as much slope to get the water away, and this slope goes down.

The more improvement you put in the channel the more you are approaching the horizontal all the time.

Mr. Chairman, I think that is the answer to why, in spite of this regulation and improvement on lake Ontario in respect of the levels and the discharge of the St. Lawrence river and the levels of lake St. Louis, that Montreal harbour has not responded in the same way you would have expected had other things been equal.

Mr. TURNER: Would that indicate to you perhaps that the remedial measures for the Montreal situation might be to dredge the outflow, or slow it, downstream from Montreal.

Mr. PATTERSON: I think this is one solution to the problem. There may be a variety of solutions. I am not going to venture a guess in respect of which one would be the most economic. However, strong, firm measures might be taken in the lower river, and the Department of Transport is making extensive model studies to determine the best place in which to do this work, both from the point of view of effect and economy.

Mr. TURNER: When the dredging originally was done over a period of years, was the water resources branch of the Department of Northern Affairs and National Resources consulted?

Mr. PATTERSON: In our department we had nothing whatever to do with the dredging, either at the beginning or in the way of knowing that it was going on.

Mr. TURNER: Is the International Joint Commission consulted before dredging is done on the St. Lawrence ship channel?

Mr. PATTERSON: No. The International Joint Commission has no jurisdiction.

Mr. TURNER: I know, but there was no consultation at all? Obviously dredging has an effect on the outflow and yet there is no consultation with a body having jurisdiction on the lakes.

Mr. PATTERSON: The dredging down there does not have any influence other than in respect of what man may dictate be done up above in the way of releasing water.

Mr. TURNER: Except that if dredging causes a faster flow down from Montreal, it means you have to let out more water from lake Ontario.

Mr. PATTERSON: You have to take some action to counteract it.

Mr. TURNER: So it may in this way affect the system?

Mr. DINSDALE: Has this matter been discussed in the advisory committee on water use?

Mr. PATTERSON: Not to my knowledge. The subject of dredging in the lower St. Lawrence river has not been discussed in the meetings of the advisory committee.

Mr. DINSDALE: Is the deputy minister of the department a member of the advisory committee?

Mr. PATTERSON: Yes, sir.

Mr. DINSDALE: Could the reference be made by the deputy minister of transport to the advisory committee?

Mr. PATTERSON: I presume the Department of Transport felt it had all the interest from Montreal harbour down and did not seek advice from the advisory committee.

Mr. DAVIS: May I ask a couple of questions related to this. Is the prime function of the three departments, first, the Department of Northern Affairs and National Resources, to measure the stream flow of the river? Is that its principal function?

Mr. PATTERSON: Yes.

Mr. DAVIS: Are there any other functions which the Department of Northern Affairs and National Resources performs on that stretch of the river?

Mr. PATTERSON: No. As a matter of fact, in the reach below Montreal we do not have any gauging stations. We have had gauging stations on the various tributary streams and in the international reach of the St. Lawrence river.

In the Beauharnois canal we have measured; we have measured in the channels entering lake St. Louis, and lake St. Francis, and we have measured in the Lachine rapids. However, we have not conducted measurements in the St. Lawrence river below Montreal.

Mr. DAVIS: But you do conduct measurements in respect of the volume and flow and the levels. You do not happen to cover that stretch of water, but normally this would be done by the Department of Mines and Technical Surveys in a similar stretch of the river. Do they look at the geology surrounding the base of the river and look at the water in the ground below the surface?

Mr. PATTERSON: They have certain responsibilities for ground water surveys. The areas in which the department has covered ground water relatively are limited.

Mr. DAVIS: So, they do not look at that section other than perhaps from just a geological point of view.

Mr. PATTERSON: Yes, but they maintain tidal gauges up the St. Lawrence river.

Mr. DAVIS: This is part of oceanography, if you like?

Mr. PATTERSON: Yes; it is part of that. I think they may operate some gauges at the request of the Department of Transport; I do not know.

Mr. DAVIS: The department with the principal interest in that stretch of the river is the one concerned with navigation.

Mr. PATTERSON: Yes.

Mr. DAVIS: Pure and simple.

Mr. ROCK: I would like to come back to Montreal harbour. I would like to know your opinion in respect of the feasibility of building dikes in lake St. Peter to regulate or cut the flow, or build dams at Three Rivers to dam the water completely and maintain the flows at a regular level in the port of Montreal, or a dam at lake St. Louis or lake of Two Mountains, so that two large watersheds could be created? These could be utilized each time it is known that the water levels of the harbour of Montreal are starting to go below normal.

Mr. PATTERSON: As I understand it, there are three alternatives here; one is to narrow the channel below Montreal; one is a dam in the vicinity of Three Rivers, and the other is dams at the outlet of lake St. Louis and the outlet of lake of Two Mountains. With regard to the first two, I think I would be very, very foolish to express an opinion in respect of what would be the better, not having studied either. To a great extent it would depend on the economics of one proposal as against another. I do not know how extensive a dam such as you have in mind would be with respect to the level at Three Rivers, or whether this is a dam which would involve another lock.

Mr. ROCK: I think it would have to involve that.

Mr. PATTERSON: Then you bring in another factor in the matter of the delay to shipping. If a ship has to pass through a lock it loses considerable time. With the amount of shipping that is there, probably there would have to be at least twin locks.

The other proposal of narrowing down the channel I think has the possibility of handling the shipping without introducing a lock.

Mr. SMITH: That is Dr. News' proposal generally?

Mr. PATTERSON: With regard to the storage in lake St. Louis and lake of Two Mountains, I think there is opportunity there to obtain beneficial storage for Montreal harbour. Again economics would enter into it. I think the conflict with whatever power interest Quebec Hydro might have would be another

factor. It has been rumoured from time to time that Quebec Hydro is going to build a plant at Lachine. If this were built it would provide a degree of storage, but there would have to be an arrangement between the Hydro Quebec and the Montreal harbour in respect of how those waters would be released.

Mr. ROCK: I believe a gentleman who appeared here made a statement to the effect that hydro of Quebec had no intention whatsoever of having any hydro project there. We were advised they had given up that idea. Whether or not this is true, I do not know; however, one of the gentlemen from one of the government departments did mention that fact.

Let us take a situation in which hydro of Quebec is not involved. I would like to have your opinion on this matter without involving hydro of Quebec. Assume that hydro of Quebec had no intention of building a power project.

Mr. PATTERSON: I think there is opportunity there for the creation of storage. Lake St. Louis is not a large lake; the amount of storage that could be created on it, to a considerable extent would depend on how much variation the foreshore interest could stand. I do not know what that would be. There would be problems. If you were using lake St. Louis as a storage reservoir, certainly you would have to take care and think of all the interests that are on lake St. Louis.

Mr. ROCK: I look at things like a hot water tank; you know it is filled when you pump water in and that the same amount will come out. It is the same with this. You know the same amount of water will flow out even if it goes to a large area. You know it will come to a small narrow body such as the port of Montreal, and that therefore the level would come up rapidly if lake St. Louis were open at a time when it is needed. I am not an engineer, but I have listened to all the experts here speak of inflow and outflow and I have come to this conclusion myself.

Mr. PATTERSON: At the present time lake St. Louis is higher than it would have been without the regulation of the St. Lawrence river and lake Ontario. At the present time it is benefitting from this increased flow of which we were speaking.

If you use lake St. Louis as a reservoir to feed water to Montreal harbour when the harbour is low—and the harbour is low at times like this—and if you were using the storage economically, you would use it all up; it would not leave lake St. Louis any better off, because if the water is put there to improve Montreal harbour levels, you are relating it to Montreal harbour and you will drain out lake St. Louis.

Mr. ROCK: If this seriousness exists when lake St. Louis is low, then even the dike along lake St. Peter will not help, because the water is not coming out from anywhere at a proper level to even off the flows across the harbour of Montreal with the rapid pace at which it seems to leave now.

Mr. PATTERSON: The dikes in the lower level of these works, whatever they may be in the lower level, would be designed to increase the friction factor and increase the slope leading up to Montreal harbour, which in turn would hold Montreal harbour levels higher.

Mr. ROCK: If one spot was narrowed just below the island of Montreal, between the island of Montreal and the southern shore, would this hold back water enough, even if there is a rapid flow in that spot, even without building dikes along lake St. Peter; would this hold back enough water?

Mr. PATTERSON: To achieve any improvement in Montreal harbour—any improvement of any amount—would mean that at that narrow spot you have that much of a drop in the river.

Mr. ROCK: But I do not think we have a problem below; we have a problem at the port of Montreal. I do not think it is a problem in the channel.

Mr. TURNER: I think Mr. Rock now is suggesting narrowing the river just below Montreal harbour but not as far down as lake St. Peter.

Mr. ROCK: Yes.

Mr. PATTERSON: You are concentrating all your improvement at one spot, a foot or two feet of improved level. If you are going to achieve that by narrowing in one confined spot, navigation is going to have to deal with that one or two feet in a very limited reach of the river; is it not going to be distributed.

Mr. TURNER: Surely, if you choke it up too quickly and increase the velocity of the water, it would be difficult to negotiate.

Mr. ROCK: The velocity is pretty fast at the moment. I would like to know whether your department was consulted when the Department of Public Works made a study and planned the building of the ice dams just above the Champlain bridge.

Mr. PATTERSON: This is a question which I believe was directed to me at an earlier meeting.

Mr. ROCK: I do not recall. I have never asked you that question.

Mr. PATTERSON: I am sorry. Was our department consulted in connection with building what?

Mr. ROCK: The ice dams which they now are building just above the Champlain bridge above Montreal harbour.

Mr. PATTERSON: Our department did not participate in any of the meetings which went on in connection with this ice bridge.

Mr. ROCK: This is very interesting. When they were building the Champlain bridge, was your department consulted about the outflow of water coming into the port of Montreal; the outflow from west going east?

Mr. PATTERSON: No, it was not.

Mr. ROCK: Do you think the piers of the Champlain bridge and also the piers now on the ice dam that is being built just west of the Champlain bridge have any effect on the inflow of water into the port of Montreal?

Mr. PATTERSON: They could affect the amount of water that reaches Montreal and which goes down the St. Lawrence past Montreal.

Mr. ROCK: I am not thinking of what passes Montreal, but rather the water coming into the port of Montreal itself. While we are speaking of building dikes below Montreal to hold back water for Montreal, I have come to the conclusion that the piers of the Champlain bridge and also the piers of the dikes for the ice control dams are obstructing the flow of water coming into the port of Montreal. This is the reason I am surprised that your department which has a lot to do with water levels was not consulted in respect of any of these projects. Since you state that water is held back when you have these dikes, then these piers of the Champlain bridge and of the ice dam which they now are building also hold back water to a certain extent from reaching the port of Montreal.

Mr. PATTERSON: We have not made a study of the construction of the piers of the bridge, or the bridge or the ice structure. I do know that this was looked at by the departments which were immediately concerned, and I assume they are so placed that they do not affect levels in the harbour.

The CHAIRMAN: Pardon me, Mr. Patterson, I have to leave at this moment owing to a previous engagement. I am grateful to Mr. Legault who will take the Chair.

Mr. ROCK: In other words, Mr. Patterson, it seems there has been a complete lack of co-ordination between the departments which had a lot to do

with water levels. Let me say I feel there has been a lack of co-ordination between the Department of Public Works, the seaway authorities, your department, and the Department of Transport, because when they are studying all these things and the departments do not get together in order to co-ordinate all the knowledge they have, a lot of errors can be made.

Mr. PATTERSON: Well, I do not know whether I should comment on that or not. I am sure the departments which were immediately concerned considered they were obtaining all the basic data that was available in the government service and that they were competent to reach wise decisions without drawing in any additional departments.

Mr. ROCK: Did the harbour authorities in the port of Montreal look at the bridge supports, and so on, having regard to their effect on the levels?

Mr. PATTERSON: I am not sure. They all are associated through the Department of Transport, the national harbours board, the ship channel and the seaway authorities. I am sure they looked at this matter very carefully.

Mr. WHELAN: I have heard a lot about how much water disappears into the ocean out of the St. Lawrence river. Do you think it is feasible to build retaining dikes, weirs, or dams in the St. Lawrence to control this flow of water that rushes to the ocean and is wasted.

Mr. PATTERSON: I do not think you can prevent it going to the ocean eventually. You can slow down the process of it reaching the ocean; I have no doubt there are feasible means of doing this.

Mr. WHELAN: My other question has to do with the Detroit river. In the brief it says that the Detroit river is 28 miles in length; its upstream section is relatively deep and the downstream section is wide and shallow. To my knowledge the water does not actually always flow through a wide section of the Detroit river before it enters into lake Erie. You have both channels and practically all the water goes into those channels. They have narrowed the river on the one side. In one spot they have deepened the channel and built a retaining dike; they moved out in the river. The water further over on shore causes some erosion on shore.

According to the meetings we had at that time with the United States engineers, the officials of the Department of Public Works and others, this was done to maintain a proper level of water in the Detroit river for the shipping in the St. Lawrence seaway. Do you agree to that? It is not a broad place for the water to escape; wide and shallow are the words you have in your brief.

Mr. PATTERSON: The purpose of the dike was to compensate for the dredging that was done in the Detroit river.

Mr. WHELAN: As I remember it, the United States engineers told us it had a greater effect than they thought it would have at that time after it was done and after one year's operation.

Mr. PATTERSON: I cannot speak to that. I do not know whether it had a greater effect than they thought it would have or not.

Mr. WHELAN: I have one other question: coming back to the St. Lawrence, I heard a conversation the other day which went this way: "Because we have icebreakers keeping the port of Montreal open longer, we are allowing more water to escape." Is there anything to this?

Mr. PATTERSON: This would allow more water to escape from the Montreal harbour area in wintertime, and this is one of the benefits of keeping the channel open, to prevent flooding in the Montreal area; but it would not have any effect upon drawing more water out of the great lakes system.

Mr. WHELAN: It does not. We would not have to replenish that water by drawing more from lake Ontario which means that it would have to come off of lake Erie?

Mr. PATTERSON: No, sir.

Mr. WHELAN: It would not affect that at all?

Mr. PATTERSON: No.

Mr. AIKEN: My first question relates to the national research council in all this affair. Do they have a branch which does water level research, and also keeps an eye on the whole water level situation, or do they only do specific jobs?

Mr. PATTERSON: I think the work of the national research council is mostly directed towards pure science and pure research. They will investigate certain problems, but I do not know of any action they are taking with respect to lake levels. I believe they are associated with the Great Lakes research institute.

Mr. AIKEN: Well, have any of these water level projects been referred to the national research council so far as you know?

Mr. PATTERSON: As far as I know they have not.

Mr. AIKEN: Do you know if they have a special branch or department which deals with water problems and the problems of water levels?

Mr. PATTERSON: They have been involved in the construction of models for the conduct of water studies and in connection with the seaway. They developed a model here in their laboratory and carried out experimental work in their laboratory for the seaway authority, and they have done special projects of that type.

Mr. AIKEN: Would it be correct to say that they merely do special projects when they are asked to do so by one of the departments concerned, or to answer a specific problem?

Mr. PATTERSON: I think that would be the correct answer, in so far as physical programs on the river are concerned.

Mr. AIKEN: Do you know if they have a continuing water level program in the national research council?

Mr. PATTERSON: I do not know of any continuing water level program. I have no doubt that they have a continuing program looking into the properties of water, ice, and snow.

Mr. AIKEN: Do they maintain any water level gauges or such things on the rivers or lakes of which you have knowledge?

Mr. PATTERSON: I do not know of any water level gaugings they carried out. They may have water level gauges in connection with particular experiments on particular lakes for some other purpose. They may carry out studies on the permafrost in the ground, and it could be that in connection with such specific studies they require information on water levels near by.

Mr. AIKEN: But as far as you know they are not being called upon to give any assistance in models such as the United States army engineers are supposed to be undertaking?

Mr. PATTERSON: No, sir, not with respect to great lake levels.

Mr. DAVIS: Does the water research branch build models and carry out tests, or do they rely upon consultant studies or upon the national research council for such investigation?

Mr. PATTERSON: We in the water resources branch through our responsibilities for the International Joint Commission have been associated with model studies, the models having been built either by such an organization as

the Ontario Hydro or the national research council. Apart from that the results of model works on the water projects that we have to deal with are provided for by consultants.

Mr. DAVIS: You do not have the physical thing as such, the model. You do not build it, or run tests on it?

Mr. PATTERSON: No, sir.

Mr. DAVIS: You just carry out measurement of streamflows?

Mr. PATTERSON: That is correct.

Mr. AIKEN: I would like to turn to another question. There has been a line of questioning in connection with the situation at Montreal and the possibility of slowing up the outflow. Now, if there were such a program there to assist with Montreal harbour levels, would this have any effect on the lakes further back beyond the control system, that is, on lake Erie and lake Huron?

Mr. PATTERSON: It could not have any effect on lake Huron or lake Erie. The only effect it could have on lake Ontario is the one which was mentioned a while ago where, as a result of the level having been changed in Montreal harbour you would not need to release so much water from lake Ontario for control work.

Mr. TURNER: It would not work its way back to lake Huron or lake Erie?

Mr. PATTERSON: No, there is no control of lake Huron or lake Erie. Lake Ontario just has to take what comes from there.

Mr. AIKEN: Where is the effective stopping point? Is it at Niagara falls and at the Hydro tunnels, or within the upper lakes?

Mr. PATTERSON: You mean for lake Erie and lake Huron?

Mr. AIKEN: Yes.

Mr. PATTERSON: There is an effective control which deals with lake Erie, and there is a control which deals with lake Huron through the St. Clair river.

Mr. AIKEN: But there is no regulating control on it?

Mr. PATTERSON: No, there is no regulating or artificial regulating. These are natural controls.

Mr. AIKEN: Is there any regulation of controls between lake Erie and lake Ontario?

Mr. PATTERSON: No. There is additional diversion which has taken place between lake Erie and lake Ontario through the Welland canal and the Decew falls power plant and on the United States side, the barge canal. But apart from these diversions there is no man made control of the levels of lake Erie.

Mr. HAHN: Mr. Chairman, I have attended but few of these meetings, but one thing which I think all of us have appreciated, and certainly I myself, is the wide range of factors which affect this problem, not only affecting water levels but also the wide range of interest involved in water flows and water levels. I would mention also the wide range of bodies and agencies which are connected with it. It may be because my memory retention is not good, or perhaps that I am too lazy to check into it, but I do not have a clear picture of how these things are all dovetailed together. So I wondered if it could be possible to try to present some form of chart which would highlight these things.

As I see it, it boils down first of all to a lot of data being collected from a wide variety of sources which all have a bearing on this thing, such as on precipitation, evaporation, the levels of various lakes, even the question of ground water levels and so on. There are a number of people conducting a variety of studies in connection with the concept that a grand canal be built. There is physical action being taken in terms of actual physical control of

water levels. Would it be possible to list these various factors, for instance, under the heading of raw data? What is the raw data, the raw information that is necessary for this problem? We know that on this ground that we have evaporation studies and precipitation studies available. But could we list these factors, and be told who is responsible for collecting that data, and finally, in another column, have it indicated who gets the result of this broad aim?

Under technical studies somebody might suggest that a dam be built, or some form of water control below Montreal which would be reflected by increased water level at the port of Montreal. But who would conduct such a study, who is responsible for conducting a study of such a thing, and of the feasibility of a grand canal scheme? Who would conduct a study of possible controls between lake Huron and lake Michigan and lake Erie affecting the levels there? Could we have a list of possible studies, and who would actually conduct them or who is conducting them? And finally, in taking physical action, people are following the flows for power purposes, and people are dredging channels for ship purposes, and people are dredging harbours for shipping purposes, and people are regulating water levels where this is possible on lake Ontario and lake Superior.

Who is responsible for taking that special action? What agencies are involved, and so on? And finally, taking two headings that are of interest especially, who are involved? In other words, we not only have the interest established of power production, but we have also a further interest in the resort operators and of people of that type, and we have the interest of various provincial agencies, and the interest of the state agencies in the United States and so on.

And then finally I would like to see a list of governmental agencies involved in the problem with the specific things that they do indicated beside it. We would wind up with what would be essentially a terrific mass of material, but I think if we did this, we could get a better grasp and have essential guidance in the matter.

I do not think we are going to solve any technical problems in this committee. That is a job for a specialist. But I think that we should make a serious effort to try to understand the administrative problem, and if we could only have a presentation of this type, I think it would help us to start to understand the administrative problem. My question is: Is this possible, and if so, could your department be able to assist us in this matter?

Mr. AIKEN: I think that should be the committee's report.

Mr. SMITH: Do not ask for a diagram, because Rube Goldberg has retired.

Mr. PATTERSON: We in our department would certainly endeavour to provide you with something which would be helpful along those lines. As has been indicated, it is quite an involved affair, when you consider all the interests and associations and agencies in the international as well as in the national sphere. But if it is the wish of the committee that we attempt something along these lines—and much of this information as to the collection of basic data has been presented to the committee in the briefs which have been filed with you up to the present time—and if it is your desire that we undertake to put this down in some condensed form, we shall be happy to do so.

Mr. SMITH: I think it would be most desirable to get it without any accompanying data, as it were, but to show who is responsible, and who is interested, because I am quite sure from what Mr. Hahn has said, that he is speaking for the whole committee, and that this really would help to solve the problem of writing our report. Such a condensation would be almost essential for us to have in presenting an intelligible report.

Mr. HAHN: A lot of the data or information exists now in narrative form through the various briefs we have received. I suppose we might be able to dig into the briefs and individually try to pull it together. I think it would be very helpful if this could be done on a standard basis for the committee.

Mr. AIKEN: Before we resume our next session.

Mr. TURNER: Yes; reduce it from narrative into graphic form, in other words. I think it would be useful if each one of the five departments was to present its own version of this.

The ACTING CHAIRMAN (*Mr. Legault*): I think Mr. Hahn practically has described the purpose of this committee.

Mr. WHELAN: I had one question arising out of Mr. Turner's, but which may not be similar to Mr. Turner's. Does Mr. Patterson think the great lakes levels will come back up by themselves?

Mr. PATTERSON: Mr. Chairman, based on history, I do not have any doubt but that the levels will come back, but I cannot venture an opinion in respect of when it will make the turn.

Mr. AIKEN: Regardless of the fact that there are fluctuations and that the water levels will come back, do you believe there is more need now for controls of some sort on the water levels and the outflow than there was in previous years prior to the seaway; do you think there is a greater need? Of course the reason for my question is that if there is a natural flow which no one can prevent or do anything about, then that is one thing; but if there have been other factors which have changed or altered the natural flow, then perhaps that is what basically we are concerned about.

Mr. PATTERSON: If the question means do I consider there has been a greater development and use of these waters since the seaway, there is no doubt about that; there are far more people living on the shores of the lakes today than there were 10 and certainly 15 or 20 years ago. Every year sees an increase in the use of the foreshore of the lakes and every year sees an increase in population living along the lakes; every year sees an increase in industrial usage of the waters of the lakes.

Mr. SMITH: And more traffic on them.

Mr. PATTERSON: Yes.

Mr. AIKEN: Do any of these things affect the levels?

Mr. PATTERSON: In our brief we have indicated some of the things which do have an effect on the levels. Improvements for some purposes have affected levels. In some cases measures are being taken to remedy this effect.

Mr. DAVIS: There are various ways in which the water disappears. It flows out and is used for navigation purposes, it evaporates, and so on. Is there another category of consumption which has to be measured; for instance, water taken inland to a city and used for domestic and industrial purposes, some part of which does not return to the basin?

Mr. PATTERSON: I do not think that up to the present time there has been any such use in respect of which the loss is measurable.

Mr. DAVIS: It is not appreciable in relation to the large numbers with which we are dealing.

Mr. PATTERSON: That is correct.

Mr. DINSDALE: I would like to pursue the suggestion raised by Mr. Hahn and the problem of co-ordination which hangs over the committee. Also, I would like to refer back to a matter raised by Mr. Turner earlier this afternoon. The advisory committee on water resources policy does have a co-ordinating function. I imagine the information which has been requested by

Mr. Hahn largely will come out of the records of this advisory committee. Is that correct, Mr. Patterson?

Mr. PATTERSON: As I understand the question and the suggestion by Mr. Hahn, it would go much wider than the policy considerations which take place in that committee. There are all the basic functions of data gathering which go on. In connection with this desired condensation, I wonder whether it is the wish of the committee that in respect of these actions which the different departments take you would like to have the authority for the responsibility incorporated in this.

Mr. AIKEN: Yes; very much.

Mr. PATTERSON: The particular act or the particular agreement?

Mr. HAHN: The sort of authority I was thinking of, for instance, was in respect of shipping, the Department of Transport, and in respect of dredging, the canals branch. I am interested in knowing who they have to consult, or who has authority to do it; do they do it on their own, or do they have to consult a certain authority such as hydro if they are affecting the flow over a power dam. We have not been thinking of statutory authority as much as who gives the authority for these things.

Mr. TURNER: It might be useful.

Mr. HAHN: Yes.

Mr. DINSDALE: It seems to me, in order to supplement the information which will result from Mr. Hahn's inquiry, that it would be useful to the committee if we could have someone appear before us from the advisory committee on water use policy so that this person might answer questions which would arise from this structural presentation. Who is the most knowledgeable man from this committee?

Mr. AIKEN: It would be among the deputy ministers; that is your choice.

Mr. DINSDALE: Who is the man who is responsible?

Mr. TURNER: Perhaps the chairman would be the man.

Mr. PATTERSON: The chairman, Mr. MacDonald or Mr. Cote.

Mr. AIKEN: Mr. MacDonald has come from treasury board less than a year ago. I do not mean to in any way disparage him, but this is the problem.

Mr. DINSDALE: There is no secretariat at the moment, but I imagine the secretariat would be knowledgeable. Is there any person who has been with the advisory committee for a long period who might be able to attend?

Mr. PATTERSON: At the present time Mr. Schonenbach in the department is acting as the secretary.

Mr. DINSDALE: Would it be possible to call in some former secretary; are they available?

Mr. PATTERSON: The secretary that was on the committee for the longest period is in Winnipeg; the one who succeeded him left some months ago and I believe is in Toronto with an oil company.

Mr. DINSDALE: The man with the longest experience would be the person most helpful to this committee. I would suggest that the steering committee might consider calling someone like this.

The ACTING CHAIRMAN (*Mr. Legault*): Would it be your intention to have the steering committee decide on the line of action in order to co-ordinate all the data we have accumulated so far?

Mr. DINSDALE: Yes.

Mr. TURNER: It might be useful, when tabling the report on the water use committee, to have a list of the personnel of the water use committee since 1955 as it developed.

Mr. AIKEN: I did not mean to disparage Mr. MacDonald, but I happen to know he has been in this department for less than a year.

Mr. PATTERSON: Since he has been with us he has been a very active man on the water use policy committee.

Mr. AIKEN: I know he was very active on the treasury board.

Mr. TURNER: Is it not true that the water use interdepartmental committee has been sitting more frequently in the last year than in the past?

Mr. PATTERSON: Yes.

Mr. TURNER: Then it may be that in terms of meetings Mr. MacDonald has as much experience as anybody.

The ACTING CHAIRMAN (*Mr. Legault*): Is it agreed that this will be left to the steering committee?

Agreed.

Mr. DINSDALE: In respect of co-ordination with the United States, there is a data co-ordinating committee which is referred to on page 160 of the fifth report where it says:

Officials of the pertinent Canadian and United States agencies met in early 1953 and formed the co-ordinating committee on great lakes basic hydraulic and hydrologic data. Representatives of the Departments of Mines and Technical Surveys, Transport and Northern Affairs and National Resources form the Canadian section of this committee.

Is this the only co-ordinating body between the two countries?

Mr. PATTERSON: It is the only continuing body on the great lakes system that is dealing with the basic data. We have other international committees on the great lakes system itself in connection with the St. Lawrence regulation and in connection with the Niagara operations. These, and the boards which look after the operations for the International Joint Commission, are meeting quite frequently.

Mr. DINSDALE: Are we having any witness from the United States side?

Mr. TURNER: The United States side of what?

Mr. DINSDALE: The issue, the problem.

The ACTING CHAIRMAN (*Mr. Legault*): Yes. On December 10, Mr. Mezerow is to appear as a witness.

Mr. TURNER: Mr. Patterson, a very great part of your presentation at the last sitting of the committee related to lake Superior elevations and it demonstrates that the recorded elevations are consistently higher than the computed natural conditions.

I interpret from this that as a result of the control instituted in 1955 the levels of lake Superior have been consistently higher than they would have been under natural conditions. Is that a proper deduction from that table 5?

Mr. PATTERSON: Yes, sir. The regulation activity with the control work at the outlet of lake Superior resulted in the levels of that lake being higher since 1955 than they would have been, if regulation had not been instituted.

Mr. TURNER: I take it that the compensatory works attached to that control were relatively simple.

Mr. PATTERSON: Yes, it was a relatively simple operation to instal regulating gates at the outlet of lake Superior for the reason that there was already in existence a navigation canal and locks, and by putting in these additional gates there was no requirement for locks to be constructed. The control at the outlet of lake Superior is concentrated. It was simply a matter of passing the water over this natural control. This differs very much from the situation faced

at the outlet of lake Huron where control is spread out for 84 miles, if you go right to lake Erie, and there is no concentrated control. But if you put in regulating works there you would have to provide a lock to get the navigation by. You would have to improve the channel for the full distance to lake Erie in order to discharge the additional water that you would have to discharge in time of high water to get rid of the storage which you have created. With the level at lake Superior, and with this better condition of lake Superior as a result of improving supply on lake Superior this year, lake Superior is the one lake which has had the benefit of the improved supply situation.

And as a result of that, the board of control that operates there in consultation with the International Joint Commission and with the authority of the commission, increased the discharge from lake Superior by 10,000 c.f.s. over and above what the rule called for. What has happened with respect to that additional release I think is very illustrative of the problem which you have in regulating lakes Michigan and Huron.

Since April 1, the board has increased the flow by an additional 10,000 c.f.s. which over that period amounts to 80,000 c.f.s. months. This is sufficient water to raise the level of lake Ontario one foot. Lake Ontario in actual fact has been raised about one half an inch. The bulk of that water which was released from lake Superior is still up in lake Huron.

Mr. AIKEN: Keep it there.

Mr. PATTERSON: Lake Huron has been raised about one tenth foot, while lake Superior has been lowered about two tenths, as a result of the action that was taken.

Mr. TURNER: This illustrates the time lag in working it down.

Mr. PATTERSON: Exactly, and if you had storage in lake Huron and lake Michigan, the problem of getting it out at the time when the high water comes, is a problem which we have to face in looking at the regulations. It is not just a case of putting in a gated structure on the lake, but the channel capacity all the way down to Montreal has to be improved.

Mr. TURNER: You have indicated in what you said that the problem of controlling lake Huron or lake Michigan is of a different magnitude now from what it was in 1955 in controlling lake Superior, and that it is quite a different problem, and that it would cost a lot more money to be achieved. I notice that the United States corps of engineers in soon to present a report to the chief of the corps and it is rumoured that their report is going to show that it is virtually impossible to control lakes Michigan and Huron. At any rate, that is what the *Chicago Tribune* said. Have you any comments about it? You said it was more difficult, but is it impossible?

Mr. PATTERSON: No, I do not think it is impossible; it is a matter of money and what it would cost. I would imagine that the corps of engineers has approached this, as they do their various projects, on a benefit-cost ratio, and that they would estimate what the cost of the project would be and what the benefit would be, and if it does not show a good benefit-cost ratio, then the project may very well be turned down.

Mr. TURNER: They would be looking at the benefit-cost ratio from the United States point of view and perhaps they would not look at it from the point of view of the whole system.

Mr. PATTERSON: I think they would look at it from the total cost of the project.

Mr. TURNER: But, from the point of view of benefit to the United States.

Mr. PATTERSON: So far as I know they certainly have not been making any investigation of what the benefit to Canadian riparian owners or Canadian navigation might be.

Mr. TURNER: Mr. Patterson, you need not comment on this if you do not wish to because neither you nor I have seen the report of the United States corps of engineers. But, whatever their findings are, they might not necessarily have a conclusive bearing on what the Canadian findings might be because they are going at it from a different cost-benefit ratio, are they not?

Mr. PATTERSON: I think there is that possibility. Where the two are looking at it together there is the possibility that the benefits to be achieved by regulation would be much greater than if they were only looking at their own benefits.

Mr. SMITH: Mr. Patterson, you spoke of the fairly drastic or pronounced effects of the dredging below Montreal in order to clean out the channel in the harbour there, and your report indicates that the dredging in the St. Clair river has had a fairly minimum effect on the water levels of lake Huron and lake Michigan. Is that not so?

Mr. PATTERSON: I think the report shows there has been a considerable effect on the level of lake Huron over the whole span of years.

Mr. SMITH: Well, you mentioned between one and one and a half feet, of which only three tenths of a foot has resulted from the dredging since 1933. That is set out at page 21. Have I read that correctly?

Mr. PATTERSON: I think you have read it correctly.

Mr. SMITH: Well, three tenths of a foot has not a very substantial effect, has it?

Mr. PATTERSON: No, compared to the fluctuation.

Mr. SMITH: But, compared to the fluctuation or what we need in respect of the problem we are facing at this time.

Mr. PATTERSON: That is correct.

Mr. SMITH: It does not have a very substantial effect.

Mr. PATTERSON: But, it means considerable when it is added on to the natural fluctuation that is occurring. Part of the dredging that has occurred in the St. Clair and Detroit rivers prior to this has been compensated for; part of it is going to be compensated for.

Mr. SMITH: The reason I am asking this question is that newspapers in our part of Canada are flooded with articles on who pulled the plug. You probably have had some of these articles drawn to your attention. These articles endeavour to attribute the whole thing to the recent dredging in the St. Clair river. And, as I said, if I have read your report correctly, it says that only three tenths to four tenths has resulted since 1933.

Mr. PATTERSON: Yes.

Mr. SMITH: I have one other question which is unrelated. It is a rather parochial topic, but sometimes one of the members in the house makes speeches on it.

They talk about reviving the old Newmarket canal or some version of it by building a canal from lake Simcoe out to lake Ontario and then another canal down the Nottawasaga valley into lake Simcoe.

As I understand that, it could only have the effect of again diverting more water and lowering the water in lake Huron. Would that not be the case?

Mr. PATTERSON: By the amount of water that would be required to operate the navigation facilities?

Mr. SMITH: Yes, and by the amount of water that presently from lake Simcoe flows into lake Huron.

Mr. PATTERSON: I do not think the amount of water that would be required to operate navigation facilities would be a substantial factor in the levels of a body of water like lake Huron, but it would have some effect.

Mr. DANFORTH: Mr. Patterson, in the studies of the water levels of the great lakes system there is ample evidence to ascertain the periods during which the water has been at its lowest and periods which indicate the water has been at its highest; but there is also the problem, as far as population is concerned, of the availability of water in the water table itself.

My question is this, Mr. Patterson: Has there been any study of, or are there any indications whether the level of the water table progressively follows the level of the great lakes water in its rise and fall?

Mr. PATTERSON: I think the two respond to the same basic cause. It is precipitation which provides the water for the water table and it is precipitation which provides water for the lakes.

Mr. DANFORTH: I know this is a matter of concern to a great many people. Could we assume, then, that if there was a change in precipitation it would once more cause the water of the great lakes system to rise, and that there would be a corresponding rise in the water table in the basin that is concerned?

Mr. PATTERSON: I am sure there would be a rise in the water table.

Mr. TURNER: May I ask a supplementary question?

Would the water table rise faster than the great lakes?

Mr. PATTERSON: I think it might be expected to rise faster than the great lakes. There are other artificial factors which affect it in localized areas. For instance, in the area of London, Ontario, where they have drilled a number of artesian wells, the water table has been lowered artificially and the natural process has been disturbed.

However, in an area where there is no such artificial factor, I am sure the water table would rise, and would rise faster than the lake levels themselves. They both respond to the increased precipitation and increased supply to the basin.

Mr. DANFORTH: I have one other line of questioning, Mr. Patterson.

May I turn to page 7 of the brief that was submitted. I was tremendously impressed and surprised to find that most of the loss of our precipitation is by evaporation and evapotranspiration, and that of the available precipitation only approximately one third actually reaches the water in the lake itself.

There has always been a belief, or we have been led to believe that proper use of reforestation or cover would perhaps make more of this water eventually available to the lakes by preventing a rapid runoff.

Am I correct in assuming from your report here that this would not be a big factor or could not be a big factor?

Mr. PATTERSON: I think where you have deforestation the water actually reaches the lake faster. It does not decrease the amount of water that reaches the lake necessarily, but it gets there sooner. While it is held back with forest cover you have the factor of the transpiration. All the water that goes out through the forest leaves is a factor.

Mr. DANFORTH: It is a question of which loss is the greater—the rapid run-off or the transpiration?

Mr. PATTERSON: The rapid run-off is not actually a loss to the lake system because when the water gets into the lake the fact that you may have an extra foot of water on the lake does not increase the amount of evaporation that you lose from the lake surface.

Mr. DANFORTH: But would evapotranspiration be a direct loss?

Mr. PATTERSON: Yes.

Mr. DANFORTH: In effect reforestation could work in reverse?

Mr. PATTERSON: Yes, it could, I think.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Mr. Patterson, I understood from some of your earlier remarks you feel that a control mechanism must be put into effect at the outlet of lake Huron if a project, such as the Grand canal project, is ever put into effect. Am I correct in assuming that this is your feeling?

Mr. PATTERSON: Yes, that is what I have attempted to draw to the attention of the committee in the brief, that this is a very important consideration which cannot be lost sight of.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): You feel it is essential that control measures should be put into effect at the outlet of lake Huron if more water is to be diverted to either lake Superior or lake Huron from another system?

Mr. PATTERSON: I feel it is essential. If the government is not going to be held responsible for flooding during periods of high water it has to have the facilities to dispose of that increased water that is in the system in a manner in which it will not damage the interests of the people that live along the shores.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): In making forecasts about the cost, I think at one time you mentioned a figure in the vicinity of about a billion dollars for control measures on lake Erie and lake Huron. Are you thinking in terms of underwater weirs or are you thinking in terms of a dam across the entrance to the St. Clair river with a canal bypassing the dam? Have you started to think in concrete terms about the type of control measure?

Mr. PATTERSON: No. If I used the figure of a billion dollars it was an order of magnitude figure. It was something that is designed to impress one of the magnitude of the problem with which we would be faced. We have not attempted to design structures either in the form of gated structures or submerged weirs.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Are the two rivers, the St. Clair river and the Detroit river, able to handle a substantially increased flow of water without causing flooding to the people living along the rivers?

Mr. PATTERSON: I would say they are not capable of handling increased flows over and above what they have experienced in nature. If you go back to 1951-52, damage was being done in many areas through there. If you had increased flows, with the increased development which has occurred on the connecting rivers I feel quite confident that you would be into a situation of serious damage.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I do not know what amount of water is envisaged as being diverted from James bay or Hudson bay watershed back into the great lakes watershed, but assuming it was an average of 25,000 cubic feet per second—and I think it is much more that is envisaged in respect of the diversion in the Kierans plan—would this result in a drop being necessary in the St. Clair and Detroit rivers in order to carry the additional flow of waters through peak flood periods of the lakes.

Mr. PATTERSON: I would think so. You would not be discharging just an additional 25,000 cubic feet per second. Once you are faced with a high water situation you would have to get rid of what you had stored on lake Huron and which had accumulated over a period; you would have to get rid of this over a short period or you would have trouble on the lake.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Not only would you have to have control measures in the way of dams and weirs at the outlet to lake Huron and the outlet to lake Erie and Michigan, but also you would have to raise the St. Clair and Detroit rivers.

Mr. PATTERSON: It is questionable whether the present channels of the rivers would permit of the increase in capacity. It might involve a new channel.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Does anyone propose to study the cost of these works in the immediate future?

Mr. PATTERSON: As the committee is aware, there has been a reference to the International Joint Commission to study the whole great lakes problem. In the course of this study the decision will have to be made from time to time in respect of the particular type of improvement, the size of the improvement and the cost of such improvement. So, I think the answer to your question would be yes.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Would you tell us who could supply this committee with the dollar value of water to the United States cities which presently are in need of this water? Is there any economist whom we could call before this committee or any United States official who could come here and tell us in dollar terms what this diversion would be worth to the United States? I would like to have an idea what that diversion costs per cubic foot per second.

Mr. PATTERSON: I am not aware of it. I am not in a position to tell you of any individual who can give you a fair assessment of the value of the water to the different interests along the lake.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Would there be anyone in Chicago who could tell us what the additional water would be worth to that city?

Mr. PATTERSON: I think that they might be very cautious about it.

Mr. DINSDALE: You might call in the premier of British Columbia.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I would like to ask if there is available at this stage anyone who could give us any sort of estimate of the power potential of a diversion of water from the Hudson's bay watersheds?

Mr. PATTERSON: Well, the value of such a diversion to the power interests would to a very large extent depend upon the continuity of the diversions. At the present time the great lakes system suffers from low water for a few years, and then it suffers from high water; and during the high water period it is questionable whether you could countenance diverting water into the great lakes system. So the diversion might have to be cut off for a few years, and this would be a very serious thing to power installations which were placed on the diversion route or, on northern waters leading to the great lakes. They are still capable of value to the power interests that are located on the connecting waters of the great lakes, and the St. Lawrence river, if these waters were allowed in for a certain time and could be regulated and used for their benefits.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Do you know if the United States corps of army engineers have investigated anything other than the simple engineering aspects of these controlled measures on the great lakes? Do you know whether they, on their own have commissioned any studies of the use of water for irrigation in the American west, and the additional use of water from the great lakes in addition to what might be used for city purposes? Do you know of any such study?

Mr. PATTERSON: I do not think that the corps approached their study on the basis of irrigation. I believe they looked at it from the point of view of

improving navigation, improving power, and improving the foreshore interests from the point of view of a better regulated range. But I do not think they considered irrigation as a factor.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Will this joint commission be studying the potential use of water south of lake Michigan for irrigation and other purposes? This water may well be economic now, but we do not seem to be gathering the facts in this committee which will enable us to say, even in a few months, whether or not it would be worth our while to initiate a diversion from the north. But if we were to have a study or commission a study of the possible effects south of lake Michigan, we might find there is a much greater potential for the use of water than we realize now. I wondered how we could get this information for this committee.

Mr. PATTERSON: Well, Mr. Chairman, the present study that the International Joint Commission is initiating has to do with the regulation of the level of water that is now in the great lakes system or that is naturally supplied to the great lakes system. They are not contemplating additional diversion out of the system for irrigation south of lake Michigan or for any other purpose.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Do you not think this is an area which should be studied because after all it has a direct bearing on the economy and on the value of directing water from the Hudson's bay watersheds?

Mr. PATTERSON: Well, it is my own opinion that before consideration is given to diverting water from the northern watershed we should know what we can do with and how we can control the waters that are now in the system.

We have been faced with very damaging high waters, and if these high waters that we had in 1952 return now, with the increased development that has been going on on the lake shores, the damage would be very much worse. We are experiencing at the present time a low water situation. These two changes have occurred within 12 years of each other.

I think the first thing that is very essential to consideration of adding any water to the system is to know how you can handle what you have.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): But, you know of no study that has been made in the area south of the great lakes; that is, in the United States, on the topic of water needs for the next 10 or 12 years, or longer, for industrial and agricultural purposes.

Mr. TURNER: Mr. Chairman, may I suggest that Mr. Meserow is coming on Thursday. He is chairman of the great lakes commission which is formed of representatives from the eight American states fronting on the great lakes. He might be able to answer that question.

The ACTING CHAIRMAN (*Mr. Legault*): Yes, perhaps he could enlighten us in this connection.

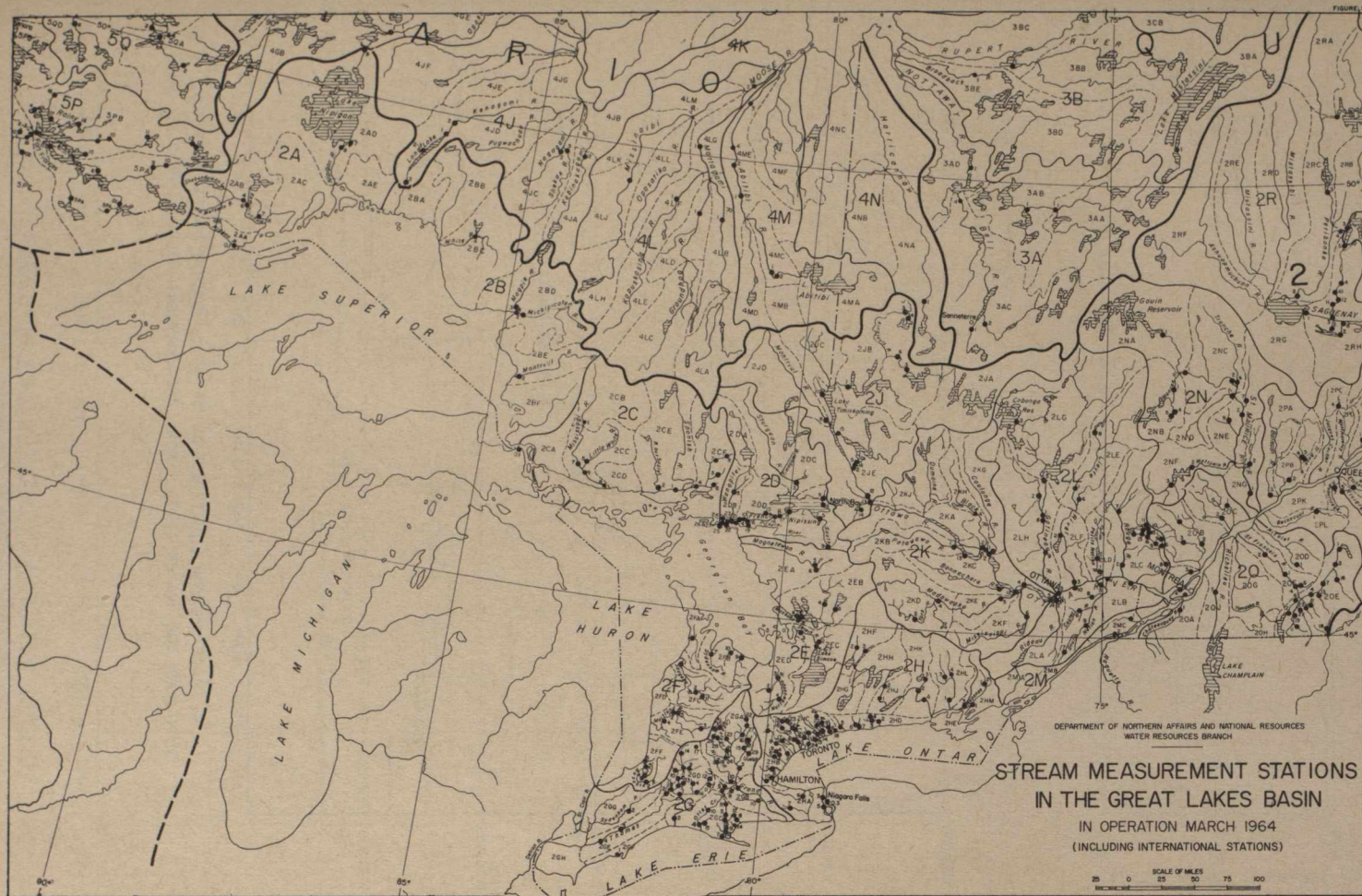
Mr. PATTERSON: I believe there has been a study made in the United States of water requirements of the whole area.

Mr. AIKEN: Mr. Chairman, I suggest that this might be a good time to adjourn.

Mr. PATTERSON: Mr. Chairman, before you adjourn, in connection with questions which Mr. Rock directed to me I have had handed to me now an indication that one foot of storage on lake St. Louis would raise the Montreal harbour water level one half foot for one day.

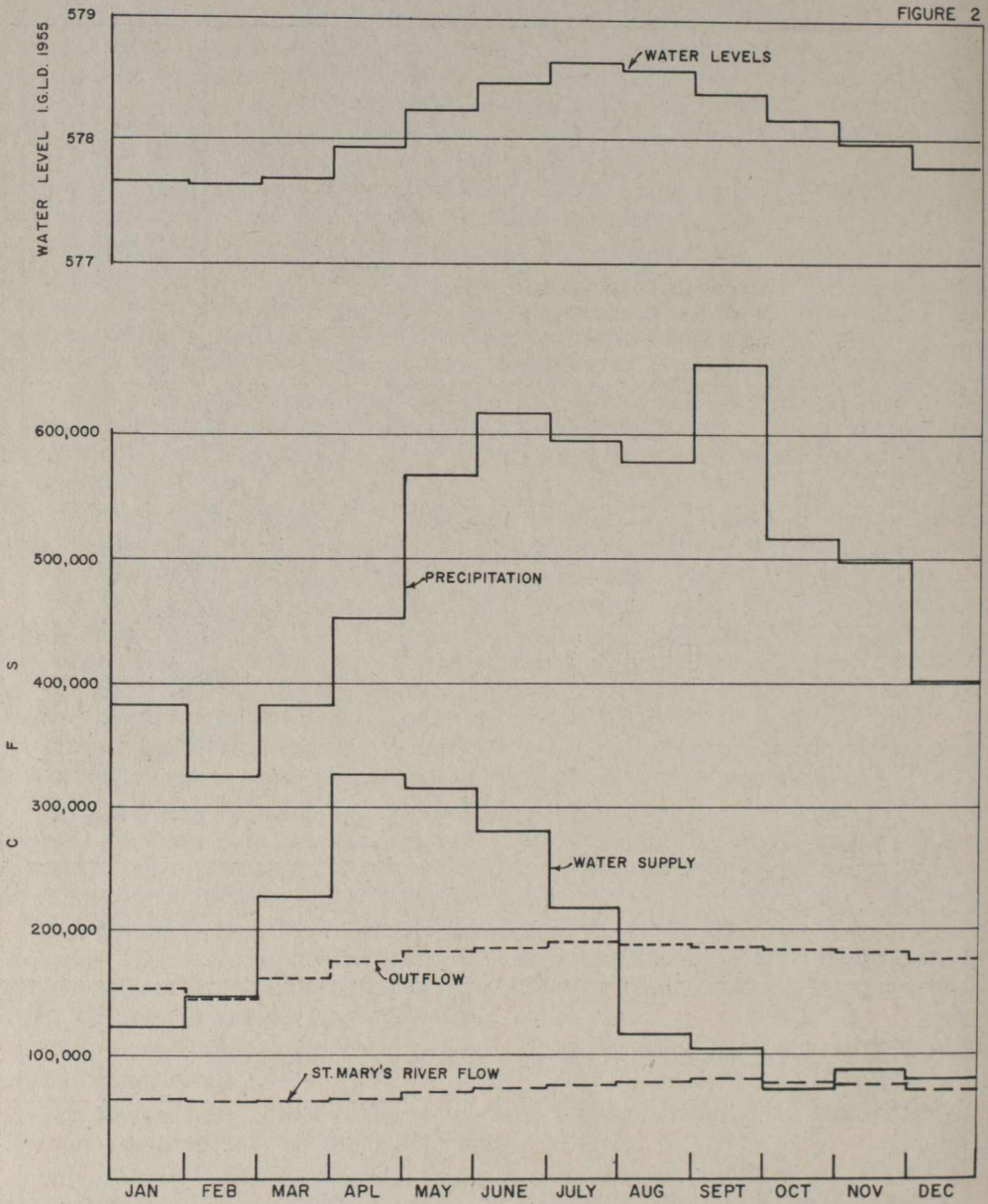
The ACTING CHAIRMAN (*Mr. Legault*): Gentlemen, we will adjourn until 3.30 on Thursday afternoon, at which time we will hear Mr. Meserow.

I would like to take this opportunity of thanking Mr. Patterson and his officials for appearing before us today.



APPENDIX "B"

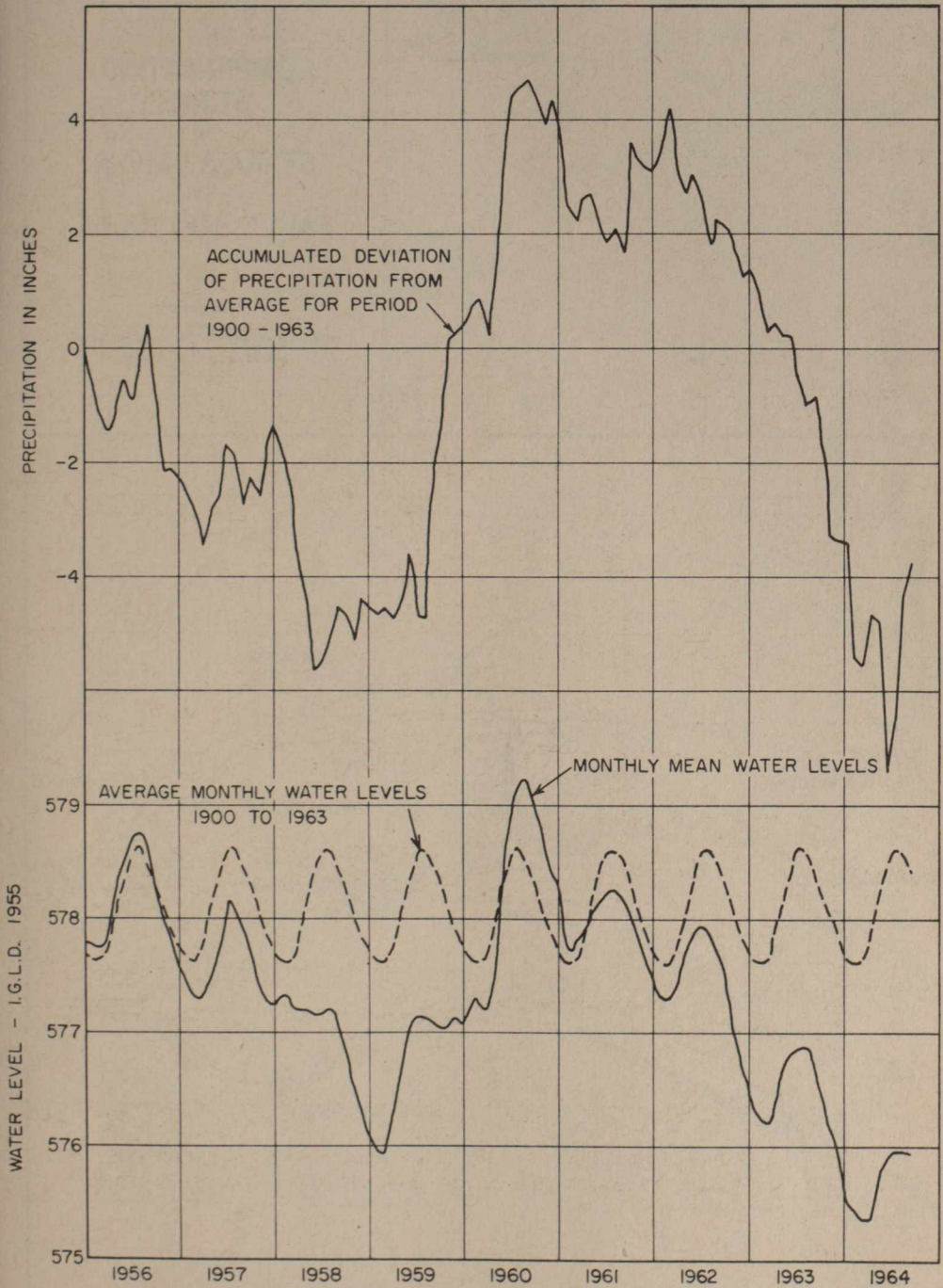
FIGURE 2



AVERAGE MONTHLY DISTRIBUTION OF PRECIPITATION, WATER SUPPLIES, OUTFLOWS AND WATER LEVELS FOR LAKE MICHIGAN-HURON (1900 TO 1963)

APPENDIX "C"

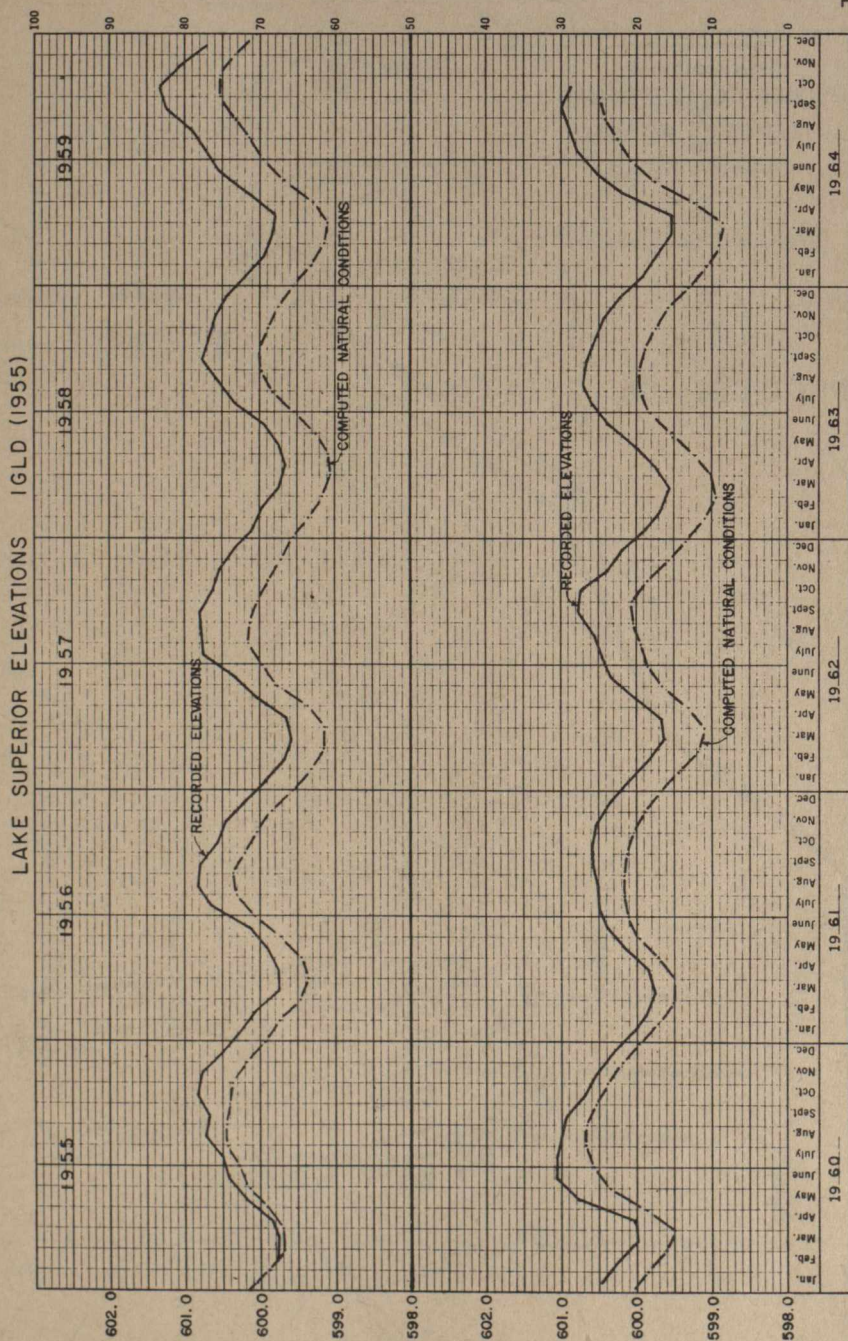
FIGURE 3



EFFECT OF PRECIPITATION ON WATER LEVELS OF LAKE MICHIGAN - HURON

APPENDIX "E"

FIGURE 5



LAKE SUPERIOR RECORDED ELEVATIONS AND COMPUTED ELEVATIONS UNDER NATURAL CONDITIONS

2-6077

APPENDIX "F"

FIGURE 6

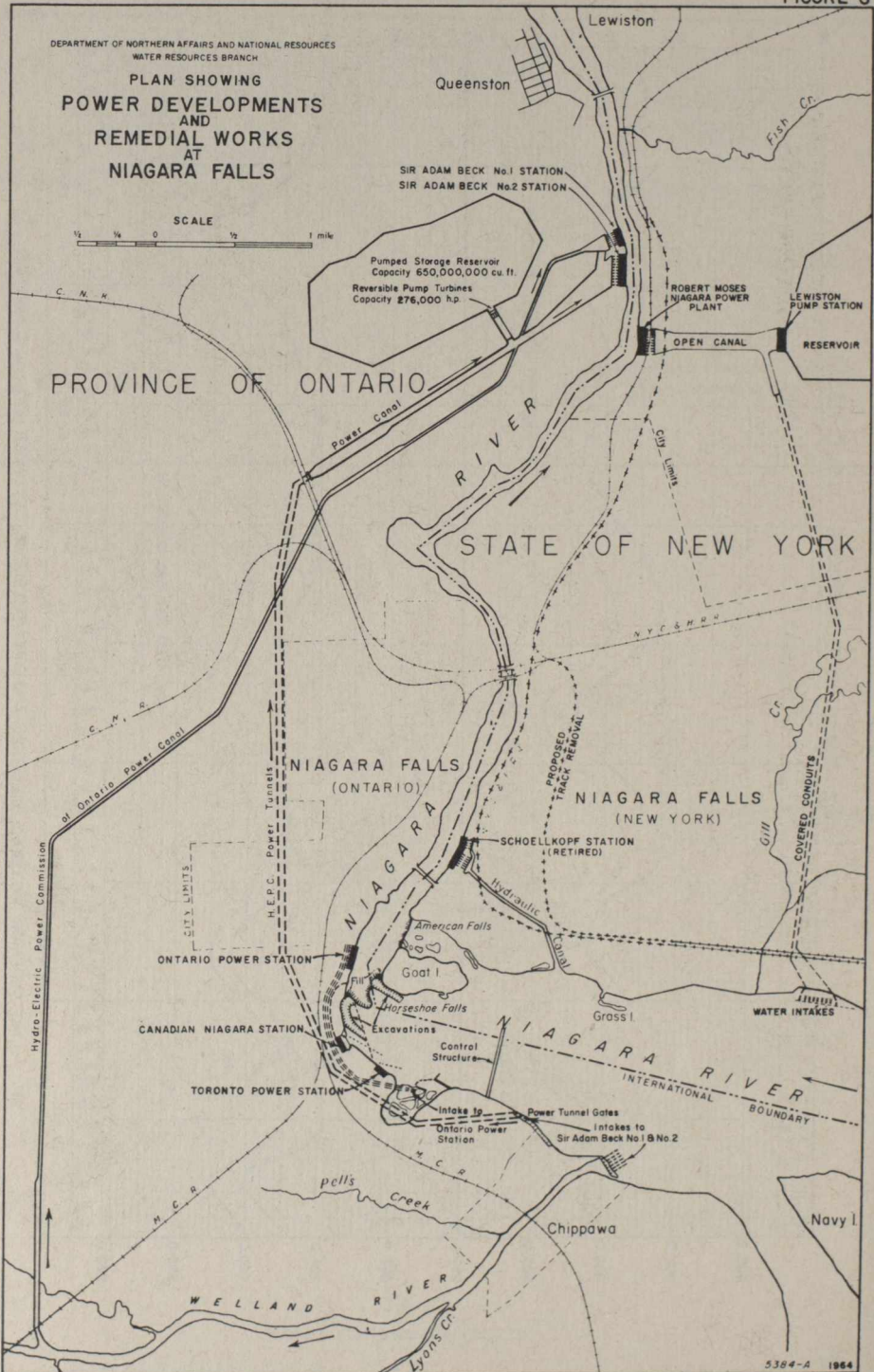
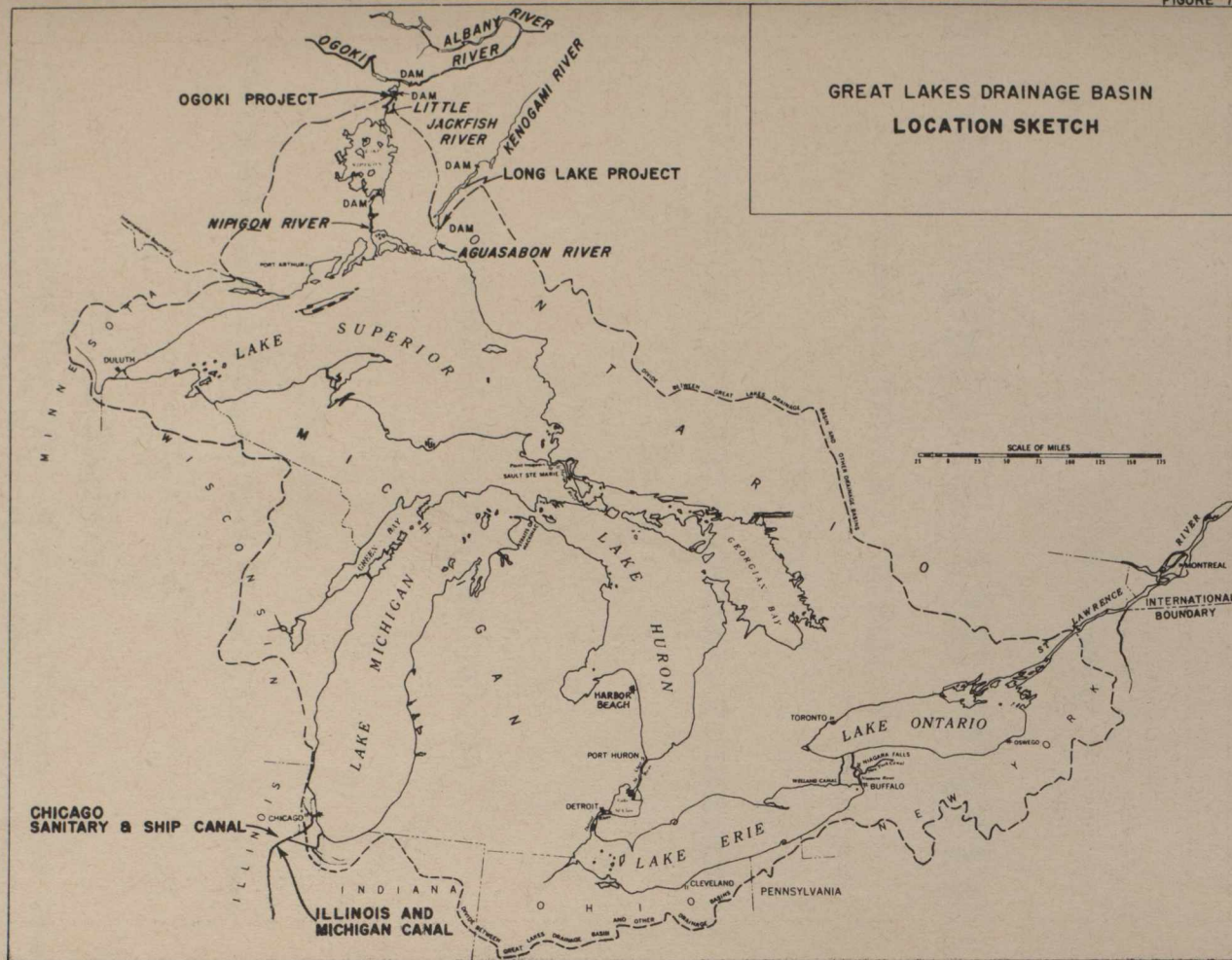
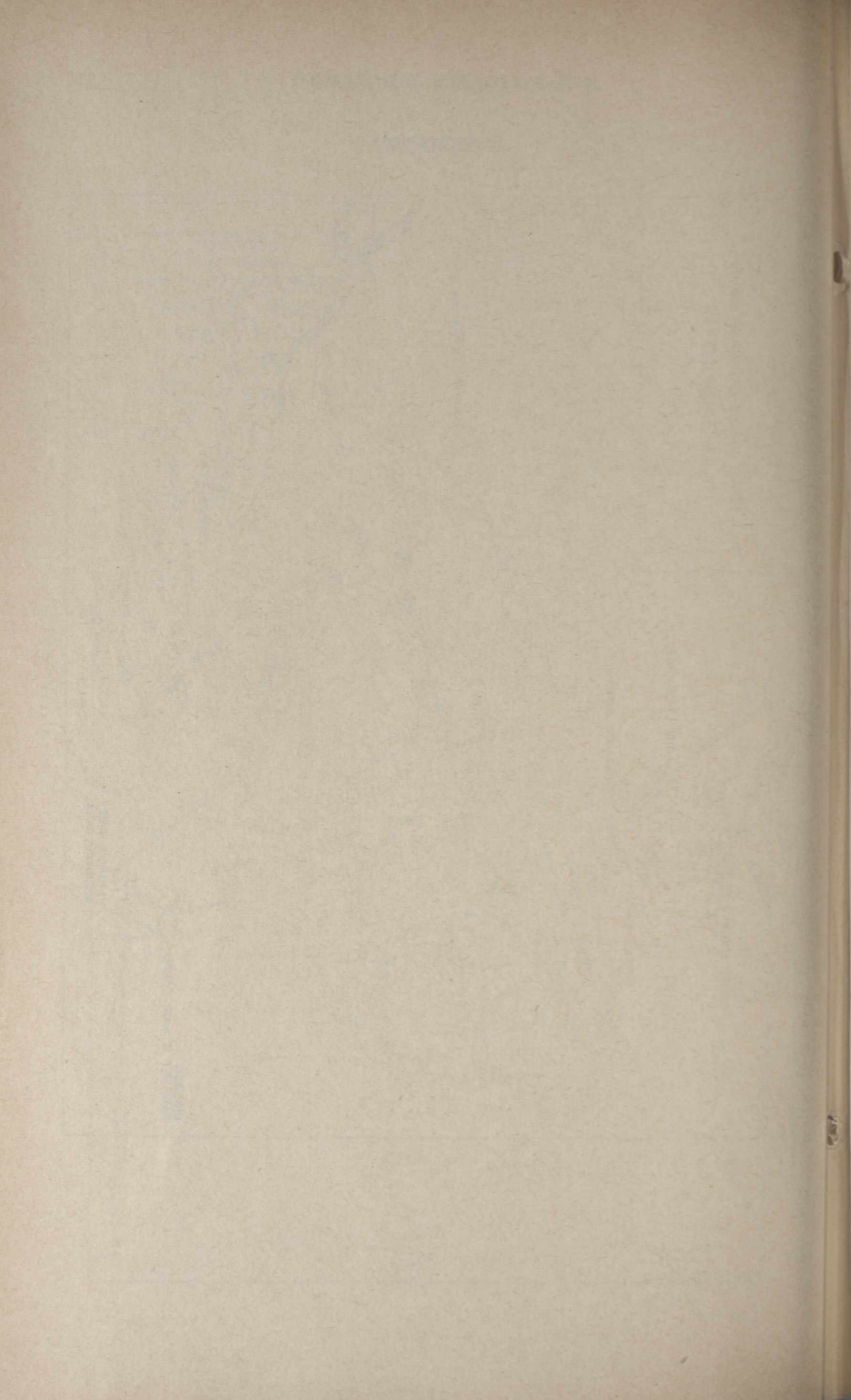


FIGURE 7





HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS-J. GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 7

THURSDAY, DECEMBER 10, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

WITNESSES:

Mr. Albert J. Meserow, Ann Arbor, Michigan, Chairman of the Great Lakes Commission; Mr. T. M. Patterson, Director of Water Resources Branch, Department of Northern Affairs and National Resources.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias-J. Godin

Vice-Chairman: Mr. Ian Watson

and Messrs.:

Aiken,
Alkenbrack,
Berger,
Danforth,
Davis,
Dinsdale,
Flemming (*Victoria-
Carleton*),
Foy,
Grégoire,
Habel,
Hahn,

Harley,
Herridge,
Laprise,
Leboe,
Leduc,
Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,
Noble,

Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

(Quorum 10)

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

MINUTES OF PROCEEDINGS

THURSDAY, December 10, 1964.

(10)

The Standing Committee on Mines, Forests and Waters met this day at 5:20 p.m., the Chairman, Mr. Osias-J. Godin, presiding.

Members present: Messrs. Aiken, Danforth, Godin, Hahn, Harley, Leboe, Legault, Loney, Martineau, McBain, Peters, Rock, Ryan, Rynard, Scott, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*) and Whelan—18.

In attendance: Mr. Albert J. Meserow, of Ann Arbor, Michigan, Chairman of the Great Lakes Commission; and Mr. T. M. Patterson, Director of Water Resources Branch, Department of Northern Affairs and National Resources.

The Committee resumed its consideration of the subject-matter of the water levels of the Great Lakes System.

The Chairman introduced Mr. Meserow who made a preliminary statement; he was questioned thereon and on related matters.

Mr. Patterson answered questions about the diversion work from Ogoki and Long Lake into Lake Superior.

The Chairman expressed his gratefulness to Mr. Meserow for his appearance. He thanked the members for having made this meeting possible in view of the importance of the debate and the vote in the House.

At 6:25 p.m. the Committee adjourned until 3:30 p.m. Tuesday, December 15th.

Gabrielle Savard,
Acting Clerk of the Committee.

EVIDENCE

THURSDAY, December 10, 1964

The CHAIRMAN: Gentlemen, I see a quorum. You will please come to order. We are grateful that we were able to find a spot for Mr. Meserow to testify this afternoon, and we are grateful that a reporter was available at this time. I would like to introduce to you Mr. Albert J. Meserow, of Ann Arbor, Michigan, Chairman of the Great Lakes Commission.

I believe through our hearings most of you are familiar with some of the functions of that commission, so without any further remarks from myself I am pleased to give you Mr. Meserow, who may wish to make a statement before you question him.

Mr. ALBERT J. MESEROW (*Chairman of the Great Lakes Commission*): Mr. Chairman, and members of the committee, I appreciate the opportunity of being here. This is my first appearance in Ottawa, especially before such an august body as your House of Commons which I visited a few minutes ago. I would like to preface my remarks by saying that my mother was born in Canada. She is 80 years old. So you may be assured that at least one half of me is sympathetic to your side of the case. Your invitation to me as chairman of the Great Lakes Commission is an indication of the spirit of co-operation existing between our two countries, and a recognition that the problems of the great lakes are not limited to either side of the shores of those lakes.

The Canadian government, your parliament and particularly this committee are to be complimented on showing your interest in the problem of the levels of the great lakes by conducting these hearings.

The Great Lakes Commission is an eight state statutory agency with a membership through a compact ratified by the state legislatures of the eight states of New York, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Wisconsin, and Minnesota. We are concerned with the water problems of the great lakes basin and we act for our states in this matter.

Incidentally, the compact provides for membership in the commission by the provinces of Ontario and Quebec whenever the laws of those provinces and the laws of Canada will permit their membership in the compact.

Several years ago the International Joint Commission embarked on a plan with the ultimate objective of regulating and managing the waters of the great lakes for all purposes. This, of course, would have to be effected by treaty between the two governments and the provinces and the eight great lakes states participating. The commission recognized the problems of the great lakes, namely, pollution, fisheries, recreation, increased demands for domestic and industrial uses, power problems, navigation problems, diversions, and of course the problem of fluctuating levels. In 1952 and 1953 our levels were at a record high and caused considerable damage. Today we are confronted with the acute problem of record low levels.

The present low levels have caused considerable damage to shoreline facilities, recreational areas, conservation areas, power output, and to navigation. It is my estimate that the loss and damage resulting from these record low levels on the great lakes and the St. Lawrence river for the past year should exceed \$100 million.

What is the answer and what are the remedies? It is unfortunate, but we must face the realization that there is no immediate cure or help for this

problem. Recently in your parliament someone suggested "Pray for rain". I doubt whether this would help immediately. I suppose we could also try to revert to biblical times and seek a Moses who could wave a magic wand and make the waters rise.

The apparent futility of solving the problem immediately should not discourage our efforts and your continued efforts for a long-term remedy. What you are doing here and now is the beginning of a project which should have been started about 50 years ago, and I am sure that, in the not too distant future, what this committee is doing will prove to be of benefit to the people on both sides of the border.

Most of the technical people who have watched and studied these levels agree that the present low levels are due to natural causes, chiefly lack of precipitation and evaporation. Lake Erie loses as much as three feet in its level in one year, owing to evaporation alone. The man-made factors cause only minor lowering of levels which are more than compensated for by diversions into the great lakes.

The solution of this problem is an engineering one. We have heard all types of theories about solving the problem of the levels. Some say we need regulation of the levels through controls. Others say regulation alone is not enough, and they advocate bringing more water into the great lakes from outside sources, while others say "What will we do with the extra water when the levels are high"?

Gentlemen, these are technical problems that only study and technically qualified experts can answer. The important thing is to start now and study all the possibilities and resolve the problem with the engineering ability available to both countries. This appears to be the only intelligent approach to this vast problem.

A big step to solution of the levels problem was given impetus by the meeting called in Toronto on June 29, 1964, by Premier Robarts, and the meeting of the Montreal port council held in Montreal on June 30, 1964. Both sides of the border were represented at these meetings through Premier Robarts and his cabinet from Ontario, the minister of natural resources, René Lévesque of Quebec, Governor Turner of Illinois, Governor Welsh of Indiana, and the Great Lakes Commission representing the eight great lakes states. As a result of the meetings there was unanimous agreement by all persons represented that co-operation should be had toward this common problem, and that both governments should be urged to cause a reference to be made to the International Joint Commission, and that committees representing the two provinces should be appointed by their respective ministers to meet with representatives of the International Joint Commission to exchange information and discuss this problem and its solution. I am pleased to report that the ministers have appointed their respective committees, and we have already held one meeting in New York, and another meeting will be held in Toronto in the near future.

As a result of these efforts and through requests by the governors of the great lakes states and the International Joint Commission upon the President of the United States and upon the secretary of state, Dean Rusk, probably the most important step in the water resource history of our two countries was made on October 7, 1964, when both countries referred the problem of the levels to their respective sections of the International Joint Commission for study. Joint boards of control to set up the study mechanics have already been set up by the International Joint Commission, and the machinery is underway in both countries. Extensive studies to control the levels of lakes Michigan, Huron and Erie, the only lakes not now controlled, have been carried on by the United States army corps of engineers for several years, and the results

of these studies will be available to the joint board of control of both sections of the International Joint Commission. More intensive work and study will be required. But let us not be impatient and recognize that after these studies are completed, the real job of implementing these projects, whatever they be, can get underway.

Although the references to the International Joint Commission are not as broad and comprehensive as the International Joint Commission would have liked, and what it suggested, we do feel however that the present references are a step in the right direction, and the terms of the references do make provision for further and broader studies when the present level study is completed.

The present references of October 7, 1964, are limited to the study of the water of the great lakes basin. This excludes consideration of the various proposed plans for bringing more water into the great lakes from any source outside the basin.

There are four possible plans for bringing more water into the great lakes basin that have been under discussion from time to time with varying degrees of emphasis. Probably the most prominently discussed plan is that of the Grand canal project to reverse the flow of the Harricanaw river and connect it with the Ottawa river with outlets into lake Huron.

A second plan which has recently been presented and which at first blush appears to be grandiose, is the so-called Parsons plan. This plan suggests bringing more water into the great lakes from Alaska and the Yukon, and it hopes also to supply the arid west of North America as well.

A third source of water is one which I believe should receive further study and consideration. It is the one that would enlarge the source area north of lake Superior in the Albany river watershed to increase the flow in the Long Lac and Ogoki river or reverse new rivers in this area to flow southwards instead of north into the Hudson bay area where the waters are wasted.

I do not believe that only the sources in Canada should be studied, but also possible sources in the United States. There has been some suggestion made of the availability of waters from the Fox river in Wisconsin, the Des Plaines river in Illinois, and the Kankakee river in Illinois and Indiana as possible sources for replenishing waters in the great lakes. The United States rivers probably do not offer the magnitude of some of the Canadian sources, but they should be considered and studied also.

To dispel any doubts or misunderstandings, I wish to make it clear that the Canadian waters which are part of these plans which I have mentioned are the sole property of Canadians and should be studied by your government, if you should so decide. We in the United States as far as the great lakes are concerned are not making any claims to the natural resources which undoubtedly will some day prove as valuable or even more valuable to the existence of man than oil, uranium, minerals, or other natural resources. We merely point out these sources as a basis for study, so that some ultimate plan to solve the present common problem may be evolved.

In conclusion, gentlemen, again may I suggest that this committee give its consideration to provide for a study of the problems of the great lakes, including the present low levels, as true knowledge of the conditions can only come about through adequate study. This is the only intelligent approach to the solution of a problem for which generations to come will be grateful to you for your efforts. I thank you.

The CHAIRMAN: Thank you, Mr. Meserow. Now, Dr. Rynard.

Mr. RYNARD: Mr. Chairman, the witness was referring to the point of modifying these rivers that are flowing into James bay and reversing them to flow the other way into lake Superior. This could be quite a job. Does he

indicate that this would be an undertaking for the Canadian government to do? If you divert them into lake Superior you will benefit all of that watershed and benefit the American people, as well as benefit Canadian people, and perhaps even more so because you have more population.

Mr. MESEROW: I make the statement, not that we wish to shirk our responsibility, that there have been some claims that Americans are seeking to take away your water. I want to make it clear that we are not after your natural resources. They are yours to do whatever you wish with them. I might point out however on this map that there has not been too much discussion about this area here, where the Ogoki and Long Lac flow into lake Superior. I understand in a detailed map there are probably thousands of lakes and small streams up here which are not part of the Ogoki and Long Lac diversions but which could be tapped to increase the flow into lake Superior.

I am not an engineer, but I think there have been some preliminary engineering studies and surveys made, but not detailed ones, many years ago, and I think that this is one area that should be considered.

Mr. RYNARD: In other words, the financial responsibilities could be worked out jointly?

Mr. MESEROW: Oh, yes.

Mr. RYNARD: Would this be a better plan than the Grand canal scheme, or am I getting into a field which you do not wish to discuss?

Mr. MESEROW: May I say that in my 24 years of experience with this problem I do not think that today there is any person—maybe with the exception of Mr. Patterson here who is an expert—who can say with authority that any one of these plans is a better one, or even a good one. On the face of it the Grand canal plan might be feasible. But when you get down to study the engineering phases of it, it may not be feasible. I do not think that anybody can authoritatively say whether this plan is good, bad, or indifferent. The United States army corps of engineers have been studying the control of the level of lakes Michigan, Huron and Erie over the past 12 years, and they have not come up with an answer as yet whether or not it is feasible.

The CHAIRMAN: Now, Mr. Turner.

Mr. TURNER: If Canada including Ontario and Quebec were to come to an agreement with the United States, and with the eight great lakes states of the United States, to arrange for a diversion or to finance a diversion scheme, would it be your view that the American states bordering the lakes could agree upon a quota of maximum consumption?

Mr. MESEROW: I think that is possible, Mr. Turner, for this reason: the Great Lakes Commission embarked on this objective, as I mentioned to you in my opening statement, with the view of arriving at management and regulation of the great lakes for all purposes. In other words, if we had such a joint agency of the government and the states, they would determine the quota as to their consumption. For example, if the state of Ohio wanted more water for a canal down to the Ohio river, it would present the request to this joint board, and they would determine whether they could take water, and whether it would have any adverse effect on the levels, or anything else. I think certainly this is a joint problem, and that you cannot just take water out and disregard the rights of the other side.

Mr. TURNER: I am sure Canadians, as Dr. Rynard intimated, would be worried about the implications to populations, and the implications as between Canada and the United States. We would probably have to think in terms of a quota system or of the maximum amount of consumption because of your heavy population. You mentioned the report of the United States corps of engineers. I read a story in the *Chicago Tribune* the other day that the report was again

delayed, and the newspaper account said that the corps of engineers was very pessimistic about the possibilities. Have you any knowledge that you feel free to reveal to this committee?

Mr. MESEROW: The corps of engineers have had several meetings to set up regulations for lakes Michigan, Huron and Erie, and whether they can be controlled. It could be done from the engineering standpoint. The only reason that they have not concluded it is whether or not it will be economically feasible.

Mr. TURNER: Has your committee ever made any calculation of how much the great lakes are worth to the eight states bordering on them, in terms of value of business, or in terms of investments?

Mr. MESEROW: We have no dollars and cents estimate, but it is considerable. Having witnessed the damage through the high water levels back in 1952 and 1953, and having now witnessed the damage because of the low levels, it would have to be an astronomic figure to prove to me that it was not economically feasible to control the levels of those lakes.

Mr. TURNER: Your view is that in view of the investment and revenue on the American side, control would be economically feasible?

Mr. MESEROW: Yes.

Mr. TURNER: You mentioned a figure of \$100 million. Is that figure derived by American studies having to do with the low water levels this year?

Mr. MESEROW: This is not American alone, this is for both sides.

Mr. TURNER: How did you calculate it?

Mr. MESEROW: Well, the loss on the iron ore shipments alone on the great lakes, as stated by the Lake Carriers Association, was \$13 million. We had one installation northwest of the railroad near the northern part of lake Michigan that had to be redone, and it cost over \$1 million alone. These are just two instances which amount to more than \$14 million. I think with the information I have before me, the estimate might well be \$100 million.

Mr. TURNER: Has your commission made any estimate of how much consumption from the American side of the great lakes is going to increase over the next 10 to 25 years?

Mr. MESEROW: A committee was set up appointed by the late John Kennedy, and they estimated that the consumption for domestic and industrial use would be doubled by 1980. But let me say this: There are innumerable cities and communities along the lakeshore of the great lakes on the American side—and I am sure this is true of your side as well, because everything is the same on both sides pretty much—that are very much in need of water for domestic consumption, and there are many instances where the lowering of the water and its effect on water consumption problems are becoming real tense and of real importance.

The CHAIRMAN: Now, Mr. Rock.

Mr. ROCK: Usually when industries or municipalities take water out of a lake, they put it back into the same lake. Even though it be polluted and refined, it usually goes back to the same lake. They do not take it out and send it somewhere else. So I do not think there is any problems on water levels because of the consumption by those localities, or by industry. Chicago is a different case, of course.

Mr. MESEROW: That is the usual statement. They say: "We are taking it out and putting it back," but you have no valid estimate of how much is lost which is not put back. Personally, I think that when you take water out for domestic or industrial use, and put it back in, there is an awful lot that does

not go back to the great lakes basin. Probably if there were not some ladies here today, I could give you some examples.

Mr. ROCK: Could you tell me exactly where it goes? Surely it will still get back either under ground or on top of the ground. No matter what you say, the water will somehow be there, and it will always go back in a sense, even if it has to percolate. Even when there is rainfall and an area is drenched, it all goes back to the lake.

Mr. MESEROW: That is true, but you are talking about water taken out of the lake and used, and put back.

Mr. ROCK: Yes.

Mr. MESEROW: For example, the steel companies along the northern border of the Indiana shore use water from the lake for cooling purposes and then put it back. But I feel a lot of it is used up by evaporation. Suppose a community or just an ordinary city were to take water out for domestic purposes, and then say that they put it all back in the form, let us say, of sewage. You know that when a housewife puts a kettle of water to boil on the stove, a lot of it boils away and it never gets back to where it should go.

Mr. ROCK: It is not in the same category of nature, where it is right on the surface of the lake itself, as in your case of evaporation.

Mr. MESEROW: Yes, that is very true.

Mr. ROCK: And none of us can do anything about the evaporation part of it. We cannot stop evaporation. So I do not think we could consider the idea of evaporation in this matter. Do you not feel that most of the water does go back?

Mr. MESEROW: Well, I would rather not commit myself in this thing unless I knew of a particular situation.

The CHAIRMAN: Now, Mr. Turner.

Mr. TURNER: I have one more question. I was rather interested in how the Great Lakes Commission is financed. If it is a public body, are you free to tell us how the commission is financed?

Mr. MESEROW: The legislatures of each of the eight states biannually appropriate money for the support of the Great Lakes Commission.

Mr. TURNER: Do they do it equally, or by population?

Mr. MESEROW: Equally.

Mr. TURNER: Thank you.

The CHAIRMAN: Now, Mr. Aiken.

Mr. AIKEN: You have attended, I believe, most of the conferences held on water levels. I know you were at the Montreal one particularly, and perhaps at others as well. We have found here in the committee that a great problem results in the lack of co-ordination of effort owing to the fact that there is the federal government, the states, the provinces, and various other organizations. What is the status of the American side as far as co-ordination of effort between the federal and state authorities is concerned?

Mr. MESEROW: Well, you are asking me a very touchy question.

Mr. AIKEN: It is a touchy question here, too.

Mr. MESEROW: I do not think, from my experience on your side of the border, that your differences are quite as great as they are on our side. There is a long history of federal-state competition in the United States, and it is not confined to just the water resources problem. I would say that in the United States certainly our eight great lake states are always mindful of this problem, and we are working very closely with our federal officials. Furthermore, we requested a reference to the International Joint Commission, through the

president and secretary of state Rusk, and such reference was made. I immediately got in touch with Mr. Webber, acting chairman of our United States section, and offered our co-operation. He welcomed it, and said he would be calling on the great lakes commission and state officials for their help. After all, we probably have some of the greatest water resource experts in the world on the staffs of our state governments. Moreover, we have available the state universities, with all their departments, prepared to assist the Great Lakes Commission in its effort and work, so I think we are facing a common problem here as far as the United States is concerned.

Mr. AIKEN: What would be your suggestion for the best body to co-ordinate the efforts between all interested groups? Would you say that the International Joint Commission could handle it?

Mr. MESEROW: Yes, they have the mechanism for it, because of their international character. For example, the Great Lakes Commission has had many informal and unofficial conferences with provincial officials of Ontario and Quebec, yet we did not have any really legal authority, because the provincial official would say that they were meeting and talking, but it was merely unofficial and informal, and we had to accept it. So there was no teeth in it. However, I might say that this was true up until about the past three years. Lately they are getting a little bolder about their position and are talking a little plainer about these things. But I think that the International Joint Commission has the international mechanism to carry on this problem.

Mr. AIKEN: Thank you.

Mr. MESEROW: I might say that the reference to the International Joint Commission did not include the study of water resources outside the basin. That is left with the Canadian government.

Mr. AIKEN: That is one of the problems of this committee which we hope to find some answer to.

The CHAIRMAN: Now, Mr. Watson.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Do I understand that the International Joint Commission will be studying and making a cost analysis, or will be asking somebody to make a cost analysis of the three possible diversions? You mentioned two or three possible diversions of water from the James bay watershed into the great lakes watershed. Will you people be making those studies, or commissioning somebody in the near future to make them?

Mr. MESEROW: No, these are not included in the International Joint Commission studies.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): How are you going to arrive at obtaining these figures?

Mr. MESEROW: That is your job; that is the Canadian government's problem.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): It is strictly our problem, and you are not concerning yourself with it?

Mr. MESEROW: These plans are solely within the powers of the Canadian government, and it would be within your province.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): You people are asking the army corps of engineers about cost studies on the control measures of lakes Michigan, Huron and Erie.

Mr. MESEROW: That is right.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): When will those figures be available to this committee?

Mr. MESEROW: Well, they should be available very shortly. They said it would be the first of next year, which is just a matter of weeks.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Is any study being made by any group, commissioned by yourself, or planned to be commissioned by yourself? This question relates to the question asked by Mr. Turner on the water needs and the dollar worth of water to the area lying south of the great lakes in the United States.

Mr. MESEROW: There have been no studies that I know of that could place a dollar worth on the water needs or water requirements.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Because, if we as a committee, or if the Canadian government, are eventually going to decide on a diversion project, they will have to know what you people in the United States are prepared to pay for the diversion. So I would like to know if there is any way for this committee to get hold of the figures within the next six months? Do you see any way of doing it that quickly?

Mr. MESEROW: I am afraid you are hurrying us a little bit too much when you speak of six months.

Mr. AIKEN: Not so far as this committee is concerned.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): How long a project do you think this would be, or how would you set up such a fact finding body? Do you think that you people would set it up, or would you have to be commissioned to do it by a further reference from both federal governments?

Mr. MESEROW: I think that there would probably be a further reference. The present reference has a provision at the end of it which says that upon the completion of the study of levels, probably a more comprehensive study may be made, or words to that effect.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): When do you anticipate completing this water levels study?

Mr. MESEROW: The International Joint Commission estimates it to be about three or four years.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Is there any way of shortening the time element? It seems that we have to wait three or four years before we start to find out what the dollar value of this water from the north is to the American population lying south of the great lakes. It may be five or six years before we even have a dollar value attached to this water. Is there no way of speeding it up?

Mr. MESEROW: I would like to speed it up, if I could.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): If you had a reference immediately from the Canadian and the American federal governments, do you think you would be able to speed up the process?

Mr. MESEROW: Yes, it would, if the study was broadened to include placing a dollar value upon the water.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Do you feel that this reference should be made to you people?

Mr. MESEROW: Well, it is not for me to say. I would not like to say.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): But do you feel it would speed up the process of deciding on the economic value of this diversion?

Mr. MESEROW: Oh, yes, if we had five or six different studies going on at the same time I think it certainly would speed it up.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Thank you very much.

The CHAIRMAN: Now, Mr. Scott.

Mr. SCOTT: Mr. Meserow, you mentioned the figure of \$100 million for the last year. Have you figures for previous years?

Mr. MESEROW: No. The levels were not as acute as they were this year.

Mr. SCOTT: You mentioned that these diversion projects were in a sense Canadian projects. Have there been any discussions or efforts going towards a financial participation in the cost of such diversions?

Mr. MESEROW: No, because there has been no determination or study made as to the feasibility of these plans.

Mr. SCOTT: Is there a general feeling in the United States that they would be prepared to participate in financing the cost?

Mr. MESEROW: I suppose the best way to put it is this way: If the Canadian government wanted to take some of the oil that we have in southern Illinois, we would certainly expect to be paid for it. And if we in the United States are going to use one of your natural resources, I think probably we would have to pay for it, too.

The CHAIRMAN: Now, Mr. Ryan.

Mr. RYAN: I would like to ask the witness which of the three plans for development in Canada would the Americans be interested in seeing worked out? In other words, should we have a preliminary engineering study made of the Grand canal plan first, or of the Parsons plan, or of the third plan, to put Hudson bay water into lake Superior?

Mr. MESEROW: Well, that is a difficult question to answer because on the surface, according to the regional brochures that are put out, they all sound feasible, and they all sound good. But which one is less costly, or which one is better, and which one would bring about the greatest results, only a study could determine it.

Mr. RYAN: I asked you what the American feeling would be. But have you any personal preference as to which one should be proceeded with by way of priority?

Mr. MESEROW: I would rather not give my personal preference. However, I would say that the Grand canal project has received more publicity than any other plan.

The CHAIRMAN: Now, Mr. Legault.

Mr. LEGAULT: My question has been partially answered, but do you have one responsible authority which would co-ordinate all the research that has been made, and would that body have the power to act upon the information received?

Mr. MESEROW: I think the International Joint Commission would be that body.

Mr. LEGAULT: Do you say there is no existing authority that would co-ordinate all this? Yet you have your army engineers and your other organizations which have taken surveys and tests, and have done various other forms of research.

Mr. MESEROW: Yes. The International Joint Commission has just set up a joint board of control of which Mr. Patterson here is one member on the Canadian side; and on the American side they have representatives of the army corps of engineers. In fact, the acting chairman of the United States section of the International Joint Commission, Mr. Webber, is in civilian life a member of the corps of engineers, so there is direct liaison between the corps and this work of the International Joint Commission. We think this works, and it is probably true, from the study of the board as well, that the International Joint Commission after it completes this study will make a recommendation to the secretary of state of the United States, and they will introduce legislation in congress to make an appropriation in order to effectuate any plan, or to do anything that the International Joint Commission recommends. And that is true of your side of the border as well. Both countries operate

simultaneously. Then you have the force of law, because when your parliament acts, our congress will act, and they do it through a recommendation of the International Joint Commission.

The CHAIRMAN: Now, Mr. Turner.

Mr. TURNER: Mr. Aiken started off with a line of questioning which interested all of us, about the co-ordination of water, and we have a problem here, which is one of co-ordination between governments. You spoke about co-ordination between your federal and state governments. How are the states and the federal government getting along in the matter of the co-ordination of the various uses of water? We have here the Department of Transport which has the primary responsibility over navigation; we have the Department of Northern Affairs and National Resources which has responsibility over the levels of flow, and we have the Department of Public Works which has responsibility over dredging. This committee is concerned, I think, about the diversity of public bodies within the federal structure, and within the provincial structure in our handling of water. Have you anything in the United States, federally or within the various states such as Illinois or Michigan, to co-ordinate within one government department the use of water?

Mr. MESEROW: I think in our government we are probably more co-ordinated than you are here on the Canadian side; certainly in our federal government they are co-ordinated. We have the control of navigation and the other uses of water, while the states of course have their own provinces. Here I should not be presumptuous, but I have been trying to correspond with a certain department of your federal government, and I do not know which one to write to. As you have said, you have the Department of Transport and the Department of Northern Affairs and Natural Resources, and maybe some others that I do not know about.

Mr. TURNER: If I should write to Illinois about water, which department would I have to write to?

Mr. MESEROW: We have a department of public works which handles water for Illinois.

Mr. TURNER: And that would include water for navigation, or for fisheries, or pollution, and so on?

Mr. MESEROW: Navigation is within the province of the federal government.

Mr. TURNER: How is your co-ordination getting along?

Mr. MESEROW: Very fine.

Mr. TURNER: Is it all held within one government department?

Mr. MESEROW: The army corps has to do with navigation, and the federal power commission has to do with power.

Mr. TURNER: How many more have you got?

Mr. MESEROW: We have the department of fisheries, and the department of the interior.

Mr. TURNER: That sounds familiar. Have you never felt with water reaching the importance that it has reached that you should have over-all control of water in one department?

Mr. MESEROW: I think we have problems enough without getting into the question of the reorganization of our government.

Mr. TURNER: Thank you.

The CHAIRMAN: Now, Mr. Rock.

Mr. ROCK: Mr. Meserow, is your Great Lakes Commission directly interested in this Canadian parliamentary committee? Do you receive at this moment our minutes, and do you in your meetings discuss the reports of our meetings?

Mr. MESEROW: Well, first of all let me say that we are very much interested. I have received the first two or three transcripts of your minutes, and Miss Savard has promised to send me the remainder of them and to keep me on her mailing list.

Mr. ROCK: Here in Canada we have the International Joint Commission and also the provincial governments of Ontario and Quebec, as well as the federal government which may be expected to participate, should we come up with some plan—I mean to participate financially. Is there indication of your federal government, and also your state governments being concerned? Do they also have in mind any financial participation, if we do come up with a certain plan which we would want to execute?

Mr. MESEROW: Yes, that may be necessary and quite probable. Incidentally, this whole project we are talking about may seem a little nebulous, but there is good precedent for it in the Columbia river basin compact, which was just recently signed. There was a treaty signed between the two countries, and the province, and some of the states on the use of the waters of the Columbia river. But it took 17 to 18 years before it was accomplished. So let us not become discouraged about it. What we are attempting is a very big job, and not one related to building two or three big locks.

Mr. RYAN: Here we are, and surely with our experience on the Columbia we should catch up with it a little quicker, and get along with it faster.

Mr. PETERS: What pressure is being put on by the United States? I imagine your problem is much more acute than ours. Where we are hit the hardest is in our tourist areas, with lowered water levels, and communities being affected. But your problems must be much greater on the American side. What pressure is being applied through the International Joint Commission to have the Canadian government give consideration to a long range solution?

Mr. MESEROW: Well, one pressure is evidenced by my presence here. Is that part of the so-called pressure you are talking about? We feel it is a common problem on both sides of the border, and that what affects us, affects you. As to the need for considered co-operation, we would like to see this solved. But again I want to thank you and this committee of your House of Commons for taking the time and effort to go through these hearings and to listen and try to solve this problem. I think you are making more progress on this side than we are making on the American side.

Mr. PETERS: I have one last question. We are interested. At least the committee has found that it is a cyclical thing, and that we will have this problem for many, many years. There has been a terrific variation in the water levels in lake Huron particularly, as well as in lake Erie and lake Michigan, I presume. But there has been less variation in lake Superior and lake Ontario because we have controls.

Mr. MESEROW: That is right.

Mr. PETERS: We understand that part of the problem we are faced with was brought about by an agreement made in the International Joint Commission—although this of course is debatable—and that some of the problems have developed from the dredging or deepening of the seaway, and that there will be remedial works installed or contemplated. What is said about this is far as your interest is concerned? I know concerning lake St. Clair there has been some discussion, and it may be necessary to apply in the near future to put in some kind of control on lake Huron which would contain the water level there. We have not gone into this matter, but I imagine that you, as chairman of the Great Lakes Commission, have been very interested in whether or not these controls will do something which we have not been able to do for lake Superior, and again for lake Ontario.

Mr. MESEROW: I might say that we recognize—and Mr. R. J. Byers, vice chairman of the Ontario Hydro Electric Commission has spoken of it, and I have heard him say this—that dredging in the St. Clair river near Detroit would actually lower lake Huron and lake Michigan by about three inches.

The army corps of engineers now are working on the installation of underwater sills which are like dams under the water to compensate for this lowering so that it will not be so much.

As I mentioned before, this has been going on for 12 years in an effort to control the levels of lakes Michigan, Huron and Erie. They say from the engineering standpoint that it can be done, but that the only question is whether or not it is economically feasible.

The CHAIRMAN: Now Mr. Aiken.

Mr. AIKEN: Is the federal government doing anything to assist private operators who are suffering from the water levels? I am referring to aids to navigation, to assisting them in extending docks, and so on. Is any such assistance being given where there is a necessity?

Mr. MESEROW: I know of no such assistance.

Mr. AIKEN: Do you know of any application for assistance from any such group?

Mr. MESEROW: No, I do not know of any application for funds for assistance, and I do not think there are funds available to assist the owners from the effects of low levels. I know that in 1952 and 1953 when the high levels took place, there was no financial assistance of any kind given by the government.

Mr. AIKEN: Do you know if there is any litigation in the matter before the courts?

Mr. MESEROW: You mean with respect to levels?

Mr. AIKEN: I mean private litigation?

Mr. MESEROW: No, I do not believe so.

The CHAIRMAN: No, Mr. Rynard.

Mr. RYNARD: In other words, I take it from what the witness said that there has not been any financial problem where the department looks after transportation and navigation, or where it has done anything to repair docks, harbours, or wharves?

Mr. MESEROW: No, there has been no government assistance that I know of the shoreline owners for damage as a result of low levels.

Mr. RYNARD: How about docks?

Mr. MESEROW: Docks as well.

The CHAIRMAN: Now, Mr. Loney.

Mr. LONEY: Have your studies with respect to high water levels been as extensive as your studies currently of low water levels?

Mr. MESEROW: I think the studies of high levels were more extensive than the present low level studies.

Mr. LONEY: You have assembled all the facts relative to a feasibility study of one of these three proposed diversions of waters from the north, I take it you have such data?

Mr. MESEROW: There has been no detailed study other than a superficial plan of these sources, for bringing water in from northern Canada to the great lakes. Mr. Kierans has prepared some document on the Grand canal project. He took me up in a small airplane not too long ago—it was my first trip in a small private plane—and he took me over this area to show me the connecting

points on the Ottawa river. To me it looked to be quite feasible just from the air. Of course I am not an engineer myself. As I say, it would require detailed study.

The CHAIRMAN: Now, Mr. Peters.

Mr. PETERS: Can you personally explain how we got that diversion into lake Superior? How was it arrived at? Did the Americans finance it and set it up: Was there joint participation in the diversion which took place?

Mr. MESEROW: Perhaps Mr. Patterson might answer the question better than I can; but I think it was done by the Ontario Hydro Electric Power Commission originally for power purposes and with their own resources.

Mr. PETERS: Did you not say that the amount of water which would come into the lake up there is more than sufficient to meet the needs of the Chicago canal, and we would have some left over?

Mr. MESEROW: The Chicago diversion, by supreme court decree, is 1,500 cubic feet per second plus domestic pumpage, which is about 1,700 cubic feet per second or a total of 3,200 cubic feet per second. The diversion into lake Superior from the Ogoki river, and these other rivers up there would amount to an average of 5,000 cubic feet per second. This is almost double the amount that Chicago takes out, so it compensates us for what they take out.

Mr. PETERS: You use that figure, I presume, because it has something to do with the diversion; is that correct? I presume there must have been some arrangement made between the Chicago people and the hydro-electric people or whoever did handle the work, to divert this water.

Mr. MESEROW: No, there was no relationship between the two. I think the amount of water that is brought from the two rivers into lake Superior is controlled by the International Joint Commission.

Dr. T. M. PATTERSON (*Director, Water Resources Branch, Department of Northern Affairs and National Resources*): No, the International Joint Commission has no control over it.

Mr. MESEROW: It is a joint board control?

Mr. PATTERSON: Perhaps I could add here that the Ogoki and Long lake diversion was initiated in the early stages, when there was a great shortage of power, and additional storage was required at Niagara Falls in order to develop additional power. There was an exchange of notes between the Canadian and United States governments under which an understanding was reached that in an Ontario Hydro diversion of this water into lake Superior, the Ontario Hydro would have the full use of that water at their Niagara Falls plant for power purposes. That understanding is still in effect. Canada gets 5,000 additional cubic feet per second at Niagara for power purposes, and the Ontario Hydro pays for all the diversion work from Ogoki and Long lake into lake Superior.

The CHAIRMAN: I have no other names.

Mr. WATSON (*Châteauguay-Huntington-Laprairie*): Is anybody at the moment gathering data on the additional amount of water required immediately by cities on the United States side south of the lakes, and of the future needs for the next 15 years?

Mr. MESEROW: There have been some studies made of this, but a lot of work would have to be done.

The CHAIRMAN: Well, gentlemen, I have no further names. We are certainly grateful that Mr. Meserow indicated he wanted to testify before our committee, and we are most pleased today that he did manage to come down,

and that we were able to hold this meeting. I wish to thank him and the members of the committee for making this meeting possible, since he has to leave to catch a plane to return to Chicago. Thank you again, and thank you, gentlemen.

HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 8

TUESDAY, DECEMBER 15, 1964

Respecting

The subject-matter of the water levels of the Great Lakes system.

INCLUDING
SECOND REPORT TO THE HOUSE

WITNESSES:

Representing the Montreal Port Council: Mr. D. C. MacCallum, Chairman;
Mr. W. R. Eakin, Member; and Mr. J. C. Bourguignon, Executive
Secretary.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1964

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias Godin

Vice Chairman: Mr. Ian Watson
and Messrs.

Aiken,
Alkenbrack,
Berger,
Danforth,
Davis,
Dinsdale,
Flemming (*Victoria-
Carleton*),
Foy,
Grégoire,
Habel,
Hahn,

Harley,
Herridge,
Laprise,
Leboe,
Leduc,
Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,
Noble,

Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

(Quorum 10)

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

REPORT TO HOUSE

FRIDAY, December 18, 1964

The Standing Committee on Mines, Forests and Waters has the honour to present its

SECOND REPORT

On October 2, 1964, the House passed the following resolutions:

*“Ordered,—*That the subject-matter of the water levels of the Great Lakes system be referred to the Standing Committee on Mines, Forests and Waters for their consideration and report and that the Committee be empowered to engage technical and clerical personnel as it may deem necessary.”

Since that time, your Committee has held 11 sittings during the course of which it has heard 25 witnesses.

As your Committee finds that it will not be able to complete its consideration of this reference before the forthcoming recess or adjournment of Parliament, it recommends that it be enabled to continue its study of this reference early in the new year.

A copy of the Committee's Minutes of Proceedings and Evidence to date respecting this subject (Issues Nos. 1 to 8 inclusive) is appended.

Respectfully submitted,

OSIAS J. GODIN,
Chairman.

MINUTES OF PROCEEDINGS

TUESDAY, December 15, 1964
(11)

The Standing Committee on Mines, Forests and Waters met at 4.05 p.m. this day, the Chairman, Mr. Osias J. Godin, presiding.

Members present: Messrs. Aiken, Alkenbrack, Danforth, Dinsdale, Godin, Hahn, Harley, Leboe, Legault, Loney, Moreau, Roxburgh, Rynard, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*), Whelan (16).

In attendance: Representing the Montreal Port Council: Mr. D. C. MacCallum, Chairman; Mr. W. R. Eakin, Member of the Council and also Vice President of the Shipping Federation of Canada; and Mr. J. C. Bourguignon, the Executive Secretary.

The Chairman introduced the three witnesses. Before hearing their submission, the Committee considered a draft of a Second Report to the House which was approved unanimously, on motion of Mr. Rynard, seconded by Mr. Hahn.

The members were again reminded by the Chairman that should they wish to submit the names of prospective witnesses, they may do so by writing to the Clerk of the Committee as soon as possible.

Mr. MacCallum read a prepared statement, copies of which had been distributed to the members.

It was agreed that before asking questions the members should hear Mr. Eakin who wished to present the point of view of the Shipping interest. Mr. Eakin undertook to explain the situation the Council is faced with in the steamship business in the port of Montreal as a result of a shortage of water.

Messrs. MacCallum, Eakin and Bourguignon were questioned.

On motion of Mr. Rynard, seconded by Mr. Hahn,

Agreed,—That the proceedings of the Montreal Port Council second International Symposium on Water Levels be made available to the members of the Committee.

On motion of Mr. Rynard, seconded by Mr. Watson (*Châteauguay-Huntingdon-Laprairie*),

Agreed,—That appendices A, B, C, D and E to the brief of the Montreal Port Council, which brief was read by Mr. MacCallum, be printed as an *Appendix* to this day's proceedings.

The Chairman thanked the witnesses for the manner in which they answered the questions of the members, and at 6.25 p.m. the Committee adjourned to the call of the Chair.

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

MEMORANDUM FOR THE RECORD

DATE: [Illegible]

[The following text is extremely faint and illegible due to the quality of the scan. It appears to be a memorandum detailing a meeting or a set of instructions.]

EVIDENCE

TUESDAY, December 15, 1964.

The CHAIRMAN: Order, gentlemen, I see a quorum. I believe we have one little piece of business to perform first. I beg indulgence on the part of the witnesses. I would like to introduce to you Mr. MacCallum, and next to him Mr. Eakin, and Mr. Bourguignon. All three gentlemen represent the interests of the port of Montreal, and they are the witnesses we are to hear today.

To come back to the business of the committee, you will recall that two meetings ago the committee approved the report of the steering committee in which there was a paragraph pertaining to an interim report which this committee would be pleased to submit to the House of Commons indicating that it would wish to continue the study which it had begun. With the assistance of the clerk I have prepared a report for the approval of the committee, since it is expected that this may be our last meeting before the Christmas recess. It reads as follows:

The standing committee on Mines, Forests and Waters has the honour to present its second report.

On October 2, 1964, the house passed the following resolution:

“Ordered,—that the subject matter of the water levels of the great lakes system be referred to the standing committee on Mines, Forests and Waters for their consideration and report and that the committee be empowered to engage technical and clerical personnel as it may deem necessary.”

Since that time, your committee has held 11 sittings during the course of which it has heard 22 witnesses.

As your committee finds that it will not be able to complete its consideration of this reference before the forthcoming recess or adjournment of parliament, it recommends that it be enabled to continue its study of this reference early in the new year.

A copy of the committee's Minutes of Proceedings and Evidence to date respecting this subject (issues Nos. 1 to 8 is appended.)

Are there any comments, or is the committee prepared to approve its second report? If so, may I have a motion?

It is moved by Mr. Rynard and seconded by Mr. Hahn that the second report of the committee be approved.

Motion agreed to.

The only other matter is that Mr. Dinsdale has suggested a few further witnesses to be heard, and I suggest that you avail yourself of the time during the recess to recommend to the clerk any witnesses you feel should be called to continue the study after the recess.

Mr. DINSDALE: Are we going to have a recess?

The CHAIRMAN: I believe that is a presumption of the Chair, but it may be. We do not know, but let us put it this way, it is expected that this committee will have a recess.

If there are no further comments on witnesses, I trust that our members will take advantage of possibly the few weeks when we may not be sitting to let us know of any further evidence which could be beneficial to this committee to complete the study which we have begun. Are there any further gen-

eral comments? If not, I am very pleased that we have these gentlemen from the Montreal area, and as I understand it, Mr. MacCallum is the star witness, if I might use that expression, while Mr. Eakin is also capable of furnishing some evidence, and Mr. Bourguignon as well, I presume. Therefore, Mr. MacCallum, we have received copies in English at least, and today in French, of your brief. I do not know if you intend to read it, or summarize it, and then permit questions from members of the committee. We would like the witness to be free about the procedure he prefers.

Mr. D. C. MACCALLUM (*Chairman, Montreal Port Council*): With your permission I shall read it. It is not too long, and after that we shall be pleased to answer any questions which are asked.

On behalf of the Montreal port council, I would like to express our appreciation of this opportunity to appear before the standing committee on Mines, Forests and Waters. Our presentation this afternoon is devoted primarily to the critical state of the water level in the port of Montreal and the urgent need for action to improve this situation. First, however, it may be appropriate to outline the role of the Montreal port council.

The Montreal port council:

The Montreal port council was founded in 1958 to facilitate a coordination of the various interests concerned with the port of Montreal. It consists of representatives of the city of Montreal, the national harbours board, la chambre de commerce du district de Montreal, the Montreal board of trade and the Shipping Federation of Canada. Appendix "A" to this brief contains the names of representatives, advisers and consulting delegates. The chairman, which I happen to have the honour to be at this time, is normally selected as an independent citizen, representing none of the constituent organizations.

If I might digress, I would like to say that I have only assumed this position as chairman during the last month. I am not a super witness, or an expert type as was presupposed by the Chairman. I merely present a point of view which I shall try to describe herein, and deal with questions which may come later. Perhaps my own ability is a bit limited in view of this situation.

Mr. W. R. Eakin, Jr. who is with us today, is a member of the council and is also Vice-President of the Shipping Federation of Canada. Mr. J. C. Bourguignon, who is also with us today and is I believe already known to you, is our executive secretary.

The terms of reference of the council are as follows:

To study, develop and secure implementation of policies and projects to promote, improve and protect the port of Montreal in the interests of the Montreal economic region;

To work with municipal, provincial and federal governments and their agencies and all other organizations and interests using or otherwise concerned with the port of Montreal, regarding facilities and services contributing to the port's efficiency and growth;

To promote and develop traffic through the port of Montreal by every means;

To promote all facilities related to the harbour which will encourage development in the Montreal economic region;

To identify the community with the port.

It is apparent from these terms of reference that the Montreal port council must be very much concerned with any factor that can significantly affect present or future operation or development of the port. Obviously no factor can have greater significance to a port than the adequacy of the level of water. For some substantial uses of water, such as hydro-electric power production, alternatives can be found. For a port, such as Montreal, there can be no alternative.

Our Council has become increasingly interested in the subject of water levels since the summer of 1960 when the results became available of a Preliminary Port Study performed by consultants engaged by us. We have closely followed the subsequent evolution of the water level problem and have made recommendations to the three levels of government urging serious study and action. Appendix "B" for example contains the text of a resolution submitted to the provincial government on January 15th, 1962.

In October 1963 and again in June 1964 we organized and conducted seminars on the subject at which experts were given an opportunity to express their views. It is my understanding that your Committee has received copies of the proceedings of the Montreal Port Council second International Symposium on Water Levels. We have nevertheless attached hereto for your reference Appendix "C" containing the conclusions of the symposium and Appendix "D" containing pertinent extracts from the Montreal Port Council 1964 Annual Report.

We have read with keen interest the minutes of the proceedings of your committee which indicate that a full investigation of all aspects is well underway.

As another aside, I have just finished reading volume V of your proceedings, and I can hardly wait to get volume VI. It is like a serial story.

Much of the evidence that you have received or will receive represents the testimony of experts on the various technological aspects of what has been, can be or should be done. We are not experts. We do not conceive it to be our function, nor do we have either the qualifications or the means, to obtain, correlate and analyse all the necessary data or to comment authoritatively on the technical studies, proposals and recommendations that have been or will be made. We conceive our role to be catalytic by nature, to assist in the exposure of the problem to the properly competent authority and in the acceleration of the necessary studies and implementation of the results.

The Montreal Water Level Problem

The situation as we see it is that the water levels at Montreal have deteriorated steadily in recent years and have become critical during recent weeks with predictions of worse conditions next year. In spite of what we believe to be the best efforts and full cooperation of the authorities responsible for the upstream control of Montreal's water supply, the level has fallen as low as thirty-three feet four inches, some twenty inches below the 35 foot datum. If as may well be the case even worse conditions are liable to be experienced next year, the results could be disastrous. We do not have the data required to express the current and anticipated crises accurately in terms of dollars of annual loss to shipping and other transportation interests and to the regional and therefore national economies. With your permission however I will shortly call on Mr. Eakin to give you an indication of the effects of low water on navigation and shipping interests in our region.

The Montreal port council is fully cognizant of the fact that the water available in the St. Lawrence river at Montreal is part of the whole great lakes-St. Lawrence river system and that the needs of others, both upstream and downstream from Montreal, who are now or will be dependent on water from this system must be taken into consideration. We believe that the solution for Montreal must be compatible with the justifiable requirements of such other interests. We have therefore urged and will continue to urge that the entire system be studied as a whole.

The studies that have been undertaken by the International Joint Commission represent a forward step, but unless and until the terms of reference are expanded, these studies are necessarily restricted to the great lakes and the international section of the St. Lawrence. There are at present a con-

siderable number of authorities concerned directly or indirectly with water and water management and the divided jurisdiction resulting therefrom must at least be coordinated if a coherent study of all aspects of the whole system is to be made.

The Montreal water level problem is critical and urgent. If it deteriorates further next year, temporary partial relief may be possible at the expense of hydro-electric generating and other facilities located upstream but this offers no continuing solution. Even if the amount of precipitation in the great lakes drainage basin were to improve substantially in the immediate future, experts who have already appeared before you have stated that it would require several years before the full benefit could be felt at Montreal. If the studies already undertaken by the International Joint Commission were completed in any reasonable period of time and if their results were such as to confirm the feasibility of a solution based on additional control works in the great lakes, and if the engineering and construction of such facilities proceeded expeditiously, the benefits of this solution might conceivably be available to Montreal ten years from now. In the absence of any other improvement of the conditions, Montreal simply cannot wait for such a solution. Further deepening of the ship channel by dredging can contribute little unless the ship berths can be correspondingly deepened and there is a limit to what can be done in this way.

As an aside, the next sentence I would have preferred to write differently, and to say that deepening of the ship channels would obviously require the deepening of ship berths, and this would be a very expensive proposition.

As a matter of fact, the dredging that has been done and is yet to be done below Montreal may have contributed to the reduction of the absolute water level.

The level of water at Montreal can only be effectively improved in two ways: by increasing the flow to Montreal from upstream sources or by retaining more water in the port itself. If as already indicated a reliable increase in the flow to Montreal by additional controls and regulation in the great lakes cannot be expected for many years, the only possible alternative is evidently some method of retaining more water by downstream controls. Such controls will probably be essential in the future in any event even with more water from upstream in view of the constantly increasing demands for water.

Action required

It is in our opinion essential that the entire great lakes-St. Lawrence river system be studied as a whole to determine what additional controls may be provided to improve and maintain water levels for all present and future users properly dependent on the system. Such additional controls should then be implemented as quickly as practically and economically feasible. Since the terms of reference of the International Joint Commission restrict its studies to the great lakes and the international section of the St. Lawrence river and since there are so many other agencies concerned with water and water management in Canada, there is evidently a need for a new national body to coordinate and direct all such activities. Such a national body might well become the Canadian component of an international organization which might be called the Water Conservation Institute of North America and might conceivably function along the proven lines of the Arctic Institute.

However in view of the fact that the International Joint Commission study is limited to the great lakes and international section of the St. Lawrence river and in view of the time period involved, it is imperative that immediate action be taken with respect to the conditions at the port of Montreal to raise the water there independently of any increased flow from

upstream. It is our understanding that elaborate studies have been made of methods of raising the water levels at Montreal by means of downstream engineering works and that some of these appear to be feasible, without involving locks or otherwise interfering with the free movement of shipping. However none of these appears to have been adopted for implementation and although we are informed that the studies are continuing, we have been unable to determine their status. It is our present understanding that the hydraulic model that is presently available does not extend below the upper end of lake St. Peter and should probably be extended to Three Rivers to cover tests of such studies.

We therefore recommend most urgently that the necessary steps be taken immediately, including if required the extension or reconstruction of the hydraulic model to accelerate completion of the studies of downstream engineering works to retain a higher water level in the port of Montreal and that the results be implemented as expeditiously as possible by the proper authority independently of any other studies or action.

We would like to ask your committee to give the port of Montreal water level problem your earnest attention. If it is not given top priority we may soon see our greatest national port degenerate into a shallow draft port of secondary importance.

Mr. Chairman, with your permission I would now like to call on Mr. Eakin. We shall of course be pleased to try to answer any questions that you or the honorable members may care to address to us.

The CHAIRMAN: Thank you, Mr. MacCallum. Are there any questions at this stage? I have Mr. Whelan, Mr. Hahn, and Dr. Rynard.

Mr. TURNER: On a point of order, I wonder if it might be more useful to have Mr. Eakin's submission, because perhaps he might answer some of the questions which would otherwise be asked. Would that be agreeable?

The CHAIRMAN: Is that agreeable to you, Mr. Whelan?

Mr. WHELAN: I do not know if it is a point of order, but I will go along with it.

The CHAIRMAN: Thank you.

Mr. W. R. EAKIN (*Member of the council, and vice president of the Shipping Federation of Canada*): I have prepared an aide mémoire to this.

(Translation)

Unfortunately, my brief has not been translated into French on account of the technical term it contains. I think—I intend to speak in English but the questions can be put to me in French.

The CHAIRMAN: We greatly appreciate that. However, we have no interpreter just now—

Mr. EAKIN: I intended to speak in English.

The CHAIRMAN: I thought you said "in French".

(Text)

Mr. EAKIN: Mr. Chairman, the first point I would like to make is that I am not an engineer; I am not a master mariner, nor am I a naval architect, I am purely a businessman engaged in the steamship business through the port of Montreal and besides I would not dare embark on any recommendations or suggestions which might involve hydroelectric engineering.

There is no doubt about it that if you want to interfere with the movement of water, all sorts of strange things can result. Consequently, I feel this is really a question for somebody technically qualified. My proposal is merely to try to show you some of the things we are faced with in the steamship business in the port of Montreal as a result of a shortage of water.

In order to do this, let me say that the lack of water affects different types of ships and different operations in different ways. I therefore feel that I should try to describe for you the differences between a liner, a tramp, a bulk carrier, and a tanker.

By liner I do not mean a passenger liner, but rather a cargo liner. These are ships which operate between one or more ports on this side, and one or more ports at the destination end. They sail according to schedule whether they are full or whether they are empty.

They require a large organization ashore to solicit cargo for them, and to look after the documentation involved with it. In other words, they have a very heavy overhead.

Now a tramp, on the contrary, is a ship which is leased or chartered for the carriage of bulk cargo, normally speaking of a homogeneous nature such as grain, scrap steel, flour, or anything of that nature which can move in bulk volume.

The bulk carrier is a ship which is constructed principally for the carriage of ore. It normally does not have any cargo handling gear on board. In other words, it is dependant upon shore installations to load and discharge. As a result, it is normally engaged between two or more ports possibly, although it can engage in the carriage of bulk grain, because there are methods now of cleaning the grain out at both ends.

Your tanker, of course, is for the carriage of oil and liquid fuels, and again these ships can engage in the carriage of grain, but it involves cleaning. They certainly are in the grain shipping market in a very, very big way.

The tendency since the war has been for ships to become larger and larger. I think it was probably the advent of the diesel engine or the perfection of the diesel engine which started this change in design, and technological improvements in the construction of ships.

Prior to the last war there were very few ships afloat which would lift more than 10,000 tons. Today the average dry cargo tramp runs around 14,000 to 15,000 tons. Of course, there may be smaller ships. There are plenty of smaller tramps running down to 3,000 or 4,000 tons. But the modern tramp today is a ship of 14,000 or 15,000 tons.

Your bulk carriers even get into a larger category. There are plenty of bulk carriers afloat today which run around 25,000 to 30,000 tons, and there are even some dry cargo boat carriers which will run up to 48,000 to 50,000 tons carrying capacity.

Your tankers have gone completely overboard, and they are now up to 125,000 tons and larger still. It is not my impression that we should expect to bring in a 125,000 ton ship to Montreal, or bring in the *Queen Mary*. But I do think we should be capable of handling ships which will take a reasonable draft at Montreal. Today the maximum draft in Montreal is not really reasonable in relation to the size of modern tonnage afloat.

Now we have in our channel at Montreal 35 feet of datum. In fact I think it is 35 feet, 6 inches to be exact. The extreme lows we have had this year occurred on April 7, when we had 25 feet, 10 inches, and on April 16, when we had 33 feet, 9 inches. As of yesterday, I checked it just before we came up here, and there were 34 feet, 4 inches. This cannot be used to full capacity, however, because there is a safety factor involved. The port warden who governs the safety of ships going to sea has set a scale. There is a copy attached to my aide mémoire, so I do not think I need to explain it to you. It is attached to the rear end of Mr. MacCallum's brief. My notes say "You may make notes as you go along, to ask questions".

The scale varies according to the size and the beam of the ship. This scale was actually set on the advice of various marine superintendents sitting

as a committee in Montreal and establishing what they considered to be the suitable depth of water under the bottom of a ship going down fully laden with a current behind it. As you can see, that scale runs from two feet up to three feet of water required under the bottom of a ship, and as a result it definitely cuts down on the loading capacity. I may say that this scale does not apply inward, because the port warden has no means whatsoever of forcing his decisions on the port loading agent abroad. So ships will come in and will actually scrape the bottom, or with probably only two or three inches underneath. This, of course, is not an ideal practice, because one can never know whether there is a boulder there, or a projection of some kind.

Alongside the wharves we have varying depths of water, and this runs from 29 feet at some, to 28 feet at others, or to 30, 32 or 33, right through the whole port. But there is a grain berth at Montreal at which you can load grain with about 31 feet, 6 inches, at the absolute maximum, and that of course is at the new elevator in Montreal, No. 4, which cost millions to put up, and which is the most modern elevator in the country. Practically speaking, it runs to about 17,000 or 18,000 tons which you can load in a ship at that elevator, and from there on you have had it.

The other point I will bring out here is that the channel is swept almost continually so that boulders are removed as they go along, but it is almost an impossible thing to do this in the slip-ways and alongside the wharves, although it is done from time to time. Consequently, when the ship is alongside the berth the master is entirely responsible on his own; but, when it is a question of going down the channel, when the port warden dictum takes over, and they must have so much water under the ship.

As I started to point out, the effect of the lack of water on various types of tonnage is different. The main type of ship involved or affected, I should say, is the bulk carriers of grain: these are the bigger ships. Now, the people who are engaged in the chartering of ships for the carriage of grain are regular traders and they know what the depth of the water is in Montreal; consequently, if they have to load a ship there they refrain from chartering a deep draft ship. After all, that is only normal thinking. But, it is also responsible for one of the major losses of business to Montreal, because the water is not there and charterers will not charter ships that cannot go there.

Last summer we had a number of ships in Montreal harbour which definitely were too deep. For instance, there was the *Visund*, which was a Russian grain charter. Now, she actually loaded at Montreal. The *Visund* had to shut out 3,300 tons and, therefore, proceeded down to Quebec and loaded down there. When she sailed from Quebec her loaded draft was 34 feet 3 $\frac{1}{4}$ inches fresh water. There was another vessel, the *Songa* which last November listed a total of 21,150 long tons, but she was obliged to lift 3,000 tons at Quebec because of lack of water at Montreal. Her main draft on sailing was 34 feet 5 $\frac{1}{2}$ inches. There was also the *World Glade* in November. In this respect I have not the actual tonnages, but she loaded a total of 644,519 bushels, of which 121,000 odd have to be loaded at Quebec.

In respect of last year, 1963, I know of two, the *Tel Aviv* and the *Tinna*, and both of these had to do the same thing. By the way, these ships are very difficult to get hold of. In the normal course of business there are no statistics kept and the only way we can even get the names is to get it from the grain brokers and the various steamship agencies. Now, that is one loss to the port of Montreal; charterers do not charter the large vessels to go to Montreal. This is aided and abetted by the wheat board because, obviously, if you can get a ship that has a large tonnage and which can lift a large tonnage she obviously can take a lower rate because there is not the proportion of increase in crew and so on, as a result of which the charterers, naturally, are looking for the larger tonnage.

Now, the wheat board go along with this by channelling wheat to the down river elevators; Quebec, Three Rivers, Sorel. What is even more disconcerting is the fact that there is a private elevator at Baie Comeau. These elevators downstream from Montreal have had the biggest year in their history. One cannot help but feel that some of this is at the expense of Montreal because these big ships just cannot get in there.

I would say that the most modern elevator in the country is No. 4 at Montreal where we ourselves actually loaded some 17,000 tons into one ship in about $4\frac{3}{4}$ hours this summer. That particular elevator is definitely restricted in ships it can handle. It certainly does not seem right to me to be losing out to the down river ports.

This lack of water also affects various import cargoes which, again, are cargoes of bulk nature, and bulk sugar is one of these. Canada Dominion Cugar Company is located in the upper end of the harbour where the water is not so good.

Attached to my aide-mémoire you will see a statement of fact with respect to one ship, the *Agiols Nikolas*. She came in and because of her existing draft or loaded draft she could not get up to section 9 in the upper end of the harbour or whatever it was she went into eventually, and she had to go into section 95. They had to move shore equipment down to lighten her. The sugar itself had to be trucked up to the upper end of the harbour. She then had to move up herself into the upper end of the harbour which involved tugs and all the rest of it, pilotage and so on. Attached to my aide-mémoire you will see the statement of fact figured out into dollars and cents which I have, in turn, translated, or at least, tried to translate into the extra cost attributable to sugar in Montreal. She was actually going up the seaway afterward with a total of 6,875 tons for Toronto, and she discharged 4,195 tons at Montreal. I have taken the total cost which this off loading occasioned, namely \$2,699, and divided it into the number of tons, as a result of which I have come up with a figure of $64\frac{1}{2}$ cents a ton additional on the sugar going into Canada Dominion Sugar in Montreal.

Now, this, I may say, does not take into account all the overhead involved or any of the blood, sweat and tears because, as you can see, it was a Greek ship, and Greek ship owners are not given to accepting these things lightly, particularly when it comes out of their own pocket. This is only one example, of which I have given you the actual figures, but during the course of the summer there were at least four others that I know of, the *Thorfrid*, the *Guildstone*, the *Gorgistan* and the *Gemstone*, all of which had to lighten at various lower Montreal berths before they could move up to the upper harbour.

Gentlemen, I come now to the questions of tankers. In this respect there are any numbers of tankers which have to offload somewhere downstream; sometimes it is at Lanoraie; sometimes it is at Quebec and sometimes it is at Longue Pointe. They have to do this before they move up. It is also difficult today to acquire the proper facts because they may obtain a small tanker to do their offloading and, on occasion, they offload more than they necessarily would have to do through the lack of water. For instance, if it was a tanker of 2,000 tons they would put 2,000 tons into her to give her a full load, and she would proceed up on her own. They may do that but it is difficult to arrive at the actual facts as to how much is necessarily offloaded below Montreal in order to get these ships in. But, tankers, as a rule, run to considerable deeper draft than the normal ships about which I have been talking.

In my aide-mémoire I have mentioned five ships that have had to do this during the course of this last summer, but practically every tanker which comes into Montreal must offload. This is literally becoming so bad that we are again hearing talk of the possibility of doubling up the Montreal-Portland pipe line. When that pipe lines actually went in it was a considerable shock to the port

of Montreal because a much shorter haul for tankers coming up from Venezuela to go into Portland and then to bring the oil up by pipe line into Montreal, and that was that. Fortunately, the demand in eastern Canada grew to such proportions that it would not suffice any longer and tankers started coming back to Montreal again. But, we are again reaching the point where it could be economically feasible and possible to double up that Montreal-Portland pipe line, which would mean a loss of revenue not only to the port of Montreal but to the country as a whole.

If I might refer again to another bulk cargo that comes in, steel normally is discharged at sections 56, 57 and 58, but very frequently steel ships with deep drafts just cannot reach those sections. I have given one example in my aide-mémoire, the *Fernpointe*; it had to discharge at section 52. Actually, I believe that there was another such vessel late in November, the *Roccroy*, on November 29, which was drawing 32 feet 6 inches, and the pilots would not proceed beyond section 53. Obviously, all this adds to the expense of handling.

When we come to cargo liners, the effect of low water is not quite so apparent. To begin with, the cargo liners are specifically tailored to the trade in which they are engaged. Basically, they are smaller ships—although not all of them. But, as I say, the majority of them are smaller ships with lesser drafts, and the tendency already is growing, of course, for them to go up the seaway. But, quite apart from that, these ships, even if they turn at Montreal, normally load at Montreal and then go down and load at Three Rivers, Quebec or Port Alfred, and then out. This is something I do not particularly like to see, but it is part of the business; where the cargo is you must go there and get it. But, as a result they are not loading to their full draft in Montreal.

Now, we have just had the case of the *City of Manchester* and, if I may interject at this point, last week I sent by passport up to Ottawa for renewal, and when it came back to me they changed the colour of my hair from brown to gray. The reason for this, as far as I can see, is that *City of Manchester*. She came into Montreal about November 17 or 18. She completed discharge on November 23. There was some shed congestion in Montreal then and the weather was turning cold. She had to go to Port Alfred, so we decided the wisest thing to do—you see, the Saguenay usually freezes up early—was to send the ship down to load her cargo at Quebec, and then up to Port Alfred, complete her loading there, and bring her back to Montreal to complete her loading there. And, by that time we hoped the berth situation would be better and that we would get along well. She went to Quebec, loaded there from the 25th to the 29th; went to Port Alfred and loaded there on the 30th and through to December 2, and then came back to Montreal. Well, at this point, unfortunately, we realized that by the time she had completed unloading in Montreal the draft would be very close to 31 feet and, as such, we could not put her into our own sheds. We have sheds numbers 13, 15 and 18 in Montreal. There is not fresh water there for them.

The next thing we found was that the deep water sheeps were occupied, and that ship sat around until December 8, before we got a shed. She finally went into shed number 5 when Cunard finished with it, and started to load. Actually, she is a thin skinned ship for the southern trades, going out to India and Pakistan; the weather turned very cold and ice was forming on the river. We were beginning to bite our fingernails, I will tell you. She finally completed, and I hope she sailed this morning. But, we had a very tense time. In the meantime, she lost from the 3rd to the 8th sitting by, and I would say as a conservative estimate that ship must be worth \$2,000 to \$2,500 a day. She has a native crew on board consisting of 80 or 90 personnel. She burned at least 100 to 150 tons of bunkers while she was standing by. All of this amounts to a lot of money which, eventually, can only be reflected in the freight rates.

It has to come from somewhere and, in the final analysis, it will come out of the pockets of the shippers and importers.

We have had various other cases amongst liners. For example, at shed 18 we normally handle all Montreal, Australian and New Zealand line ships, for which they pay a rent to the national harbours board. I may say that this rent also includes a guarantee of top wharfage and one has to put through a certain volume of cargo during the course of the year which will pay so much top wharfage. You guarantee that or the national harbours board comes back on the steamship company which leased the shed. So, you can see it is in the interest of those who have permanently leased sheds to put in as much cargo as they possibly can. We have had two cases, the *Hororata* and the *City of Melbourne*. The *Hororata* was in in May, drawing 32 feet 6 inches. She could not use her own berth in shed 18. The *City of Melbourne* drew 27 feet 6 inches and she could not use her shed, number 18. Actually, as of yesterday, December 14, the guaranteed water at shed 18 was only 27 feet 10 inches, so you can see that we could not possibly put these ships in there. So, they had to go to other sheds, and I think it was number 5 in both cases. But, there again, the line loses out because they cannot put that cargo through their own shed and get their benefit against the top wharfage guarantee.

I would like to mention something now that I should have mentioned before I started, but which I forgot to say.

In paragraph (d) of my aide-mémoire I say that due to winter ice conditions piers are high, usually about 34 feet to cap of wharf from waterline. This is in error; it should read 24 feet. Now, this is something with which we are faced. There are 24 feet below low water and the cap of the wharf, which is necessary from the point of view of ice. But, when you have a small ship and you have to load into rail cars the ships gear just will not reach. Now, this affects only small ocean going ships and coastal ships, and I do not mean to put it in as a complaint that this happens every day in the week to every ship that comes into the harbour at Montreal. But, there are a certain number that are affected this way. This, in turn, means that shore gear, shore cranes and so on must be employed in order to discharge these ships.

As you will see from what I already have said, practically every ship that comes in presents an individual problem, and this individual problem must be discussed with the port authorities in Montreal. I must say the authorities there are extremely co-operative. They take cognizance of all the facts and work with us as closely as possible to have a berth that is suitable to the ship you are dealing with at that particular time. But, naturally, at the peak of the season in the spring at the opening of the river and the last thing in the fall, when everyone is getting their cargo out and the port is absolutely clogged, naturally tempers get a little bit frayed and there are many, many problems that arise because of low water, and you cannot use our normal facilities.

My next point is that low water constitutes an additional navigational hazard and cannot help but affect the insurance premium paid by the ships which again, must be handed back sooner or later in freight rates to the general public.

Now, unfortunately my phraseology might not be proper relating to groundings and strandings, but actually I do not know of any grounding or stranding which is directly attributable to low water. There have been cases of ships alongside elevators with grain loading apparatus at Montreal when too much grain was poured into them, with the result that they sat on the bottom. Somebody did not check the draft, and that was a human error. This can happen. But it is not, I would say, directly attributable in the first instance to the fact that there is low water. If there is low water, you should know it and avoid it.

Similarly, in the river itself and in the port, I do not know of any particular specific case which is due to low water. It is usually due to their getting out into the channel, not knowing exactly where it was, or something of that nature. It boils down to a human error, but I would like to make the point that low water is an additional hazard. There is no doubt about it, it is reflected in the insurance rates.

I have tried to give you a rundown of what we are faced with in the shipping business as a result of this low water. To translate it into dollars and cents is an impossible task. I can point out where Montreal as a port is losing business to downriver points. I can point out where ships coming down from the great lakes cannot top-off at Montreal, or cannot top-off to the fullest extent at Montreal because of the low water.

The point I wish to emphasize is that we are put to extra expense because of this thing of sending ships down the river and in shifting from one berth to another, and this cannot help but affect naturally the exporting and importing interests of Ontario and of mid-western Canada.

Admittedly, a lot of ships go down the seaway today and load at seaway ports such as Hamilton, Toronto, Sarnia, and so on, but there is still a big, big volume of cargo which originates in Ontario and which rolls down to Montreal either by truck or train. All of this, whether it is in the locks, or whether it is loaded at Toronto, or whether it is loaded at Montreal, is definitely affected by the general rate structure.

If we are to incorporate an additional expense at Montreal, then the rest of Canada will be affected by it every bit as much as is the port of Montreal itself.

To put a figure on it, as I say, is not possible. But I do know that it would run to millions and millions of dollars particularly in so far as Montreal itself is concerned, and although I feel that a study of the great lakes is a very, very desirable thing, I do feel that it is a long range program.

I hope there is a shorter range program entirely within Canadian jurisdiction which could be implemented below Montreal by sort of backing the water up to a certain extent. I would not like to see Montreal turned into a locked harbour, if it is humanly possible to avoid it. Obviously a near turn solution, as far as Montreal is concerned, and in the interests of the rest of Canada, would be some remedial works downstream from Montreal.

I only learned a short time ago frankly that we had a model at LaSalle, but it does not extend beyond the upper end of lake St. Peter. Tidewater is actually at Three Rivers. I humbly submit that I do not see how a thorough study of this problem could be done without extending that water model down as far as Three Rivers.

I was always under the impression that it was being thoroughly studied by one of the departments at Ottawa here, but frankly I am at a loss to see how it could be thoroughly studied as long as that water model does not extend down to Three Rivers. At the present time it does not extend down to there. Consequently, I urge that it be done right away, and that these studies get underway to find out what the effects would be.

One thing is certain, if we had 38 or 39 feet of water at Montreal, it would be of absolutely inestimable value. Thank you, Mr. Chairman.

The CHAIRMAN: Thank you, Mr. Eakin. I have Mr. Whelan, Mr. Hahn, and Dr. Rynard.

Mr. WHELAN: Mr. Chairman, my first question has already been partly answered, but I would like to ask if it is possible for you to give an estimate of the number of ships, or the percentage of ships using Montreal harbour which need the full depth of the harbour? Is it possible to do that?

Mr. EAKIN: No, sir, I do not think it would be possible to do that. My main point was that charterers for vessels for grain in particular know the depth of water in Montreal, and consequently they do not attempt to bring a deep draft ship to Montreal. Consequently the business we are losing never comes near to Montreal.

Second, the wheat board brings grain down to the lower level elevators to accommodate this type of draft of ships. Consequently this never comes to Montreal at all. But you can only assess this by taking all these ships loading at Baie Comeau, and down the river and adding them all together, but I do not think that would be a fair way to do it.

Mr. WHELAN: Water is not the only handicap. Are there port facilities there to handle those ships?

Mr. EAKIN: Yes, certainly, as far as bulk cargoes of grain are concerned. The new No. 4 elevator is the most modern elevator in North America.

Mr. WHELAN: Might it not be that the depth of water is as low as 15 feet?

Mr. EAKIN: You are talking about cargo liners, but they are not affected nearly to the same extent by this low water.

Mr. WHELAN: Is it not possible to obtain a list of ships giving the size and draft which they need? I do not say they are the ones to be directed to Montreal, but shipping agents do have control over the ships that do come to Canada. I know you can get a book which shows every boat using the great lakes system.

Mr. EAKIN: They are all listed in Lloyd's register, which is a volume about "that" thick. Pretty nearly every ship in the world is listed in it with its tonnage and so on. But again I do not know that it would prove the point. What I presume you are trying to get at is just how much are we actually losing by it. That is a difficult figure, and I defy anybody to arrive at it.

Mr. WHELAN: There is one ship I am happy about not being able to get into your ports, and that is the sugar boat, when it comes from a sugar beet producing area.

I have one other question which I would like you to explain. I do not have any knowledge of the Arctic institute. What does this body do?

Mr. MACCALLUM: Perhaps Mr. Bourguignon would answer your question.

Mr. BOURGUIGNON: The Arctic institute is a joint effort between the United States and the Canadian governments, who both sponsor a group of scientists who have been sitting together for about eight or nine years so far and have been studying the Arctic and the Antarctic. It is also sponsored by private contributions from industry and organizations, and they do study all that concerns Arctic regions jointly.

During the famous effort of the geophysical year they came out with fantastic discoveries down in the Antarctic, and you may also have heard of Commodore Robinson and his exploits in taking a ship across. Incidentally he is a Canadian. They do, as I have said, study all aspects of ice behavior as well as the Arctic region and so on.

We felt that in trying to use their pattern as a model, we might suggest to this committee that perhaps an organization of that sort would be a semi-government, or a semiprivate, a group of competent scientists who could possibly study carefully, deeply, and thoroughly, and in a co-ordinated manner all aspects of the problem, such as the conservation of fresh water in North America, and particularly in the great lakes and St. Lawrence system.

Mr. WHELAN: I gather from your brief that you would like to have co-ordination between the groups, and you feel there should be one over-all group. That is what you are recommending?

Mr. MACCALLUM: That is correct, that is one of our strongest recommendations.

Mr. DINSDALE: I have a supplementary question. Is it not true that the Arctic institute is a voluntary group which receives grants in aid from the governments, and that its work is largely co-ordinated through the universities?

Mr. BOURGUIGNON: I have a short note here or resume as follows:

The Arctic institute, a private, non-profit organization, was founded in Canada by an act of Parliament, and in the United States it was incorporated in the state of New York. It is governed by bylaws permitted under these constitutions.

Institute policy is established by a board of governors (at present twenty-four) and an executive committee is authorized to act on behalf of the board between board meetings. There are committees to advise on such matters as development, publications, research, and so on, and in addition, there are advisory committees concerned with the institute's various projects. The committees present reports to the board at its semi-annual meetings.

Offices are maintained in Washington and in Montreal, the headquarters also being located in Montreal.

The Arctic institute as founded with the initial financial assistance of the national research councils of Canada and the United States, the Carnegie Corporation of New York, and the Hudson Bay Company. The Institute's research program has received substantial support from a number of agencies of the governments of both the United States and Canada. It also receives private contributions from individuals, foundations and industry, such contributions being deductible for income tax purposes in both the United States and Canada.

Mr. DINSDALE: This is a private organization and its only connection with government is that it was incorporated under a charter. I wonder if the excellent symposium which I think was organized at the insistence of the Montreal port authority could not develop into a permanent group to carry on some of the functions in the area of water conservation with the Arctic institute, as in research on Arctic matters.

Mr. BOURGUIGNON: If I might answer this as far as I can, I would not like to say that I can answer it, but as you know, there are already several organizations, private and governmental, which are dealing with water. Mr. Dinsdale, like other members of this committee, I am sure has received a compendium of papers which were presented particularly at the second symposium held in Montreal on June 30. This includes an outline of what we had in mind, and also of the paper delivered by Dr. Langford, head of the great lakes institute at the University of Toronto.

We therefore feel that the foundation stones exist, and that all that is needed is encouragement, and also some facilities to perform and co-ordinate such work in a sort of advisory capacity. As I said before, and as it was explained in the paper about the Arctic institute, it is not exactly right to say that it is not unique. I am under the impression that very few organizations or institutes of the sort have been sanctioned by parliament. They might become incorporated, but they never seem to go that far. In this case there was an act of parliament which did actually confirm the existence of the Arctic institute and give it the official government of Canada status.

Mr. DINSDALE: Yes, in the sense that companies are incorporated by acts of parliament, and so on. I have a further question. It might be a good recommendation for this committee to encourage the enlargement and development of

work already done in several areas. I think we might also come to the conclusion that the need for co-ordination is one of our big problems in tackling this water difficulty.

Mr. BOURGUIGNON: I am glad you raised the point, because we have been at it for about five years, and we hope now that we have reached the critical point. It was easier to obtain this committee, I would say, when there were other things to worry about.

Mr. WHELAN: I have one or two more questions. One of the things that amazes me is that you stated you were unable to decide on the emphasis of the work being done, and on the study of this work on the model of Montreal harbour, and that you were surprised that it does not go further along the river. I was under the impression—but perhaps I had not paid close enough attention to it, when we had the officials of the department before the committee, and talking about this work on the model—that it did go further than the upper end of lake St. Peter.

Mr. MACCALLUM: After writing this brief I realized how little I personally knew about that model. Through the kindness of the national harbours board and the St. Lawrence ship channel authority I spent half a day at the model last week. I found that the model runs from Nuns' island at one end, to the west end of lake St. Peter. I was informed that the work that has been done and was being done now was nearly as far advanced as it could be; that all the schemes which looked to be feasible had been tested at about as far as they could be, and that certain negative results had been obtained, and some really positive results as well, because for every solution put forward and tested, there were ramifications which evolved out of the model, and which could not permit any conclusive results to be obtained at this stage.

Mr. TURNER: Because the model did not extend far enough?

Mr. MACCALLUM: Yes, because of that, and not only that; I was also informed that had the model been extended further to include lake St. Peter it would bring in a completely new set of problems, because the bottom of lake St. Peter has not been thoroughly explored, and with water flowing there it might create problems which nobody has had a chance to study yet, and it might cause unforeseeable problems.

It must be said that when given a complete model including lake St. Peter, there would be navigation studies required, because there is only one ship per day working on it, while there could be a body of several ships per day if it were extended and properly used.

Mr. WHELAN: I have one other question. Do you think there should be a new model?

Mr. MACCALLUM: That was just in time.

Mr. WHELAN: Thank you.

Mr. HAHN: Mr. Chairman, I shall direct my questions to any one of the three witnesses, Mr. MacCallum, Mr. Eakin, or Mr. Bourguignon. The first one deals with the general water levels. It was suggested by Mr. Eakin that the water depth in the harbour might be 38 feet or 39 feet, and that this would be desirable. My second question is this: What is the water level now approximately in relation to it?

Mr. EAKIN: It was 34 feet and 4 inches as of yesterday.

Mr. HAHN: My third question is this: if you were to get 38 feet or 39 feet by backing up water, in other words, by reason of conservation rather than deepening it, would there be any flooding problem in the surrounding territory, or could you say that 4 feet would do it?

Mr. EAKIN: I am not an engineer and I would not like to answer that question at all. I would think that if you back it up from down river, you would

probably have to move three or four dams away from there to avoid flooding. I am pretty sure of it. But whether it would be possible to get four or five feet of additional water through the docks around Sorel, I cannot answer.

Mr. MACCALLUM: I asked that particular question at the model and I was informed that 40 feet at Montreal would not bring about abnormal flood conditions.

Mr. HAHN: We consider that you have abnormally low water now with 34 feet. Would this not pose flood conditions for you, or would this exist?

Mr. EAKIN: We have been accustomed to this since about 1936. It varies from year to year. Thirty six feet is not untoward at all, and it has been higher than that considerably.

Mr. HAHN: The second question deals with the terms of reference of the International Joint Commission. I gather that the International Joint Commission just goes down the international section. Am I correct in assuming that you people feel that that study should go right down to tidal water and take in the whole system?

Mr. TURNER: The answer is yes.

Mr. MACCALLUM: Oh, yes.

Mr. EAKIN: I do not know whether it should appear under the International Joint Commission, when it is entirely within the boundaries of Canada, but it seems to me that something could be done down the river without reference to the International Joint Commission.

Mr. HAHN: In that connection surely anything that is done in the great lakes themselves is going to have the same effect on the lower system, and conversely, if you back water up into the system from down below, it must have the same effect on what they are doing further up, I would think.

Mr. MACCALLUM: I can only partly answer you by saying that the backing up process can only create a difference to a very limited upstream range. It can only have an effect to the extent that you are using a horizontal level of water, and therefore as far as horizontal levels extend upstream, that is a limiting criterion.

Mr. HAHN: The first locks would wipe the thing out. And also, on page 5 you deal with divided jurisdiction. Can you give us any specific example of jurisdictional problems that you know of? To whom do you go if you have a water level problem? To what agency of government would you go to see specifically about tackling your problem?

Mr. MACCALLUM: That is a very hard question to answer, and to point out one example, let me say that in order to see the model, I telephoned the Montreal port manager who, through his public relations man, arranged with the St. Lawrence ship channel authority to have certain people available, and I was able to go and see it. I am not sure whether I followed the right procedure or not, but at least two authorities were involved there. We are certainly aware of very strong conflicts, but I must not try to bring them up at this point.

Mr. EAKIN: We in the shipping business normally deal with Mr. Audette about water for harbour development, and the port manager, or alternatively we deal with Mr. Lamb, the engineer on the St. Lawrence channel.

Mr. TURNER: Perhaps Mr. Bourguignon would like to speak to that.

Mr. BOURGUIGNON: I shall be very restricted in my answer. I would like to point out, however, that to my knowledge there are 51 agencies at the federal level which directly or indirectly have to do with water, and we would further have to consider them when we deal with one aspect of water, because when we deal with a water body it is very difficult to divorce one

aspect from another. It is also known that certain aspects of this problem are under federal government jurisdiction. I shall not name any department, but there are several departments. And further, the provincial interests might be involved. You will recall, Mr. Chairman, that you mentioned to me that pollution would not be discussed here. But somehow pollution has to do with water, fisheries, industrial water, power, hydro, and several other things. So that it has been our feeling in the past four years. Here again I would like to recall to Mr. Dinsdale's memory that we have approached his department several times when the program was not as acute as it is now. As a matter of fact, it is a democratic problem that we are faced with now, because we have specific examples of men who used the words "differences of opinion between several federal government agencies".

Further than that I would prefer not to comment.

Mr. HAHN: I think you have made a very good point.

Mr. DINSDALE: Let me ask a supplementary question. How useful or how helpful has been the control board established at Cornwall which was designed to deal with some aspects of this immediate problem?

Mr. EAKIN: I think you are probably referring to the fact that when water becomes extremely low in Montreal, or dangerously low, representations may be made to the International Joint Commission.

Mr. DINSDALE: No. This is a special group which attempts to co-ordinate federal departments with respect to the problems of Montreal as a port.

Mr. EAKIN: I am not prepared to answer that.

Mr. BOURGUIGNON: I think I know what Mr. Dinsdale refers to. I remember two or three instances where the Montreal harbour management had certain difficulty, and they resolved it with the Cornwall body by telephone, and they were rushing up and down. There were certain points of view represented and differences of opinion, when the consequences were rather problematical. I would not like to say any more than that.

Mr. HAHN: It sounds as if this problem was beset with the average political elements. You raised the question of a short term solution by deepening the channels and deepening the berths. You suggest there is a limit to what can be done in the way of deepening berths. But is it not the case that if you go down to a certain depth you start to uncover the foundations and the footings?

Mr. MACCALLUM: That is correct.

Mr. HAHN: How much scope would you have?

Mr. MACCALLUM: I would not say you can take off any of the original bottom.

Mr. HAHN: You cannot do very much deepening unless you deepen the berths themselves.

Mr. MACCALLUM: Yes, without very expensive engineering work to strengthen it.

Mr. HAHN: I would like to ask some questions about the model. First of all, who owns this model?

Mr. MACCALLUM: I feel it falls entirely within the jurisdiction of the St. Lawrence ship channel authority.

Mr. TURNER: It comes under the Department of Transport.

Mr. MACCALLUM: That is right.

Mr. HAHN: The presence of this model is to study the flow problems in sections of the river. How far upstream does it go?

Mr. MACCALLUM: Nuns' island is about the bottom of it, and that is at the western end of Montreal harbour.

Mr. HAHN: You suggest that they have got all the information they can from the section they have built. But if they expand the model and cover a larger section of the river, is it possible that the conditions they would find by doing this extra piece of river would indicate that some of the studies they have previously made were a waste of time?

Mr. MACCALLUM: Yes, it could be indicated that some of the studies were, but I do not think that the time has been wasted. I think an additional extension of the model would permit an extension of studies already done and that some of the work already done would not have to be done over. Part of it may have been a waste, but not too much of it, I think.

Mr. HAHN: How many months of the year is your harbour open or free of ice?

Mr. EAKIN: Well, you say free of ice?

Mr. HAHN: Yes, how many months do you use it?

Mr. EAKIN: Well, Montreal is having ships in there, and they have been getting ships in there all winter long. Normally the season there would be from late March or early April through to early December, anywhere from the sixth to the eighteenth. It depends on the actual freeze up.

Mr. HAHN: Do you, sir, think it might be economically feasible to break ice and keep the seaway open in order to bring more business into that area?

Mr. EAKIN: Yes, there is no doubt that it is feasible to keep the river open, but at what cost I do not know. It obviously would involve icebreakers to a very large extent, but it also involves specialized ships. The ordinary soft skinned ship should not be brought up the St. Lawrence river in the winter-time. I would not dare bring her up. It is not actually the St. Lawrence that is so bad but down in the gulf where you run into a great deal of hard ice. The ships that are coming in there are literally cargo ships. The *Lauritzen* ships are icebreakers. They initiated it. We ourselves have a ship which is called the *Fairhead*, which has been operating into Quebec for the last year. She is ice strengthened and under certain given conditions I suppose she could reach Montreal. But, she is not a strong ship, for instance, as is the case with the *Lauritzen* icebreakers. In order that these ships be economical they really must be operated throughout 12 months of the year. I do not think you ever could get to the stage where ships in general would be strong enough to operate into Montreal in the wintertime.

Mr. HAHN: Certain of our maritime members would be happy to hear that statement.

Mr. EAKIN: In certain specialized trades it would be worth while to have strongly ice strengthened ships which could operate in and out of Montreal all year round. But, you cannot expect that in the ordinary tramp market for chartering grain and that sort of thing. I am only speculating again now, but there are all sorts of ways, I suppose, in which you could divert hot water from the lakes, build dams across from Newfoundland and Labrador, shut out the arctic current, change the climate in England, and so on but, in my opinion, they are pretty far fetched.

The CHAIRMAN: Have you a question, Mr. Rynard.

Mr. RYNARD: Mr. Chairman, several of the questions I was about to ask have been answered, but just to belabour the point a little longer, it seems to me that the immediate problem is from the port of Montreal down and not in the rest of the waterway; in other words, the rest of the waterway probably will take 10 years or more to correct but you said you could not wait any longer to have this problem corrected. Then I thought you introduced the fact that you did not want any dams in that area. Have you any proposal at all to offer as to what you would like to do to hold that water back so that you would have sufficient water for the port of Montreal.

Mr. MACCALLUM: Mr. Chairman, I have to be very careful with this answer because neither I nor those with me are competent to answer that question properly. But, we do believe that studies already have been made which will indicate that a partial damming of the river below Montreal may be done in such a way that the Ottawa could flow back upstream for a short distance. This is just an example, if you wish, of a possibility, but by diverting the back rivers of the Ottawa, Des Prairies and the Mille Isles, at a point where these flow into the St. Lawrence, so that they would flow back upstream a short distance this would give us the additional water we need, with a partial dam.

Studies that presently are being conducted on the model I saw consist largely of diking parallel to the main flow of the river to channel some of the water into the main channel, with the resultant less flow in the rest of the river. But, I do not know the results they achieved with this study.

Mr. RYNARD: I take it that you believe this is of immediate urgency?

Mr. MACCALLUM: Yes, I believe it is possible to find an answer in this way but, as I say, I am not competent to give the answer.

Mr. RYNARD: There is another problem. With the advent of the St. Lawrence seaway dredging and so on has been carried on, and I am wondering if we have not come to the point where we can only carry a certain sized vessel. For instance, I understood Mr. Eakin to say that more and more were using bigger boats, which cheapens transportation. Does that mean we are going to effectively shut off the St. Lawrence seaway and have two types of carriers, the carrier that is going to be operating on the upper seaway to the port of Montreal and, with the facilities now available, transferring these goods quickly by elevators and so forth economically to other ships? I am wondering if it would not be more feasible to have that type of carriage than it would be to increase the depth of the St. Lawrence seaway and enlarge it. Could I have your opinion in that connection?

Mr. EAKIN: I think you have that situation existing at the present time. Your depth through the seaway is 25 feet 6 inches and your draft in Montreal, at least in certain sections, goes on up to 31 and 32 feet, so you already have that. You also have the occasional ocean-going vessel going up to the head of the lakes and taking on a full cargo of grain. But, basically, I should think grain can be brought down cheaper by lakers than it ever could in an ocean-going ship. The reason for this is that your modern laker will lift 28,000 or 29,000 tons and go through the seaway, whereas your ocean-going vessel is a different shape, which it must necessarily be; she has a sharper prow and she is more difficult to handle. In respect of her steerage, a couple of twists of the propeller and she goes shooting ahead, whereas the laker is slow-moving and will move into the locks much more gently, and so on. There is no doubt about it that the laker can compete and compete very successfully with ocean-going vessels when it comes to the carriage of bulk grain.

Now, when you come to the carriage of general cargo, your liners are going up there now. Basically, they do not use a smaller type of ship than normally operates into Montreal. Some of them top-off in Montreal; some of them load completely up in the lakes both on the American and the Canadian side. I do not think there is any doubt that Ontario's rates today are being subsidized by American cargo and American exports. By the same token, a great deal of general cargo traffic does come down to Montreal, particularly by C.S.L., via the seaway, and trans-shipped at Montreal.

At the present time Canadian Steamship Lines has extremely good berthing facilities in Montreal, and they run an extremely good freight package service. They come down the seaway and discharge to their ships; the cargo is trucked up to the shed where it is being loaded into the ocean liners.

Obviously, there is double handling there but their ships use side dock loading. The cargo is economically handled with lift jacks the whole way, put on the trucks and carried up to our sheds, lifted off on pallets, and then it is ready for loading. There are some trades where I very much doubt if they ever will go up the lakes, particularly in the case of long distance trades; but, with regard to the shorter trades, such as across the U.K., there is no doubt that all the major lines are up the lakes now, and they are up there to stay. No matter what happens to the depth of the water in Montreal you will see this same pattern continuing because I do not think that the St. Lawrence seaway authority does possibly enough to make it deep enough to take the big ships up there, particularly when they are light and riding high; the wind gets a hold of them and they have difficulty manoeuvring in the locks.

Mr. RYNARD: Then, from what you say, I understand that in the foreseeable future the probability is that boats will get bigger and more of the traffic will come down and empty into the elevators in Montreal.

Mr. EAKIN: I think that is reasonable to suppose, but you will still have ocean-going ships going up the lakes. You always will have that general pattern because the person up the lakes really has the option of shipping down via C.S.L. and then having their own ships there handle it, or alternatively, they can ship direct out of main lake ports such as Toronto and Hamilton.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Are you aware of any specific study in respect of creating a series of dikes at lake St. Peter and backing up the water, or is this just part of that model project.

Mr. MACCALLUM: I am not sure that this should go into the record, but I have been told there has been a study made by proper authorities emanating from federal departments. This study, I am told, started some years ago. I believe it cost several millions of dollars. This is only hearsay, but I believe dikes were involved, the exact location of which I do not know. But, it is considered by some people to merit very intensive study.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): From whom can this committee obtain the information which I am requesting?

Mr. EAKIN: I have no idea, sir, there already are some dikes in the islands at Sorel; these dikes were built somewhere around 1912 or so. They are still there, and they do have an appreciable effect on the level of the water in Montreal.

Mr. MACCALLUM: This is not what you are getting at. I know all these dikes; I have seen them on the model. They have been put in accurately. But, two out of three have deteriorated to the point where in the centre of the dikes there is little material left. They still do have an effect, I am sure, which is an important effect at this stage, but this type of thing done over again at that or some other location has been thoroughly studied.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Was it the Department of Transport that undertook this study, or do you know?

Mr. MACCALLUM: I believe so, but I am not absolutely certain.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Mr. Chairman, I feel that we should have someone from the department who is involved in this study come before the committee perhaps as one of our next witnesses. I wonder if we could have a suggestion from our witnesses today whom we should ask.

Mr. MACCALLUM: I believe when the national harbours board and the Montreal port authority officials are before you they will mention the specific studies.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Now, you mentioned at page 2 of your aide-mémoire that Montreal is losing out to Three Rivers and some of the lower elevators. In your opinion, is this causing any over-all economic loss to the country? If the work is being done at Three Rivers or Baie Comeau does this involve a loss only to Montreal or does it involve a loss to the province of Quebec, or the country as a whole?

Mr. EAKIN: I would say it is not an over-all loss to the country because these cargoes are moving through Canadian ports, whether it is Montreal or Baie Comeau. But, it is a loss, particularly in the case of Baie Comeau, to publicly owned elevators. As you know, the elevator there is a privately owned one.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): It is a loss to the publicly owned elevators but is it more economical to transfer the grain at Montreal from the point of view of freight rates generally in the country, insurance rates and so on, if it can be done there? Are you saying it would be less economical to do it in Montreal than at lower ports?

Mr. EAKIN: I do not think it would at all. It is just the fact they are on tidewater at Baie Comeau and can get any depth or draft there which is required.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): So, there is no economic argument for transferring the grain at Montreal from the point of view of the country as a whole?

Mr. EAKIN: Not in freight rates, I would not say.

Mr. TURNER: Mr. Chairman, I have a supplementary question. Aside from the diversion to down river Canadian ports does this water level problem reflect a diversion to American ports because of a change in the freight rates? Are Montreal and the seaway losing business to the American ports?

Mr. EAKIN: In respect of tankers it definitely could, but in respect of grain, I do not think so.

Mr. TURNER: With regard to any tankers you would lose, the diversion presumably would be to Portland.

Mr. EAKIN: Yes.

Mr. TURNER: So, all the oil would come in through Portland?

Mr. EAKIN: Yes.

Mr. TURNER: And, that revenue would be lost to Canada?

Mr. EAKIN: That is correct.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Now, to your knowledge, has there been any duplication of effort by any of the federal departments dealing with these water problems? You speak of there being too many departments to deal with and too many authorities to deal with but, to your knowledge, have you come across any real duplication?

Mr. MACCALLUM: Perhaps we should have Mr. Bourguignon answer your question.

Mr. J. C. BOURGUIGNON (*Executive Secretary, Montreal Port Council*): Although I would like to be excused from answering this question I will try and make a very very short comment to illustrate how important it is to have federal co-ordination and integration of effort in respect of such matters. I would like to comment upon a remark made a few moments ago by Mr. MacCallum in answer to a question put by Mr. Hahn.

It came to our attention three or four years ago that a study had been made to divert water from the back river waters of the Ottawa into the heart of Montreal, and when that was considered the province of Quebec and

the city of Montreal ordered biological and bacteriological studies of the waters of the back rivers. That study was conducted by Dr. Lucien Piche, then director of the University of Montreal, assisted by Dr. Gustav Prevost, who later became director of the purification board for the province of Quebec. They came to the conclusion that the waters could not be mixed because of the bacteriological and pollution content of the back rivers. The waters were of a very definite different nature, and it was decided that if the municipal waterworks had to take this mixed water it would have to be of a certain standard and everything else. The study was a negative one. Now, they did report to us on that occasion. We held a meeting with them in Montreal three or four years ago. Since then it has been abandoned but probably now it is being reconsidered.

Of course, since then the question of water purification plants has been given more attention and it may be that at the present time the objection could be lessened. But, in this connection I know that the city and the provincial board were very strong against even the suggestion of it. But, as I said before, we did experiment with these differences of opinion between the various departments at federal level, but, again, there is the question of trying to integrate the problem as a whole. You have the situation where it concerns one single body of water running from one point to another, in which each government has a say. Perhaps this is where the water conversation institute might be useful.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): As a model for this water resource authority you have used the analogy of the Arctic institute, but the Arctic institute, I believe, is only a research body. In view of that, do you not feel, if there is going to be some sort of over-all water authority, it will have to be much more than just a research organization.

Mr. BOURGUIGNON: Well, we felt that perhaps if it were sponsored on the same basis as the Arctic institute and if it were manned by competent scientists and engineers, and so on, it could probably foster enough confidence on the part of all governments concerned to play an advisory role in the background and, perhaps, make certain suggestions now and again. They could make certain studies of situations involving various agencies controlled by the three level governments, the municipality, the provincial and the federal authorities. Perhaps they could create more harmony and in this way prevent unnecessary delays.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I have a further question and I believe it is supplementary to that put by Mr. Hahn. If you raised the water level at Montreal four to five feet, say up to 38 or 40 feet, would this facilitate keeping the river open during the wintertime, or is there any relationship involved there?

Mr. MACCALLUM: Not by itself. However, I think that any works that were designed to do that would also take into account the possibility of increasing the number of months in the year of operation in Montreal by virtue of ice control. We have an ice control structure being built now and it certainly will serve a purpose. Whatever else is done also could be designed partly as an ice control structure.

The CHAIRMAN: Have you a question Mr. Dinsdale.

Mr. DINSDALE: Mr. Chairman, my questions will be supplementary to those that have been put and have been answered. They will be along the line of questions put by Dr. Rynard. Could you tell us to what degree the problem at the port of Montreal is related to the increasing size of ships on the St. Lawrence river, and to what degree it is related to a decreasing water level?

Mr. EAKIN: Yes, I would say that it is at this stage of the game almost fifty-fifty. Our water level is very definitely low. At the same time the majority of ships, bulk traders at any rate, are increasing in size. We are getting now roughly the water levels that we had in 1933-34, which was the lowest period in recorded history.

During the interval we have enjoyed ample water. During the majority of that period ships remained at a reasonable draught size, but during the latter half of it, in the last fifteen years or so, ships have increased in size, so consequently when it comes to a guess I would say that our problems consist of probably fifty-fifty, both low water and the size of ships.

Mr. DINSDALE: With the trend towards larger ships, I presume the level you have specified will continue to be 38 feet to 39 feet.

Mr. EAKIN: I would like to see much more. I would like to see as much as we possibly can get. But I do think that 38 or 39 feet is possibly the most we could hope to get through backing up the water.

Remedial works in the Great Lakes can add to that as time goes on, but as I understand it now one thing I read, if they release the water from Lake Superior it would take two years before it got to Montreal, and then it would only raise the level in Montreal by one inch.

To have any appreciable increase in Montreal it seems to me that anything done at the lakes is going to take a long time. I would like to see much more water than 38 feet or 39 feet, but I would be happy to get that.

Mr. MACCALLUM: However, our genuine concern is that the trend in the water level is continuing to deteriorate. So we are already losing what shipping we had to a measurable extent.

Mr. DINSDALE: The volume of shipping is down so far as use of Montreal is concerned, and it is related to this water level?

Mr. MACCALLUM: Some ships that used to come to Montreal are not now coming to Montreal. I do not know the number of them.

Mr. DINSDALE: Has the authority given any help to this proposed diversion from James Bay?

Mr. TURNER: Mr. Dinsdale does not mean the diversion of cargo; he means the diversion of water.

Mr. DINSDALE: The Grand Canal scheme.

Mr. MACCALLUM: This is the one Mr. Kiernans is talking about. We have thought about this. Mr. Kiernans happens to be a classmate of mine from school and I have talked to him at various levels on this particular subject. We have not taken a position on this. We feel there will come a time when additional water provided in that way may even be essential. We are not at all sure whether the time is now or not. We are thoroughly in agreement with the idea that this should be studied at this point to see what costs will be involved. We think there are other things that will have to be done first. I think that is as far as our present position goes.

Mr. HAHN: May I ask a supplementary question?

If such a scheme is carried out, a scheme which would mean more water going into the great lakes system at times of flood, you would have to get rid of that surplus water. This would probably result, if nothing else, in a faster flow downstream. Would the rate of flow or the rate of current be detrimental to the ship operators in the Montreal area.

Mr. MACCALLUM: At the risk of answering where I should not, may I say that we do not think that kind of water going into the great lakes system will have as great an effect on the rate of water at Montreal as the normal spring floods, for example.

Mr. DINSDALE: The witnesses have put another question in my mind, and I am putting this question as a good Manitoban.

Are any of the boats being diverted to Churchill that would otherwise come to Montreal?

Mr. EAKIN: Yes. Montreal definitely feels depression on grain during the months Churchill is open. It is something we are faced with. So long as the price of grain at Port Arthur is the same as at Churchill it is going to cost more to get it out at Montreal, and that is something we have to live with.

Mr. TURNER: Water levels or no water levels?

Mr. EAKIN: Water levels or no water levels.

Mr. DINSDALE: I am very pleased to get that information, and I assure you it will not determine my thinking on the matter too strongly!

I have one further question. In relation to possible solutions your brief mentions the establishment of a new national body which could perhaps become a component of an international organization. This committee has been wrestling with this problem at earlier sessions. Could you be more specific? Could you provide further details of what you have in mind with this suggestion?

Mr. MACCALLUM: I think what we have in mind is some not necessarily large but extremely competent group of people who would not necessarily replace any existing authorities such as the Department of Public Works, the Department of Transport and various other authorities which do have their place in the scheme of things. They may not be changed at all. However, we have in mind that to undertake any works involving major water flows in Canada now involves so many people that if such a problem were presented to this over-all group it could be disseminated to the various authorities for proper control and proper study.

Mr. DINSDALE: In other words you are going back to the institute idea?

Mr. MACCALLUM: That is right.

Mr. TURNER: Or a permanent secretariat on water policy?

Mr. EAKIN: This would be consistent with our thought.

Mr. DINSDALE: This, of course, was one of the recommendations of the Ressources for Tomorrow conference. My friend Mr. Bourguignon said we did not do much to help but we did give him a lot of fatherly advice, and I think the symposium sprang from the fatherly advice.

Mr. BOURGUIGNON: I did attend the conference in question and I did some of the secretariat work on it. As I said before, the time was perhaps not ripe, or the situation was not perhaps mature enough. In other words, it was not critical enough and therefore, with the tendency of pushing things under the carpet when they are not too urgent, nothing was done. However, I do still feel that we had a good case for integration and co-ordination at the time because, though it is a funny thing to say, I made a little study of it and when one goes into it deeply enough one finds that water problems are really diluted between many hundreds of people and, as Mr. Turner suggested, a national secretariat, an official secretariat, between the actual government authorities is certainly a very important and urgent need. Perhaps, as in the case of the Arctic institute of North America, from time to time an outsider or semi-outsider may usefully whisper some good advice or make some special studies that would help the national secretariat.

Mr. DINSDALE: Would it be fair to suggest, Mr. Bourguignon, that rather than pushing the problem under the carpet there was an attempt made to bring it out into the open.

Mr. BOURGUIGNON: I think, frankly, the conference was certainly an excellent initiative. I am not trying to say it was not; on the contrary. For the first time it did bring together the type of people I have in mind; in other words, government officials, scientists, university people and experts in all walks of life and different departments, whether forestry or water or anything else. Then the follow-up perhaps was not exactly what the actual scientists and experts and university people expected.

I do know that the council of ministers of natural resources was formed, and I am sure you know from reading their bulletins and perhaps from getting first hand information that it has taken a long time to get their terms of reference of action. The program is still being studied. They will have a conference on pollution, I understand, towards the end of 1965.

If the people who were concerned at the time had the feeling that they were wanted and were useful, if they had the feeling that they were organized on this fresh water problem in such a way that they were a semi-official or at least a tolerated institute—tolerated if not encouraged and if not receiving a blessing—perhaps quite a lot could be achieved. I do not know if you agree with me on that, but you know that the follow-up was expected to be at the time when the conference came to a conclusion. Everybody was invited to stick together and they were told that there would be semi-annual conferences or semi-annual meetings. I do not think the first one has taken place yet.

Mr. DINSDALE: Would you not agree, Mr. Bourguignon, that there has been a development and that the progress has been quite expeditious compared to the lack of progress in the previous 50 years, for example?

Mr. BOURGUIGNON: Well, of course in the previous 50 years if you want to go back to 1909 to the time of the water act or the act that was the basis and the foundation of the International Joint Commission, you will see there that human consumption is the number one concern of the federal government or the federal legislature, that navigation is second, and industrial water is third.

Of course, human consumption being number one is the concern of the municipalities and provinces and the great lakes states. I am now talking about the great lakes system and the St. Lawrence system. Navigation is the concern of the federal government. Hydro and industrial water is the concern of the provinces. It was on that basis that I did think that integration or at least a good marriage was advisable.

Mr. DINSDALE: We do not disagree in that regard. The previous initiative was in Sifton's time.

Mr. BOURGUIGNON: Yes, but to use your own expression when I last saw you in this room two or three years ago, integration was very difficult to organize or to think of. Now I think with the critical situation it is much easier to bring it about.

Mr. TURNER: I just have two questions because the ground has been fairly well covered, Mr. Chairman.

I take it from the factors that the witnesses have brought to bear on the loss of revenue as the result of low water levels affecting eventual freight rates, these same factors would apply to other ports in the great lakes system inland as the result of their water levels. I think if a water level is low at Hamilton or Toronto or Sarnia, the same factors would be brought to bear rendering those ports non-competitive.

Mr. EAKIN: That is so to a certain extent at any rate; they are definitely deep sea water ports in the same sense that Montreal is, and not nearly as big. It also affects your inland ships, your great lakes ships. To the extent that they are affected by water levels, yes it would.

Mr. TURNER: So, although you give the particular example of Montreal and how it is affected, the same factors will affect the inland ports?

Mr. EAKIN: Yes. If I may add to that, I think it was Mr. Watson who asked the question about the fact that it had been handled down river from Montreal and whether it affected the over-all economy. It does affect the over-all economy to this extent. We have publicly a tremendous investment in the harbour of Montreal, both in elevators and in piers and wharves. If those public facilities which are already paid for—at least, I hope they are because we seem to be paying all the time—if they are not used to their full extent obviously the economy as a whole will suffer.

It does affect the economy as a whole if the ship itself is caused additional expense and if the ship has to shift from Montreal down to a lower river port to complete loading. This is an expense which falls on the ship and which is obviously going to be taken into consideration by an owner when he is chartering the ship again.

Similarly, within the port of Montreal if one has to shift from one berth to another, this is creating an additional expense which in the final analysis must be covered by the owners' revenues from the great lakes. As such, the economy of Canada as a whole is affected.

Mr. TURNER: My final question, Mr. Chairman, is this. I can understand the natural reluctance of the witnesses to cite particular examples of lack of co-ordination, but do I take it to be their view that at the moment there is insufficient co-ordination at the federal level between their agencies having to do with water. Is there insufficient co-ordination at the provincial level?

Mr. EAKIN: Yes.

Mr. HAHN: May I ask a follow-up question?

From your knowledge of all the agencies, all the committees, all the boards and so on involved in this problem and with the job that is being done today, if you were to start with a clean sheet of paper do you think you would have wound up with fewer boards, agencies, committees and so on?

Mr. BOURGUIGNON: I think this should be the job of a very intricate study that would involve Parkinson's law and human beings and maybe some political reflection on certain aspects. Therefore, we have not suggested that any of those should be abolished if it is unthinkable, but if it is thinkable perhaps it should be studied very competently and scientifically. However, we still feel, as Mr. Turner has said, that a secretariat for water is urgently needed, and perhaps it could see how much research is needed in all the main aspects, not just with regard to navigation or bacteriology but even in regard to administration and the management of water as a system, as a body, as an international body, as a state and as a province and as a municipality. I think a study of integration of administration and management is certainly urgently needed. It is less difficult for a private body to be objective and impartial because such a body would be quiet and, as I said before, we do not want a platform, we want to be on and off as a good old professor who scribbled notes in his back office, we want to be able from time to time to have a private meeting or interview and make certain quiet suggestions which do not have to appear on the front page of the newspapers.

Mr. WHELAN: May I ask a supplementary question?

The CHAIRMAN: Mr. Whelan.

Mr. WHELAN: Is the witness of the opinion that we should abolish some of these federal departments or have some of the federal departments relieved of this study? To me in my own humble opinion we have too many federal departments doing this work, and maybe one or two of them instead of six or seven of them would do a better job, or even just one new federal department. The ramifications one runs into in trying to get information as an ordinary member are too huge to try to explain as far as I am concerned.

The ramifications that you run into trying to find out information as an ordinary member are too deep to try to understand.

Mr. MACCALLUM: I do not think we would like to take the stand that anything which exists should be eliminated, but we want to emphasize this stand: if we had started from scratch we might not end up with four organizations, but rather with a pyramid of them. I think this is the position we take on that point.

Mr. ALKENBRACK: I would like to congratulate the gentlemen on what they have given us this afternoon, and especially the brief which Mr. MacCallum presented. I see on page 6 that you advocate another agency or authority over and beyond all the agencies and authorities that we have now, and you make the statement that in that area of the St. Lawrence river, because Canada owns both banks of it, it is not of an international nature. Do you not think that there is still an international interest therein, or rather an international responsibility, by whatever agency you set up? The responsibility would hold true with respect to the International Joint Commission.

Mr. MACCALLUM: Yes, very much so. My particular reference is to doing it in Canada instead of asking the International Joint Commission to do it. The fact is that the International Joint Commission as such now cannot study anything beyond the international part of it. I believe very firmly that anything done anywhere in such a system has to be internationally administered.

Mr. ALKENBRACK: How do you know that they cannot study it?

Mr. MACCALLUM: It is my understanding of the terms of reference that they cannot do this. This is what I believe.

Mr. ALKENBRACK: You go on to state that such a body as you suggest, or such a national body might well become a Canadian component of an international organization which might be called the water conservation institute of North America. Do you not think that you are reaching too far in suggesting that it be called the water conservation institute of North America?

Mr. MACCALLUM: That is the reason I find it difficult. But it seems to me that to be very valid in the future all water on the North American continent will have to be co-ordinated.

Mr. ALKENBRACK: Yes, but it is not all coming down the St. Lawrence river.

Mr. MACCALLUM: I agree, and I did not try to advocate it because I think it comes far outside my terms of reference.

Mr. ALKENBRACK: I think so. But not too long ago you appealed to the Quebec government for assistance here. This is a resolution directed to the Quebec government. Did you get any assistance from them in the request that you made?

Mr. MACCALLUM: Interest has been expressed.

Mr. ALKENBRACK: Now I notice, Mr. Chairman, that control is the answer here, in my opinion. In fact, it was economic control that I directed attention to in some of the questions asked of another delegation which visited us not far back. I would ask Mr. Eakin about this. I noted he said that we now have reduced water levels comparable to 1933, and I agree because we have a situation comparable to 1933 at the present time in lake Ontario, and I have noticed it in the marked compounding of your local problem in the Montreal harbour since the completion of the seaway.

Mr. EAKIN: No, I do not think that could be attributed to the seaway.

Mr. ALKENBRACK: Do you actually have difficulty? These are arguments I have experienced with similar trends—in connection with riparian rights in that case—but did you have any difficulty between powers, such as those of

the hydroelectric interests at Barnhart island, in arguments between and the navigational interests which are so vitally important as well?

Mr. EAKIN: This is not in my province. Navigational interests take precedence under international treaty over power interests.

Mr. ALKENBRACK: I would think so. They were there first.

Mr. EAKIN: I would hope so. This in turn, as I understand it, is regulated by the International Joint Commission on which Canada has members and the United States has members. I do know that the plan they have been working on has been altered a number of times. I have forgotten what they are down to now, but they started out and worked downward. As I understand it, these various plans have affected both power and navigation. To the best of my knowledge, navigation has been given the precedence right along the line. Whether or not we, as navigational interests, have sufficient precedents over the power interests, I do not know. Frankly, I do not know whether the outflow from lake Ontario could be restricted further during the winter months at the expense of power and stored up for use during the dry months of the summer. This is a department in which I am not qualified to comment.

However, I do know that if water in Montreal harbour gets to a dangerously low level, they can make a pretty quick decision to release additional water from lake Ontario. That has been done, and I think probably at the expense of the power interests. It probably comes at a time when they do not particularly want to use it for power.

Mr. ALKENBRACK: I agree with you; they cannot withhold water from you which is needed for navigational purposes.

Mr. Chairman, much has been made here of dams below Montreal harbour, of course which I know very little about; but I notice this is along the same lines of a suggestion I made here previously in respect of the foot of lake Ontario; that is, dams with the necessary locks which would have to be built for economic use of the water for navigational purposes. Does Mr. Eakin agree that that would be a desirable answer to their problem? You told us you were not an engineer.

Mr. EAKIN: Are you talking about below Montreal? I would not like to see locks; no. The simple reason is that Montreal is remaining open later and later in the year, and opening earlier and earlier in the spring, and nobody has developed a lock which can function properly in winter ice conditions. I would not want to see Montreal turned into a locked harbour.

Mr. ALKENBRACK: You did mention the advisability of dams. How can you have navigation with dams without locks?

Mr. EAKIN: I did not discuss the advisability of dams; I said a study should be made in connection with the possibility of dams and dikes. Personally, I feel the answer probably lies with dikes. If dams were involved, I think you would have to start at Three Rivers and work back up, with a series of dams which might be a very expensive proposition.

Mr. ALKENBRACK: Dams, of course, restrict the flow.

Mr. EAKIN: They do not block it off entirely.

Mr. ALKENBRACK: He mentioned pollution, a subject in which I am very interested. I am not interested in pollution as such but the abatement of it. Does Montreal have sewage disposal plants?

Mr. BOURGUIGNON: There are some and there are some more being studied. I should say they are past the study stage and they are going to be constructed very shortly, at least before the close of 1967.

Mr. ALKENBRACK: Do they have sewage disposal units in sewage disposal plants at the present time?

Mr. BOURGUIGNON: Yes, there are some installations already.

Mr. ALKENBRACK: Are they of the flow process type? Do they handle solids?

Mr. BOURGUIGNON: I do not think they are exactly the most modern plant but the new ones that Dr. Prevost has advocated are the up to date plants, I believe. I know there were meetings at city hall but as I do not know the decision which has been made I could not give you an exact description of the type of plant advocated. But, I do know they are past the stage of consideration.

Mr. ALKENBRACK: Do they dump any raw sewage in the St. Lawrence river, so far as you know?

Mr. BOURGUIGNON: Well, there is a certain amount, yes.

Mr. ALKENBRACK: And, Montreal is the largest municipality in Canada, is it not?

Mr. BOURGUIGNON: I do believe so, yes. But, may I point out to you that Chicago is much larger and they have no plants to date. I understand that you had Mr. Meserow here last week and I suppose you did have the opportunity to put a similar question to him?

Mr. ALKENBRACK: No, I did not. Of course, I hold no brief for Chicago. That would be the last thing I would do; they are stealing a great deal of water from our great lakes system—that is, they are diverting it without any control, and I suppose their sewage goes down the Mississippi instead of into the great lakes.

The CHAIRMAN: Have you a question, Mr. Aiken.

Mr. AIKEN: Mr. Chairman, I think most of the questions I was going to put have pretty well been covered and, as it is fairly late perhaps we should adjourn.

The CHAIRMAN: Have you a question Mr. Rynard?

Mr. RYNARD: My question has been answered, Mr. Chairman, but I would like to say that, in my opinion, there should not be too much criticism of organizations that have been formed. We have come into a century in which we have water pollution, a century in which we have had industry expanding by leaps and bounds and in which we have had transportation. All these have grown very very rapidly. I think it has been very well handled on the Canadian side when one compares our population with the population of the United States. That is all I wanted to add.

Mr. TURNER: May I ask the committee members, through you, Mr. Chairman, whether they received the bound copies of the symposium sponsored by the Montreal port council as advertised in their brief?

The CHAIRMAN: I think it was suggested that we should try to obtain them. I did see a copy a month ago.

An hon. MEMBER: No, no, no.

Mr. BOURGUIGNON: I gave one to you, Mr. Chairman, and I gave two to Mr. Rock. I thought the 24 copies we sent had been distributed.

Mr. TURNER: May I suggest to the secretary of the committee that they be distributed.

Members will find this a very useful volume.

Mr. AIKEN: I have received a copy but I think I received mine because I attended the symposium, not as a member of the committee.

Mr. RYNARD: I move that copies of the report of the symposium be distributed to members of the committee.

Mr. HAHN: I second the motion.

Motion agreed to.

The CHAIRMAN: Gentlemen, I am informed by our wonderful clerk here that we should have a motion if we wish the schedules which follow the brief of Mr. MacCallum enclosed in the report of our proceedings.

Mr. RYNARD: I so move.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I second the motion. Motion agreed to.

The CHAIRMAN: Gentlemen, I wish very briefly to thank you on behalf of the committee for the straightforward manner in which you have answered many of the questions.

The committee stands adjourned.

APPENDIX

Appendix (A)

MONTREAL PORT COUNCIL

COMPOSITION OF THE MONTREAL PORT COUNCIL

		Delegates of:
Chairman	D. C. MacCallum	
Past Chairman	A. Gagnon	
Member	J. C. Asselin, Q.C.	Chambre de Commerce du District de Montréal
Alternate Member	Marc Hurtubise	Chambre de Commerce du District de Montréal
Member	Lucien Saulnier	City of Montreal
Member	Fernand Drapeau	City of Montreal
Past Chairman	R. L. Dunsmore	Montreal Board of Trade
Member	W. R. Eakin, Jr.	Montreal Board of Trade
Member	M. L. Déry	Montreal Citizens' Committee
Member	Guy Beaudet	National Harbours Board
Alternate Member	Captain F. C. Oppen	National Harbours Board
Member	C. T. Mearns	Shipping Federation of Canada
Alternate Member	William Baatz	Shipping Federation of Canada
<i>Advisors</i>	Gilbert Latour (M. Chartrand, Alternate)	Chambre de Commerce du District de Montréal
	Georges Longval	City of Montreal
	H. H. Gould	Montreal Board of Trade
<i>Consulting Delegates</i>	R. A. Booth	Canadian International Freight Forwarders
	L. Ph. Brizard	University of Montreal
	A. T. Brodeur	Canadian Importers & Traders Association
	H. W. Craig	Canadian National Railways
	Y. Dulude	Montreal Corn Exchange
	D. B. Gillespie	Canadian International Freight Forwarders Association
	M. F. L. Jaques	Canadian Board of Marine Underwriters
	J. M. McAvity	Canadian Exporters Association
	I. C. McEwen	Dominion Marine Association
	J. N. McPherson	Canadian Pacific Railway
	R. Metcalfe	Canada Steamship Lines
	J. M. Packham	Canadian Manufacturers' Association
	M. Pinsonnault	Stevedores—Dockers
	Donat Sicotte	Trucking Association of Quebec
Secretary	J. C. Bourguignon	

Appendix (B)

MONTREAL PORT COUNCIL

a) 3. RESOLUTION SUBMITTED TO THE QUEBEC DEPARTMENT
OF REVENUE ON JANUARY 15, 1962

WHEREAS the vital importance to the interests of the people and the economy of the Province of Quebec of the flow of water down the St. Lawrence River from the Great Lakes is indisputable;

AND WHEREAS the interests are tremendously affected by regulation of the various water uses and controls, including navigation, power generation, municipal and industrial waterworks, sewage, pollution control and flood control;

AND WHEREAS water flow regulations for these uses and controls as they affect the Montreal Region and the Province of Quebec are not always compatible with uses and controls for the Province of Ontario and the States of the U.S.A. bordering the Great Lakes and the St. Lawrence;

AND WHEREAS the Great Lakes Commission, an inter-state compact of seven U.S. Great Lakes states proposes to launch a complete study of water flows and uses in the Great Lakes and St. Lawrence in cooperation with the two Federal governments and the two central provinces;

AND WHEREAS the Province of Ontario is maintaining a watching brief, and attendance of observers at the deliberations of this body;

AND WHEREAS some of these states plan now or in the near future to press for diversions out of the Great Lakes Basin, and these pressures will mount in proportion to fast growing needs in the years immediately ahead;

AND WHEREAS the Montreal Port Council is particularly concerned with an assured flow of water for the present navigation purposes and the future development of the Harbour;

THEREFORE BE IT RESOLVED THAT the Government of the Province of Quebec be urgently requested to establish a program and policy to protect and further the interests of the Province in *all* the uses of the waters of the St. Lawrence River; and that to keep up-to-date the information at its disposal on this fast developing situation, the Province maintain a close watching brief on the various activities and meetings connected with the matter;

AND BE IT FURTHER RESOLVED THAT the Province of Quebec, because of its primary responsibilities in the area of natural resources which transcend those of the federal government, expand its representation at international and inter-state meetings such as the International Joint Commission and the Great Lakes Commission to preserve its interests and press for the adoption of policies and practices favourable to the Province.

Appendix (C)

MONTREAL PORT COUNCIL

6. Statement by Mr. André Gagnon, Chairman of the Montreal Port Council, at the M.P.C. Water Level Seminar held on June 30th 1964

Conclusions of the Symposium

It has been arranged at a breakfast meeting this morning that, with your permission, the Chairman of the Port Council will act as a link between this meeting and the executive deliberations and policy formation of the Council.

I intend to report first that the concensus of opinion of the delegates here is generally favorable towards the principles of yesterday's meeting in Toronto between the states and provinces, that the two federal governments be asked to make a reference without delay to the International Joint Commission to make an over-all special and comprehensive study of the uses of the water of the Great Lakes and St. Lawrence, and the problems created thereby. I would also point out that the functions and powers of the I.J.C. should be examined right away in view of their further strengthening.

Thirdly, a series of meetings at a high governmental level between the states, provinces and federal authorities, such as the one which took place in Toronto yesterday, either on a formal or informal basis, should be envisaged for policy clearing-house purposes until the new concept of comprehensive Great Lakes—St. Lawrence planning is well established and functions as an operating reality.

I will suggest fourthly to our Council that the reference to the International Joint Commission should include provision to establish a continuing instrument to coordinate the work of universities and other research bodies concerned with the resource, and that this instrument should be so set up as to be able to coordinate either publicly or privately initiated, applied or basic, research and planning.

Finally, I will suggest to the Council that it continue to support and press for action in the harbour and in the St. Lawrence Ship Channel for engineering work to raise the water level independently of any increased flow from up-river, but keeping short of any locking devices or any interference hampering the free movement of shipping.

Appendix (D)

MONTREAL PORT COUNCIL

ANNUAL REPORT—1964

4.4 *Water Levels*

On a question that is fact becoming *vital* to the Montreal harbour, and thus, to the Port Council, close liaison has been maintained with the various government agencies connected with the water flow on the St. Lawrence.

Although it has been possible to obtain a change in the St. Lawrence water flow plan and thus provide a higher level in the harbour during periods of water scarcity, low water levels continue to be a problem to Montreal, forcing a significant number of merchant ships to be re-routed to other ports.

During the past year, the Council contributed significantly to the public's awareness of the problem, as well as fostering useful discussion among experts, by means of our highly provocative Symposium of last October where water levels was one of the three topics discussed (see below). A similar one-day symposium, this time devoted exclusively to water levels, was held at the end of June with a still greater degree of success.

The Council has resolved to follow-up as swiftly as possible, in consultation with all municipal and provincial and federal agencies, the necessary investigations and to aid in evolving satisfactory answers to the problem. Industrial and shipping firms have expressed a desire to assist us in the task of finding a positive solution. The pre-eminent position of our port and of the economic region it services is at stake if better management of the Great Lakes—St. Lawrence water resource is not forthcoming very soon.

4.5 *Great Lakes-St. Lawrence Water Planning*

Four years ago, the Port Council established its policy of overall Great Lakes-St. Lawrence planning as an essential prerequisite to insure, whatever may happen in the future, a satisfactory water flow in the Saint Lawrence and efficient levels in the harbour and the ship channel. Subsequently embraced by the U.S. Great Lakes Commission, this policy is making considerable headway with Canadian federal and provincial agencies.

For some time, the Council had proposed the formation of a *special research body* to look into this problem and was gratified to learn of the setting-up in Detroit of the Great Lakes Regional Data Center which, by seeking out, storing and disseminating basic information on these and related topics, will make the task of any such eventual international agency that much easier.

At the June 30th Symposium, it was proposed that the Council support the International Joint Commission in seeking an extension of its powers and that the Commission be requested to make a study of the water level "problem". It was also felt that the Council should liaise with all interested bodies in order to follow-up the recommendations as presented at our symposium and ratified at a special Council meeting on the 6th of July.

Continuing the Council's policy of liaison with other interested groups, we attended the Seventh Conference on Great Lakes Research sponsored last April by the Great Lakes Institute of the University of Toronto (5.6 & 5.7.)

Appendix (E)

MONTREAL PORT COUNCIL

Terms of Reference of the Montreal Port Council

To study, develop and secure implementation of policies and projects to promote, improve and protect the Port of Montreal, in the interest of the Montreal Economic Region;

To work with municipal, provincial and federal government and their agencies and all other organizations and interests, using or otherwise concerned with the Port of Montreal, regarding facilities and services contributing to the Port's efficiency and growth;

To promote and develop traffic through the Port of Montreal by every means;

To promote all facilities related to the Harbour which will encourage industrial development in the Montreal economic region;

To identify the community with the Port.

HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964-1965

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 9

THURSDAY, MARCH 11, 1965

Respecting

The subject-matter of the water levels of the Great Lakes system.

WITNESS:

Mr. Thomas W. Kierans Consulting Engineer—Mining and Water
Resources, Sudbury (Ontario).

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1965

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias Godin

Vice Chairman: Mr. Ian Watson

and Messrs.

Aiken,
Alkenbrack,
Asselin (*Richmond-
Wolfe*),
Berger,
Danforth,
Davis,
Dinsdale,
Flemming (*Victoria-
Carleton*),
Grégoire,
Habel,

Hahn,
Harley,
Herridge,
Laprise,
Leboe,
Leduc,
Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,

Noble,
Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

(Quorum 10)

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

Mr. Asselin (*Richmond-Wolfe*) replaced Mr. Foy on December 18.

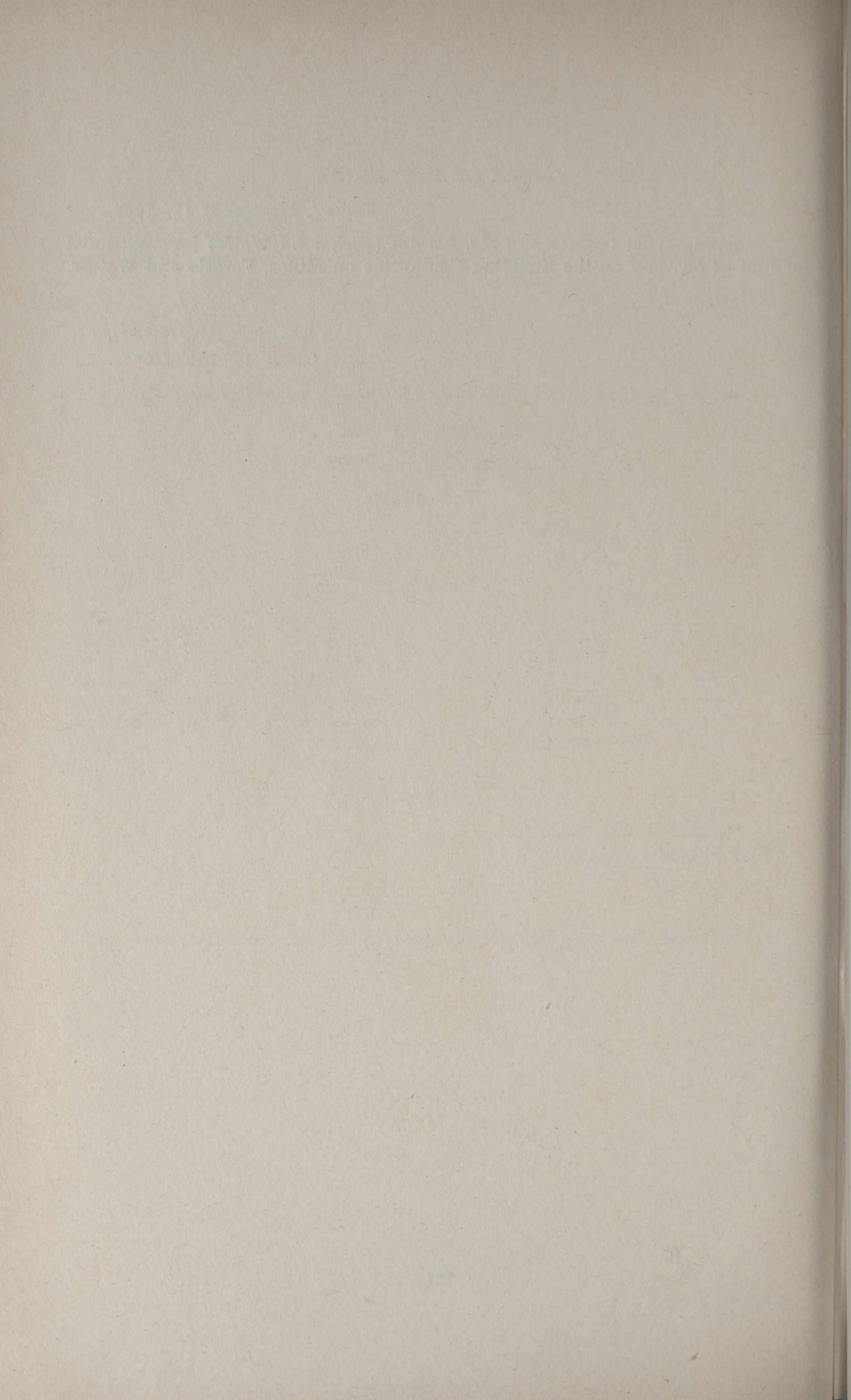
ORDER OF REFERENCE

FRIDAY, December 18, 1964.

Ordered,—That the name of Mr. Asselin (*Richmond-Wolfe*) be substituted for that of Mr. Foy on the Standing Committee on Mines, Forests and Waters.

Attest.

LEON-J. RAYMOND,
Clerk of the House.



MINUTES OF PROCEEDINGS

THURSDAY, March 11, 1965.

The Standing Committee on Mines, Forests and Waters met this day at 10.45 a.m. The Chairman, Mr. Osias J. Godin, presided.

Members present: Messrs. Aiken, Davis, Dinsdale, Godin, Habel, Hahn, Harley, Herridge, Laprise, Leboe, Legault, Loney, Mitchell, Moreau, Rock, Roxburgh, Ryan, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*)—(19).

In attendance: Mr. Thomas W. Kierans, Consulting Engineer, Mining and Water Resources, of Sudbury, Ont.

The Committee resumed its consideration of the subject-matter of the water level of the Great Lakes System.

The Chairman presented the *Third* Report of the Subcommittee on Agenda and Procedure as follows:

The Subcommittee met on Tuesday, March 9, and has agreed to recommend:

1. That Mr. Thomas W. Kierans, Consulting Engineer—Mining and Water Resources, be called to appear at 10:30 a.m. on Thursday, March 11th.
2. That the Committee call Dr. G. B. Langford, Director of the Great Lakes Institute, University of Toronto; also Mr. Dean Wenborne, President of the French River Resorts Association, French River, Ontario, to appear on Tuesday, March 16th.
3. That following the hearing of the above-mentioned witnesses, the Committee proceed to the preparation of a Report to the House.

On motion of Mr. Aiken, seconded by Mr. Hahn, the said report was adopted unanimously.

Referring to a request made on December 8,

On motion of Mr. Dinsdale, seconded by Mr. Rock,

Resolved,—That the information—a letter and a table—supplied by Mr. J. A. MacDonald, Assistant Deputy Minister of Northern Affairs and National Resources, about the Advisory Committee on Water Use Policy be printed as an appendix to this day's proceedings (*See Appendix "A"*).

The Chairman also referred to a resolution passed on December 15th "That Proceedings of the Montreal Port Council Second International Symposium on Water Levels be made available to the members of the Committee."; he informed the Committee that the Montreal Port Council was unable to supply a sufficient number of copies, and that the information contained therein has already been placed before the Committee.

The Chairman introduced Mr. Kierans.

The witness read a prepared statement on The Great Replenishment and Northern Development Canal, copies of which were distributed to the Members.

To amplify his statement the witness showed slides. By agreement of the Committee his explanations of the slides are not included in the verbatim evidence.

Agreed that a map which was distributed to the members be appended to the proceedings (*See Appendix "B"*).

At 12.30 p.m. the Committee adjourned until 3.30 p.m. this afternoon.

AFTERNOON SITTING

(13)

The Standing Committee on Mines, Forests and Waters reconvened at 3.55 p.m. this afternoon, Mr. Osias J. Godin, the Chairman, presiding.

Members present: Messrs. Aiken, Berger, Davis, Dinsdale, Godin, Hahn, Herridge, Leboe, Legault, Mitchell, Rock, Ryan, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*)—(14).

In attendance: Same as at the morning sitting.

The Committee resumed its consideration of the subject-matter of the water levels of the Great Lakes System.

Mr. Kierans was questioned on his presentation.

At 4.40 the Committee adjourned for a short recess.

At 4.45 the Committee resumed questioning of Mr. Kierans.

During the course of his examination, the witness read into the record part of the remarks by Brigadier General Roy T. Dodge, Division Engineer, North Central Division Corps of Engineers, U.S. Army, to the Great Lakes Commission, Chicago, Illinois, January 25, 1965; also part of a report of April 10, 1964, by Michel Chevalier, former Secretary to the Montreal Port Council.

The Committee agreed that the witness file with the Clerk of the Committee a list of all the works he knows of which he feels are relevant to the future water consumption needs of the United States.

The Chairman thanked Mr. Kierans for his testimony and the personnel who worked extra hours due to the extended hearing.

The Chairman also expressed his gratefulness to the witness's brother who assisted in the showing of films.

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

EVIDENCE

THURSDAY, March 11, 1965.

The CHAIRMAN: Gentlemen, I see a quorum. Before we proceed with the testimony there is a matter regarding the work of the committee which I should like to bring up at present. I would like to present the third report of the subcommittee on agenda and procedure. (*See Minutes of Proceedings*).

This takes care of all the witnesses to this date. It would appear that this would conclude the evidence to which we have committed ourselves.

Is there any discussion of this report?

Mr. AIKEN: Mr. Chairman, there was one other witness whose appearance was discussed, that is Dr. Nu from the National Research Council. I understand that at the moment he is not available. I merely wanted to mention his name because we have referred to him and we agreed we would like to call him when he is available. Otherwise, Mr. Chairman, the statement you made is agreeable.

The CHAIRMAN: Thank you, Mr. Aiken. Are there any other comments on the report?

Mr. AIKEN: I move that the report of the subcommittee be adopted.

Mr. HAHN: I second it.

Motion agreed to.

The CHAIRMAN: Most members will recall it was suggested that further information be tabled concerning the meetings of the advisory committee on water use policy. Mr. MacDonald, the assistant deputy minister of the national resources branch, has furnished a diagram which I have in my hand, indicating all the meetings held since 1955, and those branches of the various departments which were represented. I would like to have this appended to our proceedings.

Mr. DINSDALE: I would so move.

Mr. ROCK: I will second it.

Motion agreed to.

The CHAIRMAN: Another item was the possible inclusion in the evidence of certain speeches and briefs presented at the Resources For Tomorrow conference in Montreal. This was looked at by some members of the committee. I know that Mr. Aiken was one of the members. It was felt that most of the material evidence has been presented to a great extent since the commencement of this study. Therefore, it would be, in some way, a duplication to have it presented here. This material was not available as such, and that was the problem. I trust the committee will agree to forego the inclusion of these works in our evidence.

Mr. AIKEN: Yes. Mr. Turner and I were delegated to look over the papers that were presented at the Montreal conference. By the time we have heard Mr. Kierans and Dr. Langford, most of the witnesses who appeared there and who had evidence bearing on this committee will have appeared or their papers will have been reproduced. We felt we would not be justified in reproducing the whole symposium.

Mr. ROCK: I would agree with that. I was also present at that conference in Montreal and I agree with what Mr. Aiken said.

The CHAIRMAN: Can we take it that we will dispense with the inclusion of those works? I understand that is so.

Today we are privileged to have Mr. Thomas W. Kierans, consulting engineer. I am very proud to introduce him, especially since the gentleman is from Sudbury, Ontario. Most of you know of Mr. Kierans, and especially of the work that he has done regarding the water resources of Ontario, and especially the great lakes, and his Grand Canal proposition. Most of us know something about it, and it is a privilege for the committee to be able to hear him this morning.

We have a meeting scheduled this afternoon in case we cannot complete our work this morning. I believe that Mr. Kierans wishes to project certain pictures on the screen. At that time we will consider whether and how this can be made part of the evidence, and possibly there might be some material which would enlighten the members further but not be necessarily made part of the evidence of our meetings. However, maybe there is a way of introducing this material as evidence.

Without further remarks, I understand that Mr. Kierans has a brief to present, and I trust each member has a copy of it in front of him. We will then proceed either to questions or to further explanations by way of reproductions.

Mr. T. W. KIERANS (*Consulting Engineer, Sudbury, Ontario*): Thank you very much, Mr. Chairman and hon. gentlemen. First of all, I want to express my deep appreciation for the courtesy which you have extended to me by your invitation to present our Grand Canal concept to you at this important inquiry relative to great lakes water levels.

Because of the rather intensive public debate which has been going on in regard to Great Lakes-St. Lawrence water management, the basic problems which are involved, if not their solutions, are now fairly well outlined. Their nature, priority and economic importance as well as the various areas of responsibility involved have also been sufficiently clarified to at least indicate the direction of further work.

It must be recognized that your important and I believe historic work, in this committee, has made a large contribution towards this clarification.

It is also true that as a result of the testimony of the distinguished witnesses who have preceded me at this inquiry it is now possible in the interest of brevity to make many useful assumptions with reference to our mutual understanding of the special complexities of the Great Lakes-St. Lawrence hydraulic system.

Briefly then, the basic concerns appear to be:

- (a) Water quality, which while not directly within your terms of reference is nevertheless fundamental: water without quality has not only small value, but becomes a hazard and a nuisance.
- (b) Safe and dependable level and flow stabilization of all the lakes and their interconnecting channels as well as the St. Lawrence river,—the natural discharge and the key to the mid-continent.
- (c) The multi-purpose and mutually beneficial use of the lakes as Water-Export distribution and transmittal reservoirs and the profit and growth opportunities for Canada that are inherent in this use. This use is made attractively possible by the central location of the Lakes and their large storage capacity, as well as the providential arrangement of our many northern rivers flowing into James Bay.
- (d) The concern of water users all the way down the system in regard to the largely unknown effects of increasing population and industrialization on the water shed itself, with the attendant requirement for wider water distribution services for rural as well as urban areas. Coupled to this, is the growing need to provide water control structures and reservoirs on streams tributary to the lakes.

The Grand Canal Concept and the Great Lakes

The major concerns here therefore, are level and flow stabilization,—the opportunities open to Canada to make use of the lakes for profitable water export and—finally the effects of consumptive water use on the basin itself. These are the technical problems. Beyond these are the frustrating problems of coordination of all of the interests involved in water management of the Great Lakes Basin. While we will not deal with these problems here, they are nevertheless of great importance.

Now, if we could find the safest, most dependable and effective long term solution to any one of these important technical problems, the cost and effort to study its merits in depth should be considered worthwhile.

If, as it appears, providence has arranged the geography of our water resources so that we can combine the solution to all of these problems in a single facility, surely it is logical that, in the light of the recent statement of the Economic Council of Canada in regard to Canadian growth needs, we should earnestly, thoroughly and promptly set to work to examine such a multi-purpose concept in detail.

The grand canal concept, we respectfully submit, offers such a multi-purpose facility.

Before we outline for your consideration the merits of this proposal in regard to each of the major problems mentioned above let us first review very briefly the basic grand canal concept.

The essence of the grand canal concept is in the forging of an hydraulic and economic link, with which to join, for permanent and mutual benefit, the great lakes watershed and its special problems and opportunities, to the very large and beneficially arranged fresh water resources of the James bay basin. For important additional purposes of control as well as power and navigation development, the historic Ottawa river is included in this concept.

It is important to note that the two major watersheds included here are approximately the same shape and size and can be expected to produce about the same average volume of fresh water run-off; that is approximately 250,000 c.f.s. or approximately one cfs per square mile of area, more or less.

The great lakes-St. Lawrence System can be described as consisting of a single, long river including along its length several very large elevated reservoirs in a series of steps, with the reservoirs having many, very short tributary streams. The ratio of total drainage area to total lake surface is 2:1, resulting in an extremely narrow catchment area, particularly in the south and west.

The whole system finally discharges down to the sea in a long sloping river channel. The average precipitation on the Basin is 31.5 inches per year with a range of from 25 inches to 37 inches. Approximately one-third of this becomes stream flow.

On the other hand the James Bay Basin consists of a single, large, central, open-ended, sea level reservoir fed by a radiating system of many long rivers. The shortest southern river to originate at the "height of land" is the Harri-canaw river, the site of the northern end of the Grand canal.

To return to the great lakes watershed, the very large capacity reservoirs mentioned above, with the relatively fixed discharge capability of some of the interconnecting channels as well as that of the natural discharge river itself, have provided, in comparison to other rivers, a naturally regulated hydraulic system, particularly as far as seasonal fluctuations are concerned. In this sense it is not comparable to the conventional tree-structure type of watershed drainage pattern where man-made storage reservoirs are very much smaller in size.

Thus, as far as long-term level and flow fluctuations are concerned;—if the annual rate of precipitation for successive years is near the long term

average, or if high and low precipitation years occur in an alternate pattern, level and flow conditions do not change significantly. However, it frequently and unpredictably occurs that we have a sequence of successive years of low or high precipitation. We then enter serious periods of very high or very low water conditions. For example, on lake Michigan-Huron which represents 50 per cent of the total lake area the range of stage is 5.6 feet.

Because of the very great concentration of Canadian and American population and industry in such a naturally beneficial water system, the cost of tolerating such periods, while not adequately studied as yet, is frequently well over \$100,000,000 annually, and is naturally increasing with industrial growth on the basin. On the shallow shorelines of many of these rivers and lakes, economic and other effects can be profound. Such conditions also have very wide international areas of disturbance. These effects are of course, the reason why the international joint commission has recently been given the task of studying the manner in which a greater degree of stabilization can be achieved. The I.J.C., for the purposes of this study however, are unfortunately confined to the consideration of the use of the waters of the great lakes only. This narrow principle to which they are confined is usually described as "regulation". While the studies will take, it is understood, several years to complete, they have already been authoritatively stated to involve works which would be complex, costly (possibly more than a billion dollars) and requiring extensive and major modifications to existing shipping channels.

Now in regard to water export from Canada, we should note the central and elevated location of these large lakes on the continent, and their excellent characteristics as storage and water distribution reservoirs. There is as well known, a rapidly growing need for substantial and dependable new fresh water supplies, particularly for the central and south western United States as well as the eastern seaboard. There is already an indicated requirement within thirty years for an additional 40,000 c.f.s. at least. Some areas, even now, would be eager customers for Canadian water if it were made available under reasonable conditions of cost. It would seem both natural and mutually beneficial, therefore, providing special safeguards and conditions of control and replenishment to protect the interests of Canada can be provided, to extend and accept and yes, to promote, very frankly the important but now contentious use of the Lakes for profitable water export from Canadian wasted waters. This development should clearly offer very large benefits particularly to provincial, but also to national and international interests. Such water export would provide a base for northern development in Quebec and Ontario on a scale which would give Canada the economic depth, the serious lack of which is probably, the greatest single hazard facing the future development of our country today.

The Grand canal concept then, is based on the multi-purpose economic advantages of reclaiming in James Bay, at sea level and by a system of dikes designed to create a new fresh water lake, either a relatively small portion of the run-off from the radiating rivers feeding James bay or all of it, as desired.

The required volume of fresh water, whatever it may be, so reclaimed in this new fresh water lake would then be delivered via the shortest and most direct route to the continental divide along the Harricanaw river valley where a system of approximately seven large reversible pump storage reservoirs would be constructed in successive steps. Each reservoir would be about twenty-five miles long and approximately on hundred and thirty-five feet above the one below it. Power for pumping would be derived from the adjacent rivers flowing into James bay. At the continental divide or height of land near Amos, Quebec, the new water would be delivered to the Kinojevis river, a tributary of the upper Ottawa. It would then flow down the Ottawa river to Mattawa, Ontario. Here, depending on the particular great lakes

requirements applying at the time, it would either be permitted to move directly down the lower Ottawa to Montreal or diverted by pumping via a pump storage reservoir system on the Mattawa river, to lake Nipissing. From here it would flow down the fully regulated French river to lake Michigan-Huron, where it could be used either for export outside the basin, for "water level-conditioning" or for the purpose of off-setting the effects of the increased consumptive uses of water on the great lakes basin itself.

Costs

It should be carefully noted in regard to costs that it is simply not possible for the authors or anyone else at this time, to make any accurate estimates of cost or for that matter of the benefits, or of the most beneficial capacity or size of the initial Grand canal. Further studies are essential to such estimates. We can say however, that the needs of potential customers are very great, the extent of the water resources available are very large and the nature of the arrangement of the water resources are such that they can be developed in a wide range of stages. The best estimate for one stage of Grand canal development is as follows:

It has been estimated that the cost of a system designed to deliver 24,000 c.f.s. of water to the great lakes would be between \$1,200,000,000 and \$2,000,000,000 depending on the extent of the navigation and other services supplied.

It is suggested that this fresh water canal could be developed in stages dependent on need, and provide an expandable, dependable, and fully controllable supply of fresh water to the great lakes. The following items should be especially noted. The unit cost of such water would be low (approximately 1.5 cents/1000 gals.).

—This could be done without flooding large and important inland areas or infringing upon riparian rights in any detrimental manner.

—It would not commit to other areas by diversion, any Canadian waters which could in the future conceivably be used in their natural water courses.

—It could make available in a single "just above" sea level fresh water reservoir, varying volumes of water up to almost one-fifth of the total manageable water now available to the continental United States.

—Substantial quantities of energy could be developed within the Grand canal concept. In particular, ideal peak power facilities could be provided as part of the multi-use concept.

—Many new northern navigation opportunities particularly on the Ottawa river would also be made available.

—It would make possible for development in Canada the very attractive and shorter ship channel via the Ottawa river from the sea to the great lakes in order to relieve pressure on the Welland canal after 1980.

—Most important of all, it would provide the necessary combination of natural catalysts of power and water to promote industrial growth in the north

Assumptions

In considering a broad and complex subject such as the multi-purpose Grand canal and the problems it is hoped it will solve, it is necessary, in the interests of time, to make certain assumptions in regards to the great lakes basin.

We will assume therefore, that you are familiar, at least in a general way, with the complex structural, hydro-meteorologic; economic and political geography of the great lakes basin. We will assume also, that you accept the

paramount importance of the basin to the Canadian-U.S.A. partnership which shares its historic past, its rapidly changing present and its increasingly important future.

We should accept also the fact of riparian law, that to those interests and peoples who have settled at various locations either upstream or downstream on the watershed, this resource is presented in many conditions. The condition of flow, even very large flows, at Montreal is not a "waste" as some have claimed. Such flows are the heritage of that area and just as important to it, now and possibly even more in the future, as the condition of broad lake expanse and extended shore lines are upstream. We submit that nothing will be gained, except futile and endless controversy, by trying to improve one condition of the resource at the expense of the other. The goal of stabilization must be the improvement of all conditions of the resource, indeed, it is possibly the only basis on which we will avoid a dismal stalemate in this important work.

Further, we should, as a matter of ordinary good business relations, seek positive opportunities rather than negative positions in regard to special problems such as that at Chicago. Here, with the height of land only four to six miles from the shallow shoreline of lake Michigan, unique problems of water management needs, present great opportunities for Canada, if they are examined in a spirit of mutual co-operation, having full regard to rights, with due concern for needs.

It should be clear also that the value of water per unit is a steadily increasing one while the value of a unit of energy is a steadily decreasing one. Both of these trends can be expected to continue.

We should finally assume that in spite of the highly complex way in which this watershed is involved in almost every field of human concern, its most profoundly important characteristic is that it is a unit. The effectiveness therefore, of our management of this resource will depend on the extent to which we can bring about mutually beneficial and co-operative action by the many and varied interests involved.

LEVEL STABILIZATION

Now, with regard to some aspects of the Grand canal's immediate future, let us first consider the problem of level stabilization. It is by far the most interesting current consideration in attempting to establish the benefits that can be provided by the Grand canal.

Without going into detail, as far as the hydraulics of level stabilization by regulation only is concerned, it should be emphasized that, even with lakes Ontario and Superior already man-regulated, eighty per cent of the flow of the whole system must pass through the discharge from lake Michigan-Huron. It is essential, therefore, that this St. Clair-Detroit river discharge and the closely related level of lake Michigan-Huron should be recognized as the key to the whole system. It can be shown that whatever happens on lake Michigan-Huron is eventually reflected all the way downstream to the sea.

The water level of lake Michigan-Huron will remain stable at any given elevation, when the total volume of water entering the lake from lake Superior, from precipitation on the lake, from diversions into the lake, from its tributary systems, and from ground water inflows are equal to the total volume of evaporation from the lake, diversions out of the lake and the natural discharge of the St. Clair-Detroit river. The average annual rate of discharge is about 189,000 c.f.s., and the average elevation of the lake is 578.8 feet.

The lake level will move upwards or downwards from any given elevation at a rate which is dependent on the rate of change of the total volume of water in the lake and whether this volume is increasing or decreasing.

As levels rise, the rate of discharge increases because of the greater cross sectional area of the discharge, and vice versa. The change of flow per foot of change in elevation is approximately 15,000 c.f.s. per foot. This natural increase and decrease in the discharge capacity is one of the natural regulatory influences on the whole hydraulic system.

Records show that the changes of levels to extreme average annual high or low levels occur only following a sequence of at least three years of upward or downward changes in lake levels. This three year maximum annual increase or decrease in annual mean lake levels can be shown to be of the order of one foot per year, or in other words, a maximum sustained increase or decrease of approximately one inch per month.

One inch of rise or fall in a lake levels in a month, can be shown to correspond to a change in the volume of water in the lake equivalent to a sustained flow of 40,000 c.f.s. more or less for the month.

Therefore, if we are to design the most fully effective system of offsetting such a rate of change, that is one inch per month, then we must provide for a sustained, month after month, opposite response capability of approximately 40,000 c.f.s. of either recharge or discharge of water into or out of lake Michigan-Huron.

CONTROL CAPABILITY

The basic requirement in control engineering involving any controlled process, calls for a sustained, opposite, and adequate response capability to measurable changes in the significant values in the controlled process, whatever it may be. In this case the significant values would be seasonably adjusted monthly changes in lake Michigan-Huron levels with as well, the rate of change in such levels as indicated by very short term forecasts.

If we can obtain such a sustained capability to respond oppositely and adequately to such adjusted monthly changes in these levels by discharging water directly from lake Michigan-Huron and adding water directly to it as conditions warrant then we can without question maintain a very narrow oscillation or fluctuation in the annual mean lake level for lake Michigan-Huron. In turn, since this is the dominating lake we would maintain a very good range of levels and flows all the way downstream through the lower lakes.

Now, if the required discharge and recharge channels can be used to serve other beneficial purposes as well, such as channels to promote water export from Canada, as well as offering new and additional navigation and power development possibilities, then, by thus widening the area of benefits we will greatly reduce the per capita cost in addition to keeping the traditional shipping channels such as the St. Clair-Detroit river free of the complex system of obstructions to navigation, proposed in regulation only.

While in the initial phases of this development, full control capability may not be possible, the closer we can approach the ideal control or response capability the more effective and complete will be our control. In other words, as we increase our exports we increase our capability to control or to stabilize the levels. The problem therefore, is to develop the best possible response capability as well as one which we can expect will expand and improve. It seems certain that such a capability can be found by making water export contracts sufficiently flexible to provide it.

Now since normal river channels are subject to seasonal and other changes in flow volumes well beyond 50 per cent changes from average, we should be able to obtain new water export contracts to deliver water from lake Michigan-Huron with such optional changes in flow volumes. Since this type of contract will help us to obtain the best possible response capabilities it would as we have said, widen the area of benefits and reduce overall costs to all participants in this multi-purpose development. In addition, as we in-

creased our water exports we would improve our control capability as well as reduce the cost per capita of maintaining it.

REGULATION ONLY

The specific principle of regulation that is being studied by the International Joint Commission's current enquiry is, of course, not known. However, on January 25th, 1965, the U.S. army corps of engineers indicated that the best plan they could devise under "regulation only" would reduce the range of stage on lake Michigan-Huron from a range of 5.6 feet to one of 4.2 feet, and this would involve very extensive dredging and control works in the St. Clair-Detroit river along most of its 85 mile length and its eight foot sloping descent to lake Erie. The objective would be to provide for controlled increases in discharge capacity amounting to 30,000 c.f.s. above normal when required.

This plan would also involve providing a system of works at several points down the river to cause similar artificial reductions in flow. Coincidentally it would be necessary to carry out similar types of works at the lake Erie discharge and other key locations downstream, as far as Montreal. As we have said, the total cost has been estimated to be in excess of one billion dollars.

—It should be noted that under such "regulation only" arrangements, the major benefit is to lake Michigan-Huron. The increase of 1.1 feet from the lowest level experienced in March last year, 1964, does not appear to be very substantial, considering the very high estimated costs and the limited area of benefits.

—In addition, it seems that as conditions on the lakes changed, it could not be further expanded.

—Under regulation only it is unlikely also that satisfactory arrangements could be made to export water from Canada to benefit U.S. water needs as downstream interests would be seriously affected in low precipitation years.

—Furthermore, no additional volume of water would be provided to the lakes in low water. The principle appears to be merely to store water as close to a permissible high stage as is considered safe in periods of high precipitation, to be rationed over periods of low precipitation.

—As should be noted, since there is no positive replacement for low water with such a rationing system, the application of modern control practice which involves positive, opposite and adequate responses to given measured values in the controlled system is not possible.

—In periods of high water in the lakes this potential flood causing high water is not removed directly from the lake, it is simply passed along down through the system with danger of serious flooding downstream if an unfavourable arrangement of circumstances occurs in such periods.

—No potential new benefit to Canadian growth is apparent under "regulation only" either on the Ottawa river for flood control and level maintenance or for new navigation developments or in the Canadian north and certainly very doubtful benefits to areas other than on lake Michigan-Huron.

LEVEL-CONDITIONING

On the other hand, we have proposed in the Grand canal concept the far more flexible "level-conditioning" principle, so called because of its similarity to air-conditioning. This principle which uses the positively controlled Grand canal "new inflows" from the James bay watershed permits positive and opposite and adequately controlled responses to all measurable values which indicate changes in rates of water production.

The reason this is called level conditioning, as I mentioned, is that it is a term we invented because there was none available and because of its similarity

to air conditioning where, in response to natural changes, we either add heat to a building or, in the hot days of the summer, remove heat from a building. This principle also recognizes the need, for artificially increased and reduced flows from lake Michigan-Huron depending on the water production conditions. However, it would transfer the responsibility to provide the major amounts of such controls to the proposed new export out-flow distribution channels. In other words, contracts entered into with those who would accept exports from the great lakes would include at least in the early stages of experience optional 50 per cent decrease and increase clauses. Thus, if, say Chicago and areas related to it, were to arrange for a contract for 10,000 c.f.s.; then, under abnormal high stage and low stages of water production on the lakes they would be required to arrange to take additional flows or decreased flows as conditions moved to extremes. This would permit a greatly reduced cost of level regulation, as well as improved regulation in St. Clair-Detroit river and much wider distribution of benefits, thus lower per capita cost. As such contracts for exports increased, controls on the St. Clair river could be very much reduced and achieve improved results for the whole system. Thus, providing even for a relatively small amount of water export contracts we could obtain better results under water level-conditioning with the Grand canal, as compared to the best plan which appears possible under "regulation only" at this time.

With water level-conditioning, high water volumes in the system would be reduced, whereas under "regulation only" they would not be reduced, simply passed along with the danger of downstream flooding.

On the other hand, with the Grand canal new inflows stopped or reversed in high water production years, continued high outflows via the new export channels would remove the flood causing waters directly from the system and thus reduce the danger of flooding all the way down the great lakes system while at the same time stabilizing lake levels.

In extremely low water production periods low water volumes would be increased, not rationed, because the new inflows from the Grand canal as well as the reduced export outflows under the optional decrease contracts would increase the volume of water in the lakes.

Flood control and level regulation on the Ottawa would become possible.

Very large growth opportunities for Canada's north would be possible, instead of the present need to purchase U.S. coal to replace power lost at Niagara, etc.

The new works required for control could be constructed in conjunction with and as a part of the costs of the water export channel, thus reducing the hazards to shipping and reducing the costs of stabilization to Canada.

Design errors in a concentrated single purpose "regulation only" system would be concentrated in one important area. Under water level conditioning there are a number of alternative discharge outlets which could offer much less serious consequences in case of failure in design or operation.

Under water level conditioning all controls, because of their more positive water replacement characteristics, would be applied closer to the most desirable level, thus improving control quality.

Under such a multi-purpose plan, as the demand for water increases since the controls improve with increased water export, the cost of water per unit to customers could be decreased and still provide a continually expanding range of growth benefits to Canada.

In conclusion may I say a few final words? I trust that this brief description of some of the benefits of the grand Canal and its comparison to "regulation only" has clearly established that the Grand Canal does include both a fully controllable and beneficial "plug" as well as a controllable and beneficial "tap"

and has explained the proper relations of the controls designed to operate these. This seems very difficult to get across.

I should like also to take this opportunity if I may, to comment on an unfortunately typical statement in regard to current "regulation only" studies made in a provincial legislature recently.

The quotation is as follows:

Before we complicate present studies with questions of adding to the water supplies of the great lakes, we should obtain better management of the water we have.

I submit that this kind of statement has only the most superficial amount of truth in it, and we do not have to examine it very closely to recognize that it is not good engineering, the fundamental principle of which is "examine all alternatives". Surely, avoiding complexity is not the objective of these studies. It is difficult to impress anyone today with any such confined types of studies involving such urgent matters and such large expenditures. In the past they have only led to a great waste of time and energy, and frequently, poor planning, which has in the long run had to be replaced at great cost. This is particularly true here where the alternative which is avoided appears, theoretically at least, to be the safest, lowest cost per capita and most beneficial and the most direct way to do the job.

The argument that we should not discuss with the U.S.A. the possible multi-purpose export of Canadian waters in this connection because such waters are of sole interest to Canadians also seems to be a very shallow one. It does not give to the Canadian section of the International Joint Commission the recognition or the credit it deserves, in view of its many years of highly competent service as the guardian of Canadian interests in negotiating boundary water problems. Further, this argument does not seem to indicate a mature sense of absolute ownership and capability to deal directly on a frank customer-supplier basis with our southern neighbours. Surely no one, least of all ourselves, questions Canadian ownership to these waters. If there is no question, then why not deal with potential customers directly and at once in regard to such potentially profitable multi-purpose mutual benefit sales. It seems to us that in the Columbia river treaty, the talks were far more open than the current great lakes studies.

It is strongly suggested, therefore, to all those authorities interested in great lakes level stabilization that: rather than confine the present urgent and important studies within the narrow costly, time consuming and yes, flood hazardous, range of "regulation only", they promptly and adequately and openly examine all alternative solutions to this important problem.

It also seems fitting that I should express the great concern that I am sure all of us feel in regard to the great and frustrating problems of coordinating all of the interests involved in getting such major water resource management studies started.

Somehow these problems of co-ordination must be given greater consideration than we have given them to date, if we are to overcome the great road-blocks to progress which the lack of such co-ordination places in the way.

It seems evident to many of you I am sure, that co-ordination is probably the key to many great lakes-St. Lawrence problems.

We should, in view of these difficulties of course, be pleased that we have started within the last year the confined "regulation only" studies and also that we now have available the great potential for open discussion offered by these committee hearings.

Unfortunately the International Joint Commission studies which will no doubt be costly and take much precious time are confined by Canadian action within far too narrow limits, and of course, this inquiry is not a study.

The problem you must solve therefore is how to get the broad and more useful studies; indeed the only studies which can be of real value, under way as quickly as possible.

Your response to the Grand Canal concept will no doubt have much effect on this problem.

The great danger of course is not only the waste of precious time and energy but also the danger that inadequate studies will result in improper implementation.

In conclusion, we ask you to remember that we are not suggesting here that the Grand canal be built, certainly not at this time; we are simply pleading here again today as we did five years ago that you authorize the full investigation of this great northern source of potential wealth and growth for Canada.

The CHAIRMAN: Thank you, Mr. Kierans.

May we at this stage discuss whether the committee would like Mr. Kierans to show some of his vivid expressions of the project on the screen before questions?

Mr. ROCK: Yes, it would be a good idea.

Mr. AIKEN: Mr. Chairman, as I presume there is no way of including the slides in the proceedings of the evidence, I suggest that any explanations of the slides given by Mr. Kierans should not be reported, as they would merely create confusion in the report.

The CHAIRMAN: Mr. Kierans, how long do you think you will spend on the slides?

Mr. KIERANS: The presentation of the slides should not take any more than 20 minutes, Mr. Chairman.

The CHAIRMAN: It is felt by the Chair that this presentation would be for the purpose of giving additional information to the members only, and that it would not form part of the evidence.

Is it agreed that the presentation of these slides should be treated as something which is for the benefit of the members here and that it should not form part of the evidence?

Mr. AIKEN: I think that would be desirable.

The CHAIRMAN: I believe the maps which have been distributed will be most helpful to the members for the purpose of their questions on Mr. Kierans' brief.

Gentlemen, is this an appropriate time to break for lunch? We have a meeting scheduled for this afternoon after orders of the day.

Mr. ROCK: I suggest we adjourn now, Mr. Chairman.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I think we should consider continuing for another half hour, Mr. Chairman.

The CHAIRMAN: Is it agreed that the map which is before you should be included in the proceedings?

Mr. ROCK: There has been distributed a report which was presented by Mr. Kierans to the Ontario legislative assembly. The map to which you refer, Mr. Chairman, is enclosed in that report. Is the report to be made part of our record?

Mr. KIERANS: That report referred specifically to mining and the benefits of mining.

Mr. TURNER: I think it would be inappropriate to include it in this committee's proceedings.

Mr. MOREAU: Mr. Chairman, are there any facilities for reproducing a map of this kind? If someone had printed it, perhaps sufficient copies could be purchased and they could be attached to the proceedings.

Mr. TURNER: I suggest that the Chairman should be asked to ascertain the cheapest way of having this map appended to the report.

Agreed.

The CHAIRMAN: Very well, the Chairman will do that.

Is it agreed that the committee should now adjourn for lunch, notwithstanding the willingness of many to continue?

Agreed.

I hope that as many members as possible will be here this afternoon immediately after orders of the day.

AFTERNOON SITTING

The CHAIRMAN: Gentlemen, we now have a quorum.

Mr. Davis has indicated that he had some questions to ask. If there are any members who wish to have their names placed on this list, would they please so indicate. I have on my list Mr. Ryan and Mr. Hahn.

Mr. DAVIS: Mr. Chairman, Mr. Kierans has provided us with a great deal of useful information today. I merely wish to ask him a few questions about one or two of the figures which appeared in his report. I would like to get some of the relative order of magnitude of these figures; first, the total quantity of water available for diversion, and second, the amount that is needed in the great lakes basin to control effectively the outflow from the great lakes. In one of his reports, the blue covered one which we were sent along with the notices of this meeting, I see the figure of 25,000 cubic feet per second as being an amount of water which could be made available to the St. Lawrence system from this new fresh water lake at the bottom end of James bay. This would be water collected as a result of controlling as many as six rivers, the Harricanaw perhaps being the principal one. This 25,000 c.f.s. is a figure which can perhaps be compared directly with the 40,000 c.f.s. which you mentioned on page 12 of the report which you read to us today. Is it correct to assume that we could expect a measure of control which would accurately reflect the 25,000 c.f.s. diversion on the one hand and this figure of 40,000 c.f.s. needed substantially to control the great lakes on the other? Are they directly comparable figures?

Mr. KIERANS: As far as we can see at the present time, in order to have absolute capability to control the oscillation of the mean annual variations which have occurred to date, we would require 40,000 c.f.s.

Mr. DAVIS: This is the opposite response capability?

Mr. KIERANS: That is right. It would appear from the records we have to date that this is the requirement that you must have in order to do this. There is an economic balance then which comes into this picture as of this particular moment. While we realize that by 1980 the requirements for water in the United States will have increased well beyond what they need now, and by the year 2000 they have been forecast to be of the order of 40,000 c.f.s., we tried to design a system which would have a substantial effect on low lake levels and on high lake levels and still meet the possibility of some current requirements or some requirements which could be expected to exist at the time when such a canal as we are proposing could be expected to be built. In other words, we tried to design a system which could be expanded but which would start at a rate which would be useful and yet within certain economic balance which would exist at the time that we could expect to build it.

The basic difference between the Grand Canal concept, which includes water level conditioning as opposed to regulation only, is that once you design a system of regulation only it is usually maximized at the start. For example, the report of the United States Army Corps of Engineers presented on January 25 in Chicago this year indicated, as General Dodge said, that the best system they could design was one which would call for an increase in artificial flow of 30,000 c.f.s. He did not mention the amount of artificial decrease that he would want to have, but I assume it would be of the same order, or possibly less, but it is very difficult to say. He did not mention it and I would not like to suggest what he had in mind. However, he did mention 30,000 c.f.s. as the amount of artificial increase in flow which he would want to have.

Once this has been designed and established, it becomes a pretty fixed thing. Since he said that this was the best system they could design for the great lakes, it is unlikely that they could modify it substantially if, say, at some future time, conditions changed. In addition to that, it is very difficult to imagine that, because of the fact that we have to ration the amount of water that is available during an extended period of low precipitation years, we would have any commercial water export involved in this kind of a system. This is the basic concept where the single purpose of regulation is the stabilization of the system, and this is basically what it is for. In general, I would think that it would have the same basic objectives as we had in the case of lake Superior regulation; that is an upstream benefit in order to do as much as possible to regulate the level of lake Michigan-Huron. There are some downstream benefits in that it tends to extend the flows above and below, but since you do not know when they start or when they end, basically all you can do is take them up to what would be the safest figure that you have in history and then ration them and hope it does not go on too long, but having no way to do anything about it if it does extend.

On the water level conditioning, however, the whole situation changes. Here you are operating on the basis that you have made optional decrease and increase contracts with water importers, say, in the United States. Having made these contracts, the more water that you can export, the greater becomes your capability to vary. We have suggested in our proposal here 25,000 c.f.s., and basically we have done this for a number of reasons because, as I mentioned at the beginning, it is about economic for the time that we can expect this system to be built, and it is still sufficiently large to demonstrate the basic principle of increase. Here we are combining an arrangement whereby we have 15,000 c.f.s. allocated for water export and we have 10,000 c.f.s. which are specifically allocated for water stabilization only; this is what it is there for. The costs are borne by the 15,000 c.f.s. of water exported, by the benefits that accrue from the 10,000 c.f.s. of water which are allocated for stabilization only, and the benefits that you get from this say, at Niagara Falls we are having stabilized; it is now available for power generation at Niagara, Cornwall, Beauharnois, and also for stabilizing the levels of the port of Montreal. So that as we can increase our water export and get this desirable optional contract fluctuation which we would build into all our contracts, the effect would be that instead of putting the works which the United States Army Corps of Engineers have designed for the St. Clair-Detroit river—and assuming that, say, these are of the order of major modifications to the channel—we could in our proposal include minor modifications to the channel of the order of 7,500 c.f.s. instead of going up to 3,300 c.f.s., with the benefit of the 15,000 c.f.s. that we would export with the option to cut off the pumps and take this off the top in high water. Then we could take an additional amount of water because of our optional increase contracts, and then take a further optional

increase of 7,500 c.f.s. by virtue of the minor modifications which would be made in the St. Clair-Detroit system. This then would total 15,000 c.f.s. say in the high period discharge. We discharge 15,000 c.f.s. from the top of lake Michigan-Huron. By shutting off the pumps and taking this natural water that is there, we would have another 7,500 or 50 per cent of the 15,000. In other words, we would take another 7,500 by virtue of our optional increase contract. This would bring it up to 2,250 c.f.s. that would be available for export. Then we would have 7,500 modification to the channel instead of 30,000, which has been proposed. This fits into the category of minor modifications. This is now where you are discharging water through the system. So you can see that as we increase our water exports—supposing now we increase the water exports to 30,000 c.f.s.—we now have 30,000 cubic feet that we can discharge off the top during periods of high water because we shut off our pumps and this is exported. We also have an optional increase of another 15,000 c.f.s. which would bring this up to 45,000 c.f.s. and at this point we do not need to do anything to our St. Clair-Detroit river in order to reach that capability of 40,000 c.f.s. that we need. Is that answering your question?

Mr. DAVIS: Yes. It is quite an elaborate reply. Perhaps I could go back to more simple figures. You have a capacity under the Grand Canal project of 25,000 c.f.s.?

Mr. KIERANS: We have suggested this capacity.

Mr. DAVIS: Do you see that operating at that capacity 365 days a year, year after year?

Mr. KIERANS: I would say that it could operate at this capacity but it will probably tend to go up.

Mr. DAVIS: All right. Now you mention that of the 25, conceivably 10 would be used for stabilization in the great lakes?

Mr. KIERANS: Yes, this is our suggested figure.

Mr. DAVIS: Your objective is 40,000 c.f.s. and you state on page 12 that 40,000 c.f.s. is the required figure that you could turn on and off the Grand Canal would then be one quarter effective in the sense of going all the way towards controlling levels of the great lakes?

Mr. KIERANS: On the high side of the cycle it would actually go up to 30,000 c.f.s. We would have 15,000 c.f.s. that we would use for stabilization only, the 10,000 c.f.s. is only an additional amount. This 10,000 c.f.s. at the bottom is for adding water at the low stage. The 15,000 c.f.s. that we have above the control zero is the ability to move this out of the Chicago river. Instead of moving it artificially down through the St. Clair-Detroit system, we move it artificially out of the Chicago river by shutting off pumps. We do not do this now.

Mr. DAVIS: How effective is the Grand canal project scaled the way you have it?

Mr. KIERANS: It is about three quarters on the high side.

Mr. DAVIS: Three quarters effective?

Mr. KIERANS: On the high side. In other words, we need 40 and we have about 30. This is in the period that we want to discharge water.

Mr. DAVIS: When you have too much?

Mr. KIERANS: When we have too much. In this period we have about three quarters or about 75 per cent according to the size of system which we have suggested and this is only a suggestion.

Mr. DAVIS: When you are in the long cycle with a surplus of water, the Grand Canal project can be 75 per cent of the way towards controlling the level of the great lakes.

Mr. KIERANS: As we have suggested it.

Mr. DAVIS: What is the position when you are in the low point of a cycle, in the dry years?

Mr. KIERANS: It is not quite as great as that. We only have the 10,000 c.f.s. that we have allocated for additions during low period. We get the 10,000 c.f.s. for sure. Then we have an additional 7,500 c.f.s. when we reduce from the Chicago contract. This brings us up to 1,750 c.f.s. Then we have the 2,250 c.f.s. Then we can be given an additional 7,500 c.f.s. by a minor modification in the St. Clair-Detroit river. This gives us 22,500 on the low side.

Mr. DAVIS: So it is better than 50 per cent effective in the dry years and up to 75 per cent effective in wet years?

Mr. KIERANS: Yes, as we have designed it. Beyond this, of course, as we increase our water exports, this becomes more and more advantageous from the point of view of stabilization because we then move more and more towards taking advantage of our optional increase and decrease contracts to add water or subtract water.

Mr. DAVIS: You are saying that as you increase the exports you not only have a tap to turn on into the basin but you have taps to turn on out of the basin as well?

Mr. KIERANS: That is right.

Mr. DAVIS: So with more taps and bigger taps you are better able to control the basin?

Mr. KIERANS: That is right. To answer one of the questions which you asked first as to how much potential capacity we have here in order to meet all these requirements, we have built into the initial proposal 25,000 c.f.s. and this is based on using this much water from a lake which receives water at the rate of 75,000 c.f.s. We are assuming, simply because of the fact that the water runs so fast in the spring that we cannot hold it there, we would have to have about three times our capacity. This is really just a guess, but the best guess we can make. In other words, we have taken a factor of three as a safety factor. In order to be sure of 25,000 c.f.s. we design for 75,000 c.f.s. If we want to increase this we have a 20 mile canal and a dike to be built in the Moose river area in order to increase it by approximately another 50,000 c.f.s. If we want to go beyond this again we can increase the present canal by including the east Moose river up towards the Quebec side or perhaps even including the Albany. I am not sure just how this could be done but it is theoretically possible to increase it. I would think at this time, however, that you would be thinking, as you move into these kinds of demands for water, you would then be thinking of a dike across the mouth of James bay which would then turn James bay into a fresh water lake. Now, you have created James lake instead of James bay by these works right across the mouth of James bay. I should point out that this is approximately 90 miles across, and it is fairly shallow as large bodies of water go. As a matter of fact, it is quite shallow. The order of works involved, as I mentioned this morning, are of the order of the sea level Panama canal. But the fresh water lake we would create here would have a run-off comparable to the whole of the great lakes basin because the size of the basin is approximately the same. We would have roughly 250,000 to 300,000 c.f.s. flowing into this lake. This gives us a very large capacity out of which to take water. Since it is at sea level we can practically use all of it. There is really no reason why we could not use all of it thinking ahead to those years which are probably 50, 60 or 70 years ahead.

Mr. DAVIS: In summary what you are saying is that the project as scaled at the moment could go half way towards controlling the great lakes levels under adverse conditions?

Mr. KIERANS: Better than half way.

Mr. DAVIS: And up to three quarters of the way under extreme precipitation conditions?

Mr. KIERANS: That is right.

Mr. DAVIS: And there is a great deal more water which could at least physically be regulated—

Mr. KIERANS: That is right.

Mr. DAVIS: —which is now flowing into James bay and these additional amounts are more than enough to control the great lakes 100 per cent?

Mr. KIERANS: That is right.

Mr. DAVIS: And I assume would make a good deal more water available potentially for export or down the Ottawa river towards Montreal?

Mr. KIERANS: That is right, that is true.

Mr. DAVIS: On another aspect, the export that you have been talking about has been couched in terms of options. It sounded to me as though this would be a variable export, an export that you would not turn on and off, you would vary it.

Mr. KIERANS: That is right.

Mr. DAVIS: Do you think the United States, or indeed any utilities in Canada or the United States, would be interested in variable quantities of water in Canada?

Mr. KIERANS: Yes, they are. I spoke to engineering persons in the Chicago sanitary district in connection with this, and they could see no objection to this kind of variation because it falls within the normal variation of river flow, well within it. The variation of normal river flow from high stage to low stage of flow in western Canada is of the order of 100 or more to one. The variation in the east is probably of the order of 30 or 40 or, under very good conditions such as those in the great lakes, of the order of three or four to one. So since under normal conditions they would have to take a very wide range of flows, they could not say why a range of 50 per cent up or down on a given contract was objectionable.

This could be put in another way, of course. It was suggested to me by one of the engineering firms with which I am associated that it might be better to put it that way, although it would have the same effect. That is, it might be better to say, "We'll give you a contract for 7,500 c.f.s. which you will increase to 15,000 or to 22,000, and you must be prepared, if you want to take the 7,500, to go in these two stages from this point." It has the same effect basically; you are giving a range.

Mr. DAVIS: You would see Canada, in effect, selling a minimum firm flow plus a variable amount which, at Canadian option, would be available to the United States?

Mr. KIERANS: That is right.

Mr. DAVIS: I can really only visualize this being fully optimized if on the United States side there were a number of reservoirs which they could use to iron out this variable flow.

Mr. KIERANS: I think we will see reservoirs built in the United States certainly to take this kind of flow. We are certainly seeing them being built on, say, the Upper Missouri today. There are at least two very large ones that have been built, and I understand there are plans for two more quite large ones. It is through these reservoirs that actually we will probably be delivering water to the southwest. That is the way in which I see this distribution. In other words, I do not see this water simply going down the Mississippi unregu-

lated. I think provision will be made in order to handle it. They are going to some very serious extremes in order to do this now. For instance, I have seen a newspaper report which I may have with me which indicates that in order to handle flood water in the Chicago area—which, as you may be aware, comes off at the rate of 30,000 c.f.s. at times—they must pass this through for very short periods. In heavy rainfall on an asphalted area like this there is a very quick run-off, a run-off of the order of 26,000 c.f.s. So the channels can take it and they do not want to lose it. It does sometimes back up on them because it might exceed this point.

What they are suggesting here is a huge underground cavern at 600 feet below Chicago in which to store this kind of water. This might sound like an extreme, but it gives you some idea of the extent to which they are going in order to handle their water problems.

Mr. DAVIS: These surpluses and shortages are immense and last over a period of years, do they not? This variability is not likely to be handled by small reservoirs or small caverns but by big caverns—although small relative to the great lakes and the flow we are talking about. They need very substantial reservoirs for this, do they not?

Mr. KIERANS: Yes, I think there would have to be built more substantial reservoirs than they have now, but they could use the kind of flow we are suggesting now very beneficially during periods of low water.

Mr. DAVIS: Yes. I would have thought if they were spending considerable sums of money in desalinating water and pumping in water from subterranean sources, they could lay off even for a period of years and save money. In other words, they could offset this flow in other ways.

Mr. KIERANS: I think, in line with what your thoughts are on this matter, what we are seeing developing is something like a water grid, something like a power grid in essence, whereby water is moved from areas of surplus to areas of need. And it is kept moving; it is not just allowed to stay simply in one reservoir. It is kept moving as the need appears, and it is optimized over the whole country. I think we will see this, just as we see it in power optimization.

Mr. DAVIS: I would like to move on to financing. Do you think it would be conceivable for us to have in five or ten years time an arrangement with the United States similar to the financing in the Columbia? I think you made reference to this.

Mr. KIERANS: Yes.

Mr. DAVIS: There would be an arrangement whereby they would prepay for a service and the prepayment would enable us to build many or perhaps even all of these works.

Mr. KIERANS: That is basically the idea I have suggested to a number of people who would have some concern with this. It certainly seems the way in which we would have to do it. I think we must see very firm contracts before we would ever undertake expenditures of this kind. We would have to have a very firm contract with the responsible governments in the United States, just as were developed in the case of the Columbia, indicating that the requirement was for this much water, and that there was a very firm requirement for it.

Having given us this requirement, then I would expect that in order to finance the works we would expect a prepayment of those works.

Mr. DAVIS: Financed, presumably, at lower United States interest rates and so on? We could take advantage of the United States demand to create works.

Mr. KIERANS: Yes, I think the Columbia financing has given a very good pattern to work toward in connection with the Grand Canal arrangements.

Mr. LEBOE: Without being facetious, I think Mr. Davis is trying to tell you that he wants to take a leaf out of Bennett's book!

Mr. DAVIS: That formula was recommended by the royal commission on Canada's economic prospects, better known as the Gordon Commission.

Mr. LEBOE: I do not know about that.

Mr. TURNER: Let us fight that out in another arena.

The CHAIRMAN: Let us return to the problem on hand, gentlemen.

Mr. DAVIS: I have only one or two more questions which will be very brief.

Perhaps you do not want to answer this in any detail, Mr. Kierans, but what has been the response of the authorities in Quebec to this general concept?

Mr. KIERANS: I hesitate, of course, very much to answer this kind of question. I have a great respect for the interest of the authorities in Quebec at the present time in this development. They have sent representatives to Chicago for the recent meeting of the Great Lakes Commission. They had two representatives there. I had some discussions with those representatives. We have tried our best to keep the authorities in Quebec informed of all our efforts in this regard.

I think because of the nature of the negotiations which are interprovincial, interstate, international and so on, it would not be wise to comment on what anyone in any responsible position has said. I would prefer that they speak for themselves in that regard.

Mr. DAVIS: Are there any general studies under way in Canada, initiated in Quebec or Ontario or by Ottawa, that to your knowledge are facing the problem in the same fashion as you or giving the breadth of approach that you are giving?

Mr. KIERANS: No. I think the reason basically is that the project is too large for the average single private enterprise to become engaged in without some guarantees from all the governments concerned. On the other hand, the project is of such a complex political nature that it is almost unimaginable for a single government, without some kind of formal arrangement being worked out. It is very difficult for any single government to undertake this kind of study, and this is basically the big problem with this kind of project. What we must work toward, as I see it, is some means whereby the governments concerned can come together under some form of leadership. I am suggesting your committee here could well play a role in this.

Mr. DAVIS: You need an initiative without saying who has what authority in what jurisdiction?

Mr. KIERANS: Someone must start the ball rolling. This is a very difficult thing, and I appreciate the difficulties and complexities and the concern in the province of Quebec for initiating or even starting such a project on such a level, and the province of Ontario and, for that matter the great lakes states. The great lakes states have demonstrated more leadership by attending your hearings here. As you know, the chairman of the Great Lakes Commission was here. So we are actually looking for some public governmental body which is involved, and I think the federal government is very definitely involved in this but not solely involved. We are looking for leadership to emanate from such a body to encourage the others concerned and the others involved to participate.

I think it might well be that private enterprise—that is, large scale private enterprise—might play a useful role at this stage with the understanding that in due course, and with prior arrangement even, as it became of a size which would best be carried out under ownership, it could be expropriated at that time. In other words, I think we have a parallel for this, let us say, in regard

to the communication satellite preparations in the United States where we have a very complicated international problem involving very large sums of money and very complicated involvements between various bodies. We have seen a combination here where private enterprise and government have worked quite well together. We might usefully copy some of the work that has been done in this regard. The size of the enterprise we are considering gives you an idea of it.

We are talking about sizes of enterprises and complexities of intergovernmental relationships, let us say, of the order of the Bell Telephone Company and of large communications companies. It is well beyond the size of any single hydroelectric power commission, I would think, but it is not beyond the size of a combination of them.

Mr. DAVIS: I think many of us are concerned about our bargaining position relative to the United States if we did not add any water to the St. Lawrence system, or if we did nothing about the St. Lawrence other than to regulate its flow within the basin. We are faced with the possibility that the United States could, through Chicago or through the Erie canal or these other points which you mentioned, divert water unilaterally within the basin. Would you say that the Grand Canal project or a diversion into the great lakes from the Canadian side is a carrot or lever which we might use to bargain with the United States, or even limit those diversions, or to have those diversions carried out in some fashion which would be more compatible with our own requirements in the long run?

Mr. KIERANS: Yes, this is very definitely the impression that I have myself. We are faced with what we have seen actually in the case of Chicago which was a unilateral diversion to the detriment of downstream users. Fortunately it included some of their own states, and as a result of that downstream detriment those states were able, through political and legal means, to have those diversions limited.

But as the needs of downstream states become increasingly greater, the support which President Eisenhower was able to gain from them in applying his veto would be lost. The president will not be able to veto the congress of the United States in such a unilateral diversion being made. When this is done we have exactly this: if we do not have some leadership in this matter, or demonstrate some leadership, we shall find ourselves in the position of having an intransigent partner who will be a dog in the manger, you might say. He simply will not move.

Mr. DAVIS: I assume that once we turn on the tap we cannot turn it off. But before we turn it on we might conceivably require treaty arrangements, or some other type of arrangements with the United States, or some patterns.

Mr. KIERANS: All my relationships with the United States—speaking for myself—have been on the basis that they have shown me that they are anxious to work within treaties. I think of our own position in regard to our relationships under the 1909 International Boundary Waters Treaty Act. It has been modelled on respect for each other's rights. But if we can look forward to this continued kind of operation it is far preferable to do it in this way, and I think we can obtain good results if we do it in this way; whereas if we take the opposite view and refuse even to discuss the matter, I think we are leaving the moral position up to them. We would have tended to lose our own moral position in this matter. This is just my personal opinion, but I think many people—for instance, Mr. Michel Chevalier, secretary of the Montreal port council—I was just reading some of his remarks—have expressed this view.

Mr. TURNER: He is no longer secretary of the Montreal port council.

Mr. KIERANS: No, but he was at that time, and he said almost precisely what I am saying. You may refer to the papers of the Montreal port council

symposium last year when he was one of the speakers, when he made those remarks, and I agree with him.

Mr. DAVIS: Thank you.

The CHAIRMAN: Do you wish to ask questions, Mr. Turner? I have quite a list here, and I shall put your name down. I am trying to follow an order.

Mr. TURNER: I thought your water touchstone was not working as well this afternoon, Mr. Herridge.

Mr. RYAN: May I interject, before Mr. Turner gets started, to make a comment about a matter in which Mr. Leboe was giving credit to the premier of British Columbia for the financial arrangements of the Columbia river treaty. I have read a large part of the Gordon Commission record and I find it was Mr. Davis himself who had the original idea for these financial arrangements. I think he has been too modest here.

Mr. LEBOE: I do not agree.

Mr. RYAN: The facts are right there. Read them for yourself.

Mr. TURNER: Mr. Kierans, I think, just to set at rest the divergence of views between your evidence this morning and the position perhaps which the Canadian government has taken to date, as I understand it, we want to explore the possibility of diversion of our northern flowing rivers into the great lakes system. We have decided that the first priority is to extend the control system on the existing great lakes and then to contemplate the possibility of diversion. In other words, it is not a matter of the flows, but a matter of priorities of how we should proceed. Within that context I want to ask you a few questions first relating to your criticism of the limitation of the terms of reference currently before the International Joint Commission.

You mentioned at page five of your brief which you read this morning that:

The International Joint Commission, for the purpose of this study however, are unfortunately confined to the consideration of the use of the waters of the great lakes only. This narrow principle to which they are confined is usually described as "regulation".

And on page 19 you make the same point. Now, I gather it is your opinion that the terms of reference before the International Joint Commission should have included diversion into the system as a whole. Is that right?

Mr. KIERANS: May I answer your question at this moment?

Mr. TURNER: Yes.

Mr. KIERANS: First of all, I would like to mention the reasons behind this criticism and the underlying problems involved in it. I quite appreciate that since we would be suggesting, in the Grand Canal project, a diversion of water in which the provinces of Ontario and Quebec have major interest, for the federal government which has the sole responsibility for the International Joint Commission to suggest for them to investigate it, that they were responsible and should include such diversions, presented the possibility that they might be entering an area where they would have some questionable jurisdiction.

Now, I must say that I congratulate the federal government at the present time for coincidentally setting up this committee.

Mr. TURNER: You mean coincidentally at the same time, not by coincidence.

Mr. KIERANS: That is right; but at the same time setting up this committee which so far as the federal government is concerned, has enabled such a discussion as we are having here to be carried out. From the federal government's point of view I feel that they did very well two of the things that they should do in this regard, and which they actually had jurisdiction to do.

Even beyond that I understand that the Minister of Northern Affairs and National Resources, Mr. Laing, approached both the governments of Quebec and Ontario. I understand this only from the press.

Mr. TURNER: It was the Prime Minister of Canada to the premiers of Ontario and Quebec.

Mr. KIERANS: I thought it was through the minister of northern affairs. However, it was done. I understand this government approached the two provincial governments and encouraged them to immediately set up studies of the Grand Canal proposal. I have no way of knowing the response of the two provincial governments. Having done this, it seemed to me the federal government had done everything it could do without some arrangement having been made with the two provincial governments.

I have not changed my position in the respect that the terms of reference should be broadened to include this, but that they should be broadened at the suggestion of the two provincial governments concerned. It is with that in mind that I am suggesting to the two provincial governments concerned that they should respond positively to this request by the Prime Minister to have these studies undertaken. I understand that is the position of the federal government in confining these studies. However, I still consider it regrettable.

Mr. TURNER: Should it not be up to Canada in conjunction with the provinces of Ontario and Quebec to decide alone what its own resources are, and take an inventory of those resources in order to determine what the cost benefit is which is attached to the resources before we bargain with the United States? Is it not conceivable that it is better to keep this out of the International Joint Commission until Canada and the two provinces have assessed the benefits after having taken an inventory of the resource? We could not know what price to put on this very large resource until we know what we have and what the feasibility studies are.

Mr. KIERANS: I think this is a very good point and one in respect of which serious discussions should be held.

The CHAIRMAN: Would you continue, Mr. Turner.

Mr. KIERANS: Mr. Chairman, could the question be read back.

Mr. TURNER: Would you like the question read back? Mr. Chairman, perhaps I could summarize it. I suggest to the witness that perhaps the reason the terms of reference were not included in the International Joint Commission inquiry was that Canada considered not only jurisdictionally that the resources were Canadian, falling within the jurisdiction of the provinces of Quebec and Ontario, but that it might be a better idea for Canada to make an inventory of its own resources and the cost benefits attached to these resources before entering into a bargaining position with the United States. In other words, that this diversion problem was, first, a domestic Canadian problem, and only after Canada had achieved a national water policy would it be the opportune moment to enter into negotiations with the United States. I invited comment from Mr. Kierans on that statement.

Mr. KIERANS: Well, Mr. Chairman, there are two basic points I would like to make which, I think, might serve to indicate that we suggested the International Joint Commission terms of reference should be broadened, although this is not the only way in which the desired result could be obtained. But, we suggested the terms be broadened to include the possibility of stabilizing the levels of the great lakes by means of new inflows. I felt this should be done for two reasons. We have no idea nor can we have an idea of the cost of low water on the great lakes unless we have a joint study of the cost of low water. About one and a half years ago I circulated a letter to the various

bodies, governmental and otherwise, that I thought would be able to help me out in determining what the costs of low water were; in other words, are they of sufficient import that we can afford to spend \$2 billion to correct them. The most straightforward answer I received was from the chief of the United States Army Corps of Engineers, who told me there were no such studies and that they could not make such an estimate unless it was a joint study. Since we are dealing here with the multipurpose means of offering a solution to the stabilization problem, which would include an evaluation of the cost of not doing it, and the cost of tolerating the existing low water, it seemed to me very difficult to arrive at a useful figure unless we included in the terms of reference this total possibility.

Now, the second point I would like to make is that it would be quite in order, if we could carry out the suggestion of the Prime Minister, that the provinces of Quebec and Ontario initiate such a study.

Mr. TURNER: Together with the federal government.

Mr. KIERANS: Yes, together with the federal government, initiate a study or an inventory of our own water resources to determine what value we should attach to them. I think this is very important, and I agree. But, unfortunately, owing to a statement in the provincial legislature which I read into this speech which was made, this purportedly was representative of the opinion of the government of Ontario in regard to initiating studies of adding water to the basin, and I felt I should make reference to the fact that we were not getting these studies either by means of a joint commission set up by the federal government with the provinces of Ontario and Quebec or under the International Joint Commission. Personally, I think both of them have to be done separately anyway; but, there is no reason why we need to lose valuable time in not starting it.

I have developed over the years a tremendous confidence in the International Joint Commission; I have watched their work, as you have, and I think they are a model for the world as far as carrying out negotiations are concerned. I have confidence they can do a good job to protect our interests.

Mr. TURNER: I have a number of questions and I am sure other members of the committee wish to put questions, so I will move along, if I may.

You mentioned in your answer that it was very difficult to obtain what the costs of low water were to the American economy or, for that matter, to the Canadian economy, and I would agree with you. So, I take it your figure of \$100 million, which you have at page 4, is just the estimated cost.

Mr. KIERANS: Yes. It is tending to be low.

Mr. TURNER: Upon what did you base it?

Mr. KIERANS: We based it on a number of things. First of all, the value of 1,000 cubic feet per second of water in terms of replacement power is \$2 million per 1,000 cubic feet per second. We assumed we could add approximately 30,000 cubic feet per second to this, so we had about \$60 million of loss here. Now, I have not been able to corroborate this directly with the hydro authorities or public commissions involved, but I understand it is pretty close to the figure they are thinking of. I am referring to the New York State Power Authority, the Ontario Hydroelectric Power Commission and Quebec Hydro. All of these together are talking in terms of approximately \$60 million a year.

In terms of navigation, the figure published by the Great Lakes Carriers Association was \$19 million loss. So, we have here \$80 million.

I saw another figure of shore property damage; incidentally, there was no estimate of the damage caused to tourist operators on Georgian bay, for example, as the result of low water. We did not see any estimate of these costs, although I know they were profound. It would be a profound loss to the whole tourist industry because people who would have developed tourist industries

there were simply encouraged not to by virtue of the low water. I saw one figure of property depreciation as the result of the low water. Now, this may be only a temporary thing but the property depreciation in the state of Michigan, which has a 3,000 mile shoreline, is \$200 million. In order to tie this into something realistic we have a local test of low water in one of our lakes. I asked the real estate people in Sudbury what the depreciation in value was for a single lot on the lakefront, and they told me that \$1,000 a lot was a very modest figure to use. Now, we are talking in terms of 3,000 miles of shoreline. When we added only \$20 million to this \$80 million firm figure, we felt we were well within what would be considered to be a conservative figure.

Mr. TURNER: That is highly possible. Surely part of the problem when estimating what the benefits would be is that we really do not know definitely on the Canadian or American sides what this low water means.

Mr. KIERANS: That is right, and we should find out as soon as possible.

Mr. TURNER: We should find out as soon as possible.

Mr. KIERANS: Yes.

Mr. TURNER: On page 13 you mentioned the report by the United States Army Corps of Engineers on January 25, 1965. I take it you are referring to a release picked up by the Chicago *Tribune* of a comment by the general of the United States corps of engineers. I do not think it was a final or formal interim report.

Mr. KIERANS: No, it was not, but I have a copy of it here.

Mr. TURNER: But, the basis of your information is that news release.

Mr. KIERANS: That is right. I have a copy of the news release put out by the United States corps of engineers.

Mr. TURNER: But, the interim or final report has not been presented to the United States congress.

Mr. KIERANS: No.

Mr. TURNER: Then no one really knows what is in that report.

Mr. KIERANS: I can quote you what General Dodge said at the meeting in regard to the status of it. In view of the fact it has been mentioned perhaps, in fairness to him, it should be quoted. Is it in order to read this?

The CHAIRMAN: Proceed.

Mr. KIERANS: This was given by Brigadier-General Roy T. Dodge, division engineer, north central division, corps of engineers, U.S. army, to the Great Lakes Commission. It was given in Chicago, Illinois, on January 25, 1965. It was under the general heading of great lakes water levels. The heading to which I will refer is that given on page 7 of the release entitled "Future Actions":

I have outlined the current situation on the lakes and discussed some of the actions we have taken during the past year to alleviate the situation caused by the low lake levels. As my final topic, I will speak about our current actions and those contemplated for the future.

I should emphasize at this point, and ask you to keep in mind during the balance of my presentation, the fact that the Great Lakes, and their connecting channels are international waters. Therefore, no action can be taken which would change the regimen of these waters—their levels and flows—without the full concurrence and consent of the governments of both the United States and Canada. Any action or proposed action along these lines would require full coordination with Canada. And I might say here that based on my association with the international joint commission and its international boards which deal in these matters, I consider work in this area to be a model of international cooperation

Most of you are well aware of the fact that for some time the corps of engineers, represented by my division office, has been studying the question of further regulation of the lake levels. We are now in the process of putting the final touches on our report, which I emphasize again represents a unilateral study from the United States standpoint only. The next step for my office and the corps of engineers will be the matter of coordinating our data and findings with Canada and integrating the work we have done into that which the international study now has undertaken. The result will be a unified approach by the two countries to the solution of this problem.

We are now engaged, both here and at the Washington level, in working out the mechanics and procedures of "marrying up" these two efforts so as to best facilitate and expedite any corrective measures that may be recommended for further regulation of the lakes. Until this is accomplished and the Canadian interests are considered no final determination can be made as to what actions are feasible and what actions may be recommended. I can and will, however, discuss briefly some aspects we have explored in our study.

The corps' lake regulation studies are to determine the economic feasibility of a plan of regulation of the levels of the Great Lakes that will best serve the interests of all water uses, including the reduction of damages to shore properties, the use of the Great Lakes for navigation, and the use of the storage and outflows from the Great Lakes for power development. Since lakes Superior and Ontario are regulated, the studies are primarily concerned with the feasibility of regulating lakes Michigan-Huron and Erie.

In order to investigate the possibilities for bringing about a more beneficial range of stage on the lakes, it is necessary to comprehend the Great Lakes as a hydraulic system. This is necessary to the development of a regulation plan. We must be aware of the variations in supplies of water to the lakes that have occurred in the past and are likely to occur in the future; the capacities of the lake outlets to discharge water, with and without regulatory works; and the capacities of the lakes to store water during wet periods and to sustain outflows during dry periods.

What lake levels will result as a certain sequence of supplies is applied to the lakes, depends on interrelationships between the lake outflows and the lake storage capacities. This is a highly technical and complicated matter and I will not attempt to cover the subject in this talk. However, I would like to illustrate for lakes Michigan-Huron and Erie, the effect on lake levels of specific changes in outflow.

Mr. TURNER: We have that type of figure. You might get down to the specific part.

Mr. KIERANS:

Lake Michigan-Huron. A change in the Michigan-Huron outflow of 1,000 cfs for one month would change the Michigan-Huron level about 0.002 foot (about 1/32 inch).

He has used a lower figure than I used. I used 40,000 cfs per second per inch.

Stated another way, to change the level by one foot over a period of one month would require 481,000 cfs—about 5 times the flow over Niagara Falls.

In other words, to have the same effect on an inch basis it would be approximately 40,000 cfs.

Lake Erie. A change in the Erie outflow of 1,000 cfs for one month would change the level about 0.010 foot (about $\frac{1}{8}$ inch). A change of 105,000 cfs for one month would be required to change the level by one foot.

To change the Lake Michigan-Huron outflow by 481,000 cfs, an increase in the outlet capacity equivalent to about two and three quarter times the capacity of the St. Clair Detroit river system at means stage, would be required.

I think I should go on from there. These are basically the same figures we referred to this morning.

The problem of regulating the levels and outflows of the lakes must be considered as a long-range problem—bearing in mind that there have been and will be high-water periods as well as low-water periods. To accomplish a reduction of the high levels as well as a raising of the low levels, two facilities must be provided in the outlet river of the lake to be regulated. First, the discharge capacity of the outlet must be increased, so that at times, larger releases of water from the lake than would occur without regulation can be made. Second, a gated control structure or structures must be provided so that, at other times, smaller releases than without regulation can be made.

Several plans for the regulation of lake Michigan-Huron and lake Erie have been studied. Also included in the studies is a review of the regulation of lake Superior with a view to determining possible improvements.

The objective of reviewing the regulation of lake Superior is to devise a plan for the regulation of that lake that would give appropriate consideration to all interests on lake Superior and, at the same time, alleviate conditions on lakes Michigan and Huron during periods when levels of the latter lakes are at high or low stages. The revision is based on a utilization of the existing regulatory works at Sault Ste. Marie and without change in the stage limits of the International Joint Commission's Order of Approval.

Here is the quotation which I think perhaps is the meat of this.

The best plan we have been able to develop for the regulation of lake Michigan-Huron would regulate the lake levels between elevations 580.7 and 576.5—a range of 4.2 feet. This would reduce the high level of August 1952, the highest level since 1900, by 0.3 foot and raise the low level of March 1964 by 1.1 feet. This plan would require that the discharge capacity of the St. Clair-Detroit river system be increased by about 30,000 cfs over its average flow rate of about 180,000 cfs.

The regulatory works required for the plan to regulate the levels and outflows of lake Michigan-Huron would be placed in the St. Clair and Detroit rivers. Because of the hydraulics of these rivers, the channel enlargements must extend over considerable reaches of the rivers. Because of the riparian use and developments along their banks and along the shores of lake St. Clair, there must be control structures at several points.

And then he goes on to state the best plan that they could develop for the regulation of lake Erie. Again, I think if you refer to the evidence I presented this morning, you will see I mentioned that I did not know what they would eventually come up with. However, he states here that the best plan they have been able to develop would provide these benefits.

Mr. TURNER: All I am trying to elicit from you is, firstly, that this was not an official report of the U.S. corps of engineers, and, secondly, that there was no indication, in taking the cost benefits ratio, whether it would be worth while in terms of the total benefit to put these works through. In other words, there are factors to be taken into consideration well beyond the scope of this particular report.

Mr. KIERANS: Oh yes, very much so.

Mr. TURNER: As I understand it, the crux of your plan is that instead of regulating the whole lake system down from lake Superior right to Montreal—it is regulated now at lake Superior and in Ontario—you take the pivotal lakes, Michigan and Huron, and you keep them in balance by inflow from the reversal of the Harricanaw and other rivers and the outflow by way of variable option exports. In other words, instead of working a control system all the way down the lakes, you concentrate on those two particular lakes that really represent one distinct body of water.

I want to ask you a few questions based on that concept. First, in terms of flood times choking the possible outlets in a very narrow range of the Illinois and Michigan territory, are you not really suggesting that instead of using the St. Clair-Detroit river you work other outlets through the Chicago river and on the southern part of the United States? Would you not find the same congested problem there that you would on the St. Clair-Detroit river, and would it not cost you just as much to construct your outlets?

Mr. KIERANS: The answer to that question is as follows, as far as we are concerned, and further investigation is called for: On the one hand we have an important navigational channel in the St. Clair-Detroit river. Any works that we construct in the St. Clair-Detroit river inevitably will be an obstruction of some kind to navigation. If we proceed to put these large and, I think you will agree, expensive works in this area for this single purpose, we are providing a single benefit for a single area, the cost of which certainly cannot be charged to the United States. If we permit them to bear the cost of this, then the man that pays the piper calls the tune and we will forego some of our benefits. Therefore, we must bear these large costs. They provide a restricted area of benefits. What we are suggesting, and I take it that you have no objection to our basic principle that the control of Michigan-Huron is the key to the control of the whole system, is as follows.

Mr. TURNER: Yes, which ever way you look at it.

Mr. KIERANS: That is right. If you can control this by arranging for a multipurpose system which calls for new waterways which you now construct on a new basis and put your control works in those new areas, and you provide additional benefits as well, on the one hand you are spending a billion dollars to benefit ten million people; whereas under water level conditioning you might spend \$2 billion but you benefit 40 million people. Therefore, the cost per capita, because you have widened the area of benefits, becomes less. As far as the problems of passing this additional water down through is concerned, let us look at its history. The Chicago diversion at the present time carries 3,300 c.f.s. In 1926 it carried 10,000 c.f.s., and I understand that at times it went as high as 18,000 c.f.s. for short periods of time.

Mr. TURNER: But you would want those outlets to take the water on variable option at times of floods. Would not the adjoining watersheds such as the Mississippi also tend to be at high water mark and would those southern points be then able to absorb that water?

Mr. KIERANS: This has not been the history. In the early 1950's when we had high water on the great lakes we actually increased the diversions down the Mississippi to, I believe, 8,000 or 10,000 c.f.s., at the request of the United

States Army Corps of Engineers because of low water on the Mississippi river. This was done at their request, and actually those diversions were made without too much objection from Canada at that time because of the high water. That has been the kind of history. When I speak to people in charge of the waterways in those areas, they tell me that they need the water and they want the water and that the areas below them need the water and that provisions can be made to carry it, as well as the fact that we are dealing with channels which for short periods of time, that is during the heavy spring run-off, have to take up to many times this amount of water, certainly over extended periods of time. We can give it to them.

Mr. TURNER: You have lake Michigan-Huron taking water back from James bay and exporting it to the United States. You have really a system there whereby we are really exporting water directly through a funnel to the United States without affecting lake Superior or lake Ontario. Is that what it amounts to?

Mr. KIERANS: As long as we can keep lake Michigan-Huron at a suitable level; as you saw from the graph this morning, whatever happens on lake Michigan-Huron eventually happens all the way down to Montreal.

Mr. TURNER: You would not have to widen your discharge outlets at the St. Clair-Detroit river in any event if you brought more water to the system.

Mr. KIERANS: In our proposal, as you have seen it here, we are suggesting that we do some work. Suppose you were to consider the division of works involved in regulation to be of the order of major works, medium works and minor works, for simplification. The works that are suggested as the best plan that the U.S. Army Corps of Engineers can devise under this statement—I agree with you it is a limited statement—call for 30,000 artificial increase and some artificial decrease which they do not mention. They mention specifically 30,000. This is the major size. If we go to the medium size, it would probably be of the order of 20,000. What we are suggesting here is a modification of the order of 7,500, which I would consider to be a minor modification to the channel and certainly a much less costly one. I would therefore think that we will certainly move into an area, in the early stages at least, where we will provide minor modification to the St. Clair-Detroit river, as we have suggested in our report, which will be far less costly and could even be of a temporary nature because, as water exports increase we could practically eliminate them.

Mr. TURNER: I am suggesting the outlets you would have to put in the Illinois river and other spots so as to compensate would be just as costly.

Mr. KIERANS: It would be costly but only costly to those who want to import water. In other words, Canada, because of the fact that we would be exporting water to a purchaser, would not have to pay on the same basis as we would have to pay if it were done to an international boundary water.

Mr. TURNER: What about export to lake Erie and lake Ontario below that system?

Mr. KIERANS: This is an interesting point. I realize it will be a point that will have to come up. The chances are that we will have to increase some area, we will have to find some area in which to make an artificial discharge into those lakes.

Mr. TURNER: In other words, we will have to increase the control system down the lakes?

Mr. KIERANS: Now wait a moment. I would like to make this point very clear. One of the great water shortage areas of Ontario is the Ontario peninsula. There are a number of rivers now flowing close to lake Huron which flow into lake St. Clair on the one hand and the Thames river or into lake Erie to Grand

river. Now I am suggesting this as one of the possibilities that we would be thinking of. When we reach this point in time when we want to export water from lake Erie or lake Ontario, we are tying in developments that our province can use. This is an artificial area of discharge, in other words, right in Canada and for the benefit of Canadians, put right into the system, this is what I would seek as an engineer, rather than tying anything into that St. Clair-Detroit system that we don't have. Avoid that river system as much as we can, particularly because it is a navigational channel and, secondly, this is an international water.

Mr. TURNER: How long would your system be from James bay down to the outlet into lake Huron?

Mr. KIERANS: As the crow flies it is 350 miles. As it would exist in the present channel somewhere in the area of 550 miles.

Mr. TURNER: How long would it take water to flow down there?

Mr. KIERANS: This is something, of course, that I cannot answer off the cuff. I asked one of the engineers—and I hesitate to mention his name, but a competent engineer that works for the government—how long it takes water to flow from Mattawa to Montreal and he told me in the order of a week.

Mr. TURNER: We have heard that it takes approximately between a year and a half to three years for any change in lake level to be felt down the system from lake Superior.

Mr. KIERANS: This is an entirely different thing.

Mr. TURNER: You have made it look as if lake Michigan-Huron is a big bath tub and all you have to do is pull a plug and turn a tap and the lake level will respond.

Mr. KIERANS: No. I am sorry. I want to make the point quite clear what we are suggesting here.

Mr. TURNER: Is there not a time lag facing your ability to control this system?

Mr. KIERANS: If you are talking about our ability to control Michigan-Huron, as long as we have the capability to inject water at a rate equivalent to the rate of change of levels it is one inch of sustained change per month, which corresponds to a rate of 40,000 c.f.s. As long as we have that capability we have exactly the same quick response that you get in an ordinary heating system in a house. When the levels change outside we do not have to rush to the thermostat to keep adjusting it because it has the capability to inject the required amount, which is not much, because we are taking the sustained capability. We do not wait for three years to let the situation get very bad where you have to discharge in a month. We keep that under control all the time and have the capability of keeping it under control. It is not possible under "regulations only" because under "regulations only" you have to take this water as high as you can safely stand and try to hold it there. Then when you run into one of these long periods of low water you ration it out over an extended period. It is something like this, to make a comparison: regulations only—this may sound a little extreme but it is the best comparison I can think of—is something like trying to store enough heat in your house in the summer time to carry you through the winter time. As opposed to that, we put in a furnace whereby we inject heat as required in the winter time. Now to further refine this system and because in the summer time we can get extremes of heat, we put in another apparatus which we call an air conditioning system. So with the combination of a furnace and an air conditioning system we maintain what we consider to be a desirable temperature, just as the Grand Canal and optional outflows would maintain the desirable level of lake Michigan-Huron. So that

we have a capability under such a system and you have no capability unless you have such a system, of the ability to add water or subtract water.

Mr. TURNER: You are not just dealing with the water you may bring in from the diversion of James bay and let out by your outlets. You are dealing with tremendous ranges of water flowing down from lake Superior as well. The net supply extremes or the net supply over net outflow are 660,000 c.f.s. per month on the one hand and a net loss of minus 130,000 c.f.s. per month on the other which is a difference of 800,000 cubic feet per second per month. That is additional water flowing down from lake Superior which you also have to take into consideration in your calculations in the case of a flood.

Mr. KIERANS: The flow out of lake Superior into Michigan-Huron averages about 75,000 c.f.s. per month. It was set pretty close to this under the terms of regulations only of that lake. Now recently it has gone as high as 115,000 c.f.s. for a few months in order to aid the conditions at lake Michigan-Huron. But I understand now it is back now. As long as it flows at this rate and to the extent that we can maintain it within its reasonable limits, they are not difficult to maintain and to note. Then we vary and continue to vary the other system precisely as you do a thermostat.

Mr. TURNER: Let me ask you some specific questions. On this additional brief that you circulated to the committee you mention in the preface that one of the most prominent hydrological engineering firms in Canada and the United States has supported your cost estimates. Do you feel free to reveal the name of that firm?

Mr. KIERANS: I feel free to reveal it to you personally but I have no authority to reveal it to the general committee. I am not sure that I have it with me but I can tell you the name of that firm which has stated that in the quoted form.

Mr. TURNER: Now, in this report you said that your plan provides for an export of 15,000 c.f.s. of the 25,000 c.f.s. to be imported from northern drainage?

Mr. KIERANS: That is correct.

Mr. TURNER: On page 54 you assume 3,000 c.f.s. is being withdrawn at 2 cents for 1,000 United States gallons. I was wondering if you had any data on United States withdrawal requirements, on the value of the water to United States interests or how much the United States would be willing to pay for the water to back up those figures?

Mr. KIERANS: First of all, in regard to the volume, can we deal with the volume of water which we are concerned with? I showed some figures on the screen this morning which showed that in the great lakes studies, and this is the result of a Senate report of the United States water resources, which show a deficiency in that area of approximately 20 billion gallons per day. This is roughly at the rate of about 40,000 c.f.s. transferring it to that term. Now, first of all in regard to water requirements, in the recent issue of the *Canadian Geographer*—and there were no particular figures given on this—there was a report on the possible use of the great lakes basin as a source of water for this area. They do not specifically mention the amount of water that would be allocated to any particular area but there is certainly an indication that the requirements for water would be very substantial.

Mr. TURNER: Can you recite what that document is for the record?

Mr. KIERANS: This is a report which was sent to me from the editor of the *Canadian Geographer*, volume 8,4, 1964 and it refers to an article called the Nodal Water Region of North America written by Mr. A. K. Philbrick, Michigan State University.

Mr. TURNER: That is where you get the withdrawal requirements?

Mr. KIERANS: No. This is just an indication that they are very substantial, Mr. Turner. I would say this is about all you would get from this.

Mr. TURNER: So you cannot get any more accurate figures from that?

Mr. KIERANS: No. They are just general figures. To go beyond that, let us refer to some other figures. These are all general figures. Let us refer to some others that I have tried to edit here and use as a guide.

Mr. TURNER: All I wanted to get from you was some indication whether there were any specific figures or whether you were dealing in terms of general figures.

Mr. KIERANS: The ones I showed on the screen were figures put out by the Senate committee of the United States and they show a deficiency in the region of 40,000 c.f.s. Another one which is of interest is a report put out by Michel Chevalier of April 10, 1964. I quote from page 8:

There are indications that demands for diversion at several places on the Great Lakes will develop over the next fifteen to thirty-five years, in addition to Chicago, notably to the valleys of the Hudson, Delaware and Ohio. Chicago now diverts 3100 c.f.s., wants 6000-10,000 c.f.s. (It had 10,000 c.f.s. in 1928, prior to a U.S. Supreme Court ruling, limiting the amount to the present flow.) A total of approximately 40,000 c.f.s. in diversions may be required before the turn of the century unless present unforeseen or unproven methods of expanding the manageable supply are brought into play. There are already indications of softening attitudes on the part of some downlake states in their opposition to diversions, as hydro power and other present uses begin to decline in comparative importance to future inland needs.

Mr. TURNER: I think we can take it that the United States are going to be thirsty but I just wondered how much they were going to pay for it.

Mr. LEOE: I do not like to interrupt, but may I raise a point of order here? It seems to me that we have a problem to decide as far as the committee is concerned in connection with the witness' testimony and with what we are getting. It seems to me that we are trying now to do the work that has been suggested by the witness the provincial governments, together with the federal governments, should be looking into. It seems to me, Mr. Chairman, that we should be concentrating on whether or not we in this committee can make certain recommendations to support the view that an investigation should be carried on. I think our questioning and what we should be probing should be in that direction.

Mr. TURNER: I think the point is probably well taken. May I just put two more general questions on that subject?

The CHAIRMAN: I do not suppose we gain much in being very specific on detail.

Mr. TURNER: Have you considered the possibility, Mr. Kierans, that there may be other diversion possibilities in the north than your own?

Mr. KIERANS: Yes.

Mr. TURNER: So that it is conceivable that any investigation by the federal government in conjunction with the provincial governments might come up with a different route or a grouping of different rivers.

Mr. KIERANS: That is right.

Mr. TURNER: You are not claiming yours is the only possible diversion?

Mr. KIERANS: By no means.

Mr. TURNER: The governments of Canada and the United States have requested the International Joint Commission to make a study of the possibilities of regulating the levels of the great lakes, based on their present supplies and the existing system. The Prime Minister of Canada has written to the premiers of Ontario and Quebec suggesting a feasibility study of diversions from the north. Do you think any other steps ought to be taken at this moment? In other words, let us assume that the governments of Ontario and Quebec will agree to form a tripartite investigation of diversion possibilities. Is there anything else we could be doing at the moment, in your opinion?

Mr. KIERANS: Yes, I think there would be time lost if we did not get the two provincial governments to encourage the federal government to broaden the terms of the International Joint Commission reference to include the effect of adding water as a means of stabilization of the lakes, not talking about prices or costs or values or anything else at this particular time, but to save two valuable years, which are costing us around \$100 million a year minimum; that might be worth \$200 million.

Why try to save a little bit of time and possibly something in the order of \$0.5 million or something like that, which would go into that study, when on the other hand we are talking about the possible loss of \$200 million? It just does not seem sense to me.

Mr. TURNER: You and I do not disagree on the principle; I am just suggesting that Canada and two provinces should do this apart from this reference to the house.

Mr. KIERANS: They should because, from an administrative point of view, as I see it, we have two entirely different things to do. We must maintain Canadian sovereignty over this supply system. In order to do this, it must come under an interprovincial and federally supervised supply system.

The International Joint Commission, however, has a boundary waters problem involved here, and they then have to regulate. As I see it, what would happen would be that they would regulate the authority that would be concerned with the stabilization of the lakes and the export from the lakes. I can see this sort of thing developing where you have the International Joint Commission broadened to have the control not only of the stabilization of the lakes but of export from the lakes, and conditions under which exports would be made. This would be an international body which would place orders on a Canadian body to deliver water at specified rates and specified times, and it would be paid for by this international body.

In other words, Canada would have two positions; on the one hand there would be an international body of control for the level of lakes and export from the lakes as well as increased consumptive use of the lakes, and an entirely sovereign Canadian supply authority which would take its orders from an international authority to deliver water at a given rate, and it would be paid for just the same as gas companies are paid by the United States for gas they deliver or the power companies are paid for the power they deliver in the Canadian systems.

Mr. TURNER: Thank you very much for your patience, Mr. Kierans. And I want to thank the members too for their patience.

Mr. AIKEN: May I ask a supplementary question?

One of our problems, Mr. Kierans, as you no doubt realize is the question of co-ordinating all these multitudinous bodies concerned in this plan. It seems to me you have been going round to all sorts of agencies in an effort to interest them and you have probably had contact with a good many. Have you any suggestion or idea to put to the committee as to how this whole problem might be co-ordinated in one agency?

Mr. KIERANS: I think there has been a very good starting point which was established some years ago under the resource ministers' council, in which the federal minister is a participant. I recognize that bodies that are set up to do this kind of work take years to develop a capability, just as the International Joint Commission took years to develop its capability, which is an excellent one today. I think this is an excellent starting point. The resource ministers' council is something we already have set up and this falls within its terms of reference. What is wrong really with referring this matter to the resource ministers' council as a specific item of reference by the federal government? Since they are members they have the entitlement certainly to do this.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): What sort of staff do they have?

Mr. DINSDALE: I was going to pursue this question, but not as a supplementary.

Mr. AIKEN: I did that to be fair to Mr. Dinsdale because I am sure there are supplementary questions to this one.

Mr. KIERANS: The question you have asked me is really the nub of the present problem.

Mr. DINSDALE: Now the resource ministers' council has been brought up, I would like to ask Mr. Kierans if any approach has been made to this body, because it is recognized by everyone interested in the problem of co-ordinating resources that you have a fundamental jurisdictional problem, and as Mr. Kierans has indicated the function of the resource ministers' council is precisely to get around this difficulty. It is possible for private enterprise groups to make a referral to the council, or at least to the council through the secretariat. This is not a body that is exclusively responsible to federal and provincial authorities.

Has any approach been made to the resource ministers' council through the secretariat?

Mr. KIERANS: I have not personally made a reference to the resource ministers' council other than to keep them notified, as I think you are aware as a result of some suggestion on your part that this be done. It was referred to them, and this has been followed up with some discussions with their secretary. The discussions are very recent; they are just in the very early stages. I am very hopeful that we will see these develop in that direction.

I see the resource ministers' council probably as the solution to this very perplexing problem of co-ordinating the interests involved. All these people have very important interests, and I want to make sure that I do not underestimate their concern in these interests. I am very much appreciative of it. I think, however, if we simply allow it to become an impasse we will not be getting anywhere.

I was asked by Mr. Aiken if I had any suggestion, and my suggestion would be that your committee might approach the resource ministers' council and have some members of the council come to your committee as witnesses so that you may question them on their interest in participating in this particular problem.

I think this would be the approach that I would suggest first of all, namely, to have a responsible member of the resource ministers' council called to indicate the extent to which they could participate in this kind of problem.

Mr. DINSDALE: I think that is a very good suggestion on Mr. Kierans' part. I would like also to ask whether he thinks it would be useful to encourage action and initiative in co-ordination, and to have contact with the two provincial governments concerned, or with the ministers of the two provincial governments concerned, to see if they would not be willing to make some

reference to this problem at one of their regular meetings of the resource ministers' council. I think if you could get the provincial ministers taking the initiative and pursuing the problem actively, it would accelerate matters considerably.

Mr. KIERANS: That is my opinion; that would be the answer to the suggestion which Mr. Aiken made.

Mr. TURNER: Do you feel that before we submit this to the resource ministers' council we should have some initial co-ordination within the federal structure itself and have somebody who could cover all the aspects of water?

Mr. DINSDALE: I think the terms of reference of the resource ministers' council are large enough at least to begin discussion along this line.

Mr. TURNER: I do not think so.

The CHAIRMAN: I do not think this is something which the witness could solve for this committee in any way. If it were one of the ministers testifying, I would agree that these questions were pertinent. But surely Mr. Kierans is in no position to enlighten this committee as to what political steps may be taken among the ministers of different governments. Let us carry on with the subject of water levels.

Mr. DINSDALE: I would like to point out that it is possible for private groups to make references to the council through the secretariat. I think that is the genius of this organization.

The CHAIRMAN: You asked that of him, if he had, and he said that he did in some way, but I do not think he can enlighten the committee about what steps the ministers of the crown could take under any circumstances.

Mr. KIERANS: Except to point out that I think the minister of northern affairs is in fact a member of this resources minister's council. Is that not right?

Mr. TURNER: That is right. But my point is the jurisdiction over waters under the federal government is under so many departments at the moment that before setting up an interprovincial-federal body on water there has to be some co-ordination within the federal government, and I suggest, quite respectfully, within provincial governments as well, over the various uses of water.

Mr. LEBOE: I fully agree, and it seems to me that appropriate steps should be taken in the manner outlined by the member who just spoke. I think this is an appropriate way, and I agree with you, Mr. Chairman, that we are not going to pursue something which will get information from our witness.

The CHAIRMAN: I agree. The members here can give their opinions on the conduct. We will all be asked that when we make our report.

Mr. DINSDALE: Getting down to the point again, I take it, Mr. Kierans, that your quarrel—and that may be too strong a word—or your disagreement with the present terms of reference of the International Joint Commission investigation arises from the fact that you feel they are taking a unipurpose approach as contrasted with a multipurpose approach, which you feel is required in tackling a project or problem of these proportions.

Mr. KIERANS: Basically that is right. I think there is loss of time, and also the danger that if you spend three years working on a problem, or on a single purpose or viewpoint, you tend to build up people who are interested in supporting that which they have supported through this long period of time. So you have actually made your problem so divided that when you now say, let us look at some other thing, you have got some vested interests in the first conclusion arrived at. This is the real problem in a way which affects your long investigation.

If you are going to go into a comparison of a number of things, it is much better to carry on the comparison on the same time basis or method, because otherwise they tend to rise or fall. I have the feeling, although I was not close to the Columbia river negotiations, that all the various alternatives were discussed all the way down through the system, and that they were guided by what was said. Ones which did not stand up fell by the wayside because they were bound to fall by the wayside anyway, and they were never revived again. But if you go into the general acceptance there is some area of merit in the Grand Canal concept, and if you say: "Let us wait until three years have passed before we tackle it," you get this sort of problem coming out of it.

Three valuable years have passed with a serious waste of time, and this seems very difficult to justify. It seems to me that is the only reason I can find in my general investigation of why the International Joint Commission references were not broadened, or not to the full extent mentioned by Mr. Turner.

When we talk actually about deals and prices, to the extent that we have a problem of lake stabilization, what are the various ways it can be done? Can it be done by adding or subtracting new waters? If we have to go into the problem of determining the price, we are trying to find out what our method of investigation should be.

I do not know if I have answered you satisfactorily. I think you can see the basic problem of administration coming into it. What I call administration is this: suppose a manager wanted to find out what was going on through a series of approaches to a problem. I would tend not to take them if it was going to be a long term investigation running three years later, and another one running three years later than that, because the chances are I would become very frustrated before the first three years had passed, and I would be afraid of doing something which would be an improper type of implementation; whereas I would prefer to carry them on broadly.

There is no basic reason not to broaden them, other than the reluctance of the federal government to engage in discussion concerning resources which are provincial. I think that is the basis why the federal government did not engage in it. In other words, if they had said to the provincial government: "Let us look into this problem," I am sure we would actually be discussing it today.

Mr. DINSDALE: Do you think it would be possible to proceed in a series of stages in a project of this kind, and would not the first stage be consideration of the problem of regulation?

Mr. KIERANS: I think, as I mentioned before, it is possible that they could be done separately, but not one after the other. They could be done moving forward.

Mr. TURNER: You say they could be done separately. The reason for my earlier question would suggest that they be done separately. It was not only because of jurisdictional problems with the provinces, but because Canada needed to have an inventory of its own resources before getting into any general study. We already knew what the inventory on the Columbia was before we got into negotiations with the Americans. Would this not be the time to look into the feasibility of diversion of northern flowing rivers, and would you not start to make it in conjunction with the provinces?

Mr. KIERANS: It would be a tremendous step forward. The only problem is that it would have to be done in some way or other with the knowledge of the International Joint Commission because they are conducting another study over here. If you do not have them informed, one of the difficulties I have found in dealing with water problems of this kind would arise, namely the danger that they get out of legal bounds. In other words, you would get into an off the cuff discussion between the provincial government and the Inter-

national Joint Commission, and this should not be done in matters of this kind. These are public property matters; they should be kept in an orderly way. If we set up an international joint commission empowered by parliament to do certain things, it should be empowered to do those things and no others; it should not be empowered even to enter into others under any circumstances, because there always is a danger of unilateral deals being worked out. I think this is something with which you gentlemen probably are better aware than I am—this potential hazard. I think you must maintain very strict control. The discussions should be in the form of formal references carried on through the channels in Canada which exist under the B.N.A. act.

Mr. TURNER: You concede that if this independent study by the two provincial governments and the federal government went ahead, this would be a relatively satisfactory way, provided there was some co-ordination with the International Joint Commission?

Mr. KIERANS: Yes, under a specific reference but not under the general terms of some co-ordination. I think this would be a dangerous thing to do.

Mr. DINSDALE: That almost brings us back to the resource ministers' council as the suitable agency. I would like to ask a question about another stage in these negotiations with which Mr. Turner dealt earlier. At this stage do you feel that the federal government should be negotiating directly with the government of the United States with regard to the financial aspect?

Mr. KIERANS: No. I think we are far too early for that stage. I believe first of all we have to see whether there is any benefit in it. Of course, this comes back to the specific proposal we suggested; that is, a computer simulation of the actual hydraulics—build the Grand Canal as of 50 years ago and run it through a computer to see whether what has been said can be backed up. This still would not give you all the information you need to build the Grand Canal, but it would put you on much firmer ground.

Mr. DINSDALE: From your knowledge of the United States viewpoint on this water problem up to the present moment, would you say they would be more interested in obtaining water through this diversionary scheme rather than by considering any prospects of obtaining adequate supplies through desalinization techniques?

Mr. KIERANS: I would say they would be far more interested in obtaining water which we can get put into the great lakes for 1½ cents a thousand gallons. With desalinization, right now water is 75 cents a thousand gallons. It is hoped that it will come down to 35 cents a thousand gallons. With some treatment it might hit 20 cents per thousand gallons, but never in the foreseeable future will it come close to straight pumping costs. Just in terms of treating ordinary sewage alone, the cost is 10 or 12 cents a thousand gallons. As soon as you start to treat water, or have to do anything in the way of treatment, the costs go up fast. Fortunately we have a possibility of delivering good quality water to the great lakes without treatment. Does that answer the question? In other words, it is basically a matter of cost.

Mr. DINSDALE: In your brief you raise the problem of pollution as one of the multiproblems. If antipollution methods were adopted more universally—making possible the re-use of water—would this delay the critical part where diversions of this kind would be required?

Mr. KIERANS: First of all, I would like to make very clear that we do not consider dilution is any solution to the pollution problem; in other words, you cannot get around the pollution problem by putting more water in. We must find specific remedies for pollution problems; we must do this regardless of the Grand Canal or otherwise. I really do not think this is the specific problem that we are talking about here.

I believe I might give an illustration of this. Possibly one of the most dangerous rivers today in North America is the river which flows into lake Erie from Cleveland, the Cuyahoga river. This, among others, was stated by some of the experts to be creating a condition in lake Erie which is not reversible. Had we done the same thing at Chicago and insisted that the Chicago river flow into lake Michigan with the same general condition we have here, we probably would have an extremely polluted lake Michigan today. It would seem that we might reach the day when it could be practicable, on a joint United States-Canadian basis, to see that the Cuyahoga river is reverted into the Ohio. River water cleanses itself far more effectively than lake water. This is well known. There is an engineering board report which deals with the cleansing effect, for instance, of the Don river; it shows the effect of a river which has the capability of neutralizing the amount of pollutant in the water. Does it not seem possible that it would be more beneficial to see that some of these highly polluting rivers were put into other rivers rather than into large lakes like lake Erie; in other words, actually turn the rivers around—not just the Chicago river, but more, keeping them out of our clean water reservoirs that we want to have?

Mr. DINSDALE: I do not think I will pursue that point. We are getting into engineering.

Mr. RYAN: Mr. Chairman, I would like to ask Mr. Kierans concerning a statement he made at the slide lecture this morning which was not reported in respect of the Erie barge canal and the Oswego canal. I believe you said the United States army corps of engineers is proposing to take over jurisdiction there. Is there a problem here similar to the problem which faced Canada at the time the Erie canal was built when we had to build the Sioux canal?

Mr. KIERANS: This is what Mr. Chevrier said in his book.

Mr. RYAN: I am wondering what is proposed by the United States corps of army engineers in respect of the Erie canal and the Oswego canal? How would it be a problem for us?

Mr. KIERANS: I have no way of knowing exactly what they propose to do. The New York state barge canal as it exists today is not a modern system. I think the last figures I saw indicated a tonnage of something in the order of 5 million tons a year is handled compared to the Chicago ship canal which carrier 25 or 30 million tons a year.

Mr. RYAN: Is it a threat to the international waters?

Mr. KIERANS: Thinking in terms of navigation only and the tonnage moved to the St. Lawrence system, or through Canadian waters—and not what we would like to see moved—I think there would be diversion of some of our tonnage through the New York state barge canal down into the Hudson river and down to New York, rather than down through the St. Lawrence. This is what happened years ago and caused us to develop the first St. Lawrence seaway.

Mr. RYAN: Is there any suggestion to deepen the canal into a modern ship canal?

Mr. KIERANS: I do not think these negotiations were considered. If New York state was to turn this over to the United States Army Corps of Engineers I think it would be with the intention of modernizing it. I have noted in the New York press that discussions have been carried out. If they did so and increased the tonnage they would take tonnage away that normally would go down the St. Lawrence river.

Mr. RYAN: How does your Grand Canal plan in any way affect this?

Mr. KIERANS: In order to demonstrate this, I have a picture, and I would ask you to look at page 43 of the brochure on the Grand Canal. You will see a map there which outlines the Montreal-Georgian bay ship canal. This map was drawn in 1907 as the result of an investigation on which the federal government of that day, through the department of public works, spent \$1 million. Now, if you look at the two main features immediately below it you will see one diagonal one, which is the St. Lawrence river running from lake Ontario, and a parallel one, which is the New York state barge canal. You will see the connection from lake Erie directly through the New York state barge canal. Through Hudson bay and down to New York would be and could be an attractive one for shipping provided the cost would be competitive with shipping through the St. Lawrence. Now, the big advantage the proposed Georgian bay ship canal had over even the St. Lawrence system was that it was approximately 280 miles shorter to traverse from Montreal to the upper lakes than the St. Lawrence system.

One of the technical objections to the proposed Georgian bay ship canal was the fact that just east of North Bay we had a division of drainage; we had the Mattawa river, which is part of the Ottawa system, flowing to the east, and to the west we had the lake Nipissing drainage system which flowed down the French river to the great lakes. Now, in between these two areas was a very small catchment area or a summit. This it not too well done because of poor printing, but you can see, as opposed to the great lakes system, which was a continuous rise up to lake Superior, with large quantities of water in lake Superior we had in the Georgian bay ship canal a summit where the area was not sufficiently large to catch enough water to provide for the lockages. Therefore, the whole scheme was not technically feasible. This was one of the main reasons that killed the Georgian bay ship canal.

Since we are bringing water down from the James bay area directly through this area, with very substantial quantities we overcome this technical difficulty and make it possible. Now to develop the Georgian bay ship canal as an auxiliary access to an exit from the great lakes, we are told that by 1980 even the doubled Welland canal will have reached its full capacity and we will have to find other means to get in and out. If we can revise this scheme here and certainly, eventually, it will have to be, then we could offset some of the advantages at least that our competitors in the United States would have in the development and the modernization of the New York state barge canal. Does that point clarify it?

Mr. RYAN: Yes.

Mr. KIERANS: In other words, it is 280 miles shorter, and if you lay a pencil on that map from Montreal to Sault Ste. Marie you will see it is practically a straight line.

Mr. TURNER: It helps North Bay but not Sudbury.

Mr. KIERANS: Well, whatever helps North Bay helps Sudbury.

Mr. RYAN: In your report at page 7 you suggest that your project will provide low cost barge navigation from the great lakes and Montreal to Hudson bay. In reaching such a conclusion I understand you temporarily set aside the Georgian bay ship canal, but you must have given consideration to the length of time the canal can be kept open for navigation, the cost of navigation locks and facilities, the costs of operation and maintenance and the potential traffic over such a route. Would you elaborate on that?

Mr. KIERANS: You are not referring this time to the Georgian bay ship canal; you are referring specifically to what I am recommending at the present time, I understand. The advantages that we see in this suggestion are as follows; if you look at the population map of Canada you find that most of our people

are close to the St. Lawrence-great lake system, in other words we have developed an east-west trade artery through the St. Lawrence system which parallels the United States border and actually is part of the United States border as far as the great lakes are concerned. It seems to us that the great catalysts of industry are good water and good power. If we develop this system primarily for the purpose of water supply to the great lakes for all of the useful and valuable purposes for which this can be developed, and we create in the process a series of large reservoirs or lakes, one close to the next right down through to Hudson bay, then the problems of joining each of these lakes for other purposes such as barge navigation become attractive.

The cost of developing this system we have estimated to be in the order of about \$800 million. It has been suggested by some of the engineers that this figure is quite high. They feel, that, for instance, we would not use locks in this system, that we would use a type of marine railroad transfer for these barges. Actually this has been done in some parts of the world quite successfully, such as in China, in some parts of Russia and in Germany, where they developed very large-scale inclined plane lifts for shallow barges from one substantial elevation to another where they did not want to use water or they did not have water.

Mr. TURNER: You mean mechanical portaging?

Mr. KIERANS: If you can visualize such a system spreading from the great lakes and Montreal, what are the potential products you envisage? We have six billion tons of iron ore of a grade which has been increasingly mined in Ontario. The big factor in determining whether or not we will mine this is the cost of bulk transportation. Bulk transportation is the answer. In the United States the relative cost of transportation by barge, as opposed to other methods, is of this order: 4 mills for barge, 16 mills for railroads, and 60 mills per ton mile for truck transportation. You can see that if you can provide, as a part of another system, the possibility of developing a barge navigation system, then you can visualize now a north-south trade artery which would help to develop the forest products of the north, the iron ore possibilities of these areas here, and in time, create the same north-south kind of trade artery that we must have in this country in order to take ourselves away from the attraction of the United States border to which we seem to be adhering.

You say that these things are not developed. I answer to you this, that the task today is to do this job. National survival really depends on doing that which we have in common, which is turning our eyes to the north. If we turn our eyes to the north, it does not make any difference whether we are in British Columbia or in Newfoundland, we look at the same area. This is unifying. We are a part of a northern people. We can develop this north-south trade artery by every possible means. We have the same problems that Sir John A. Macdonald had. As I mentioned this morning, he had no wheat crops in the prairies but he had faith that if he did this he would prevent British Columbia from joining the United States. If we can turn our eyes to the north we will achieve what we want but we must have faith to do it.

Mr. RYAN: I have a question on this barge system which you envisage. How many cubic feet per second would you have to spill down the Ottawa from your pumped water reservoirs to operate the barges?

Mr. KIERANS: Surprisingly little. For instance the Welland canal takes about 5,000 c.f.s.

Mr. RYAN: That is a much deeper ship canal.

Mr. KIERANS: I would think we would probably handle something of the order of three or four thousand c.f.s. We did not even have that at North Bay; we only had around three or four hundred c.f.s. It was just too touchy and nobody would go near it.

Mr. RYAN: This amount of three or four thousand c.f.s. would have to be committed during the navigational season. I suppose the same figure would be pretty well true for the French river.

Mr. KIERANS: This is not committed in the sense that it is not available for other uses. In putting it through for this purpose, you are making it a saleable product on the great lakes as well.

Mr. RYAN: Is there any great volume of hard rock to be removed in your plan for this Grand Canal, or would most of the problem be answered by raising the water levels?

Mr. KIERANS: We have made some specifications dealing with this. We say that the Grand Canal should not be built unless there is a specification that provides for the improvement of the waterway through which it passes. In other words, we do not want to put it through the French river unless we improve the French river, and we do not want to put it through lake Timiskaming unless we improve lake Timiskaming. We have problems with this owing to the high stage and the low stage problems. By broadening the discharge of these areas and putting them under control, and by making it possible to add water, we push the water through and hold the level by varying the rate at which we put the water through the system. In other words, we are able to maintain a much better range of stage than we now have under the rather unrefined systems of control that we now have. We have refined our controls so that we would be able to reduce the range of stage to, say, one of three or four feet instead of the present seven to eight feet.

Mr. RYAN: Do I take it then that the barge canal would not take a great deal of hard rock removal?

Mr. KIERANS: Except at the discharge and the points where there are constrictions along the system.

Mr. RYAN: If Canada were to go ahead with the grand Georgian bay ship canal idea, then of course it would be a question of a ship channel in the order of 30 feet of depth.

Mr. KIERANS: Yes, I would say the specifications back in 1907 were that for \$100 million they would put a canal from Montreal through to Georgian bay which would give them 21 foot draft capability. For \$120 million they would increase this to a 26 foot draft which is roughly the present range. It seems to me that if they got at it again, I would like to see a really modern system.

Mr. RYAN: If they did put a deep sea ship canal up the Ottawa and down through lake Nipissing and out to Georgian bay, would it be in the order of a 30 foot deep channel? Would it not be 27 feet and an additional three feet which they allow in most places?

Mr. KIERAN: The sills on the locks are the controlling features. I mean whatever is the lowest one is the controlling one.

Mr. RYAN: Along this route, have you figured out how many miles would be miles of locks and shipping channels and how many miles would be more or less navigable open water?

Mr. KIERANS: Well, there is something like 42 per cent of the total system of the Grand Canal that we would not be touching at all. The figures are available in the report of the public works as to how much work has to be done on the Georgian bay shipping canal. A lot of the pools have already been established as a result of hydro electric works. Some of the work has already been done. But we go in for much more modern structures today. I would think the cost of building this system would probably be \$500,000.

Mr. RYAN: In the case of the Welland canal we hear now it is quite a bottleneck on navigation in the great lakes. I believe it is about 27 miles in

length. How many miles on the Georgian bay shipping canal would be similar to say the Welland canal?

Mr. KIERANS: I think they have the figures here. I think it is very hard to make a comparison. You see, they had quite a large number of locks even in the profile of the St. Lawrence seaway but these have been greatly reduced because the locks have been modernized. I would hesitate to go into it.

Mr. RYAN: The over-all figure is 280 miles?

Mr. KIERANS: There are 280 miles saving.

Mr. RYAN: Yes. How long is the route from Montreal to the mouth of the Fraser?

Mr. KIERANS: There are figures on that here. It is 661 miles from Montreal to Sault Ste. Marie, via the Georgian bay shipping canal and it is 943 miles via the profile of the St. Lawrence river route.

Mr. RYAN: I was trying to get an estimate of how much this route would be analogous to the Welland shipping canal route of the present day. Could you even give us an estimate?

Mr. KIERANS: These figures are available in the study. I would hesitate to give them to you because they would be off the cuff guesses.

The CHAIRMAN: Gentlemen, it is shortly after 6. Is it our intention to carry on for some minutes? I have Mr. Rock, who is absent now, Mr. Watson and Mr. Aiken on the list.

Mr. WATSON (*Chateauguay-Huntingdon-Laprairie*): I think that Mr. Aiken has told me privately that we are all likely to be required in the house tonight. I think possibly if we could go on for another half hour we could get through.

The CHAIRMAN: Fine.

Mr. RYAN: I would like to change the subject somewhat now. I would like to come up to the south end of James bay and ask Mr. Kierans first of all about the depth of the water of James bay on the north side of his proposed dikes for the fresh water lake.

Mr. KIERANS: Well, I have brought a map with me of those put out by the mines and technical surveys. The area in which we are proposing to put dikes, however, is in general very shallow.

Mr. RYAN: Is it 15 feet at the mouth of the river?

Mr. KIERANS: Yes; it is quite shallow. We are proposing a new lake.

Mr. LEOE: I would like to raise a point of order again. We are getting into details that will come out in the study. I still think that we are wasting our time probing into things that are not relevant to what we are trying to find out.

Mr. RYAN: If it is going to be a multipurpose development, I want to know all the purposes.

Mr. KIERANS: I think I can answer your question in this way. There have been studies of the possibility of a harbour at Moosonee. One of the problems related to this, of course, is the general shallowness of the water in that area, plus the silting. The silt moves because of the heavy currents in the spring, and you are liable to get a channel dredged this year and then next year you would have to dredge it again.

Mr. RYAN: Like a delta, in effect?

Mr. KIERANS: That is right.

In the new fresh water lake we provide here, we are providing new water at an elevation of, say, some 20 feet above salt water. So it does seem to me that we do answer your question in a favourable way. There is a possibility here that is far more favourable than the studies that have been

taking place in the past have indicated. We seem to have overcome the difficulties that were stated to be the difficulties in connection with the addition of dikes for the creation of this new fresh water lake.

Mr. RYAN: What is the name of the island where there are those two dikes?

Mr. KIERANS: Actually, it is not an island; it is the Ministikawatin Peninsula, and we are hoping to create an island out of it.

Mr. RYAN: Is that a muskeg island?

Mr. KIERANS: Yes, it is very low. We have fortunately been able to get quite a lot of co-operation from the Department of Mines and Technical Surveys who have given us the elevations. We have sufficient elevations and we have outlined our dikes there pretty well in accordance with the high land that has been outlined for us by the Department of Mines and Technical Surveys. In other words, that is about 100 feet in elevation. It is not high land, mind you, but it is sufficiently high for dikes to be anchored to it.

Mr. RYAN: I have one final question. Is there any problem about salination of water? Would there be seepage back into James bay?

Mr. KIERANS: Not if we created pressure on the high side.

Mr. ROCK: Is your recommendation for diversion together with canalization for shipping all the way through? In other words, the diversion from up north is connected with canalization for shipping? You are more or less recommending that through this diversion of water there should be possibly a canal and a waterway system from Huron down through the Ottawa river to Montreal?

Mr. KIERANS: May I answer this question now? First of all, I do not think if we were to have the single purpose of creating a canal from the great lakes to James bay for navigation purposes only we would have an economic system. This is not economic by itself. But if you create a system of waterways which are of a nature which can be joined comparatively simply together, for other benefits, then navigation becomes possible as a part of the whole picture.

Mr. ROCK: You mentioned a barge canal. Why did you not speak of a real shipping canal for deep sea ships? You have spoken about natural resources from the north, and you have spoken about shipping them all by barge. But if you ship by barge, you may have to transfer from barge to larger ships. I cannot understand your thinking in this direction.

Mr. KIERANS: Let me put it this way. That is a very good question. As far as the Ottawa-Georgian bay ship canal is concerned, we speak of it as a ship canal. But the one running north and south is an entirely different problem. Here, in order to create a port along the proposed Georgian bay ship canal, the only place where you would probably create such a port would be in the Ottawa area, or possibly at Pembroke, and North Bay. These are areas where we would be actually concerned with their use as port areas, because the creation of these ports is expensive. We only have a few of them, I am thinking of Montreal, Vancouver, and Halifax.

So if we wanted to develop an industry in this area it would be almost impossible for private industry to create facilities which could carry deep sea vessels. But if you have a 12 to 14 foot barge train, it will carry more than may be loaded on an ocean liner up to 40,000 tons.

Barge trains travel on the Mississippi and they can be left off at various places. And if ordinary enterprises of the order of the Johns-Manville company wished to make use of barge facilities on lake Timiskaming, there is no great cost for them involved. That is the reason it has grown so rapidly in the United

States; it has this advantage. If you can visualize this kind of thing moving north, you may then talk about the problem of transshipment. But this has been overcome in the United States where what they do is to create large vessels which they sink, something like the landing barges that they sank and then pumped out again.

They sank those large ships and floated barges into them and then they lifted up the ships and carried the barges across the Gulf of Mexico where they again sank the vessel to allow the barges to float out. So there is really no transshipping. Two of these have recently been ordered. One is for the west coast.

Mr. ROCK: On another subject, that of the Erie canal, you stated that this canal is of an ancient type at the moment. It is also mentioned here that the United States is using or maintaining it in a sense as a lever. Does that mean more or less a political lever? Suppose that relations between Canada and the United States one of these days should bog down, for example, because of serious problems of some kind. Would that mean that they could keep this as a lever in case, let us say, Quebec should separate, or something like that, and they wanted to have a seaway system of their own down the Hudson river to New York. What do you mean by this?

Mr. KIERANS: I am thinking of it in a strictly commercial sense.

The CHAIRMAN: Please let us remember that this is not the committee on external affairs.

Mr. KIERANS: I am just thinking of it in a purely commercial sense. It is just a question of the shorter distance from lake Erie to New York via the barge canal. That is why it was built in the first place. Moreover, there would be the possibility of relieving the tonnage on the Welland canal in the same way. This might be a lever. This would not be at a political level but rather at a commercial level just as one company waits until the proper time to bring out its product to compete successfully with another enterprise which is in competition with it. In other words, we should be prepared to move to offset a benefit they would seek by virtue of this kind of development, but not in a political sense.

Mr. ROCK: Mr. Kierans, by any chance did you read the article in the *Reader's Digest* of March this year entitled "Water Crisis on the Great Lakes"?

Mr. KIERANS: Yes.

Mr. ROCK: Your studies were mentioned in that article. Mr. Chairman, I am wondering whether this article might be written into the record.

Mr. AIKEN: I think it is available, if reference is made to it.

Mr. ROCK: May I make reference to that article? It gives information and an explanation not only of the water needs in the great lakes area, but also the whole continent of North America.

The CHAIRMAN: No doubt there are thousands of articles which are not a part of the evidence of this committee. They are of value, but we cannot make them part of our record.

Mr. TURNER: I agree that it is an excellent summary.

Mr. ROCK: It is an excellent summary of the crisis which exists in North America.

Mr. LEBOE: Undoubtedly the Ontario and Quebec governments will make use of the article.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Mr. Kierans, you mentioned the possible cost of the canal and the dike at the mouth of the proposed canal, the pumping stations, and so on, being something in the

neighbourhood of \$1,200,000,000. When you mentioned these figures did you include the control measures that will be necessary on lake Huron-Michigan?

Mr. KIERANS: No. We are not including this control measure.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Since we have heard in earlier committee meetings that the control measures at Huron-Michigan—which you have indicated are absolutely necessary—would cost in the vicinity of \$1 billion, the total bill for the two items approaches \$3 billion.

Mr. KIERANS: I am sorry; I may have misunderstood what you said. We are not suggesting this under the particular arrangement of the 25,000 c.f.s. system. This would reduce the need for providing these control measures on the Detroit-St. Clair rivers.

Mr. TURNER: But you still would need some additional controls.

Mr. KIERANS: There are what we might call minor matters.

Mr. TURNER: But those are not included in the \$1,200,000,000.

Mr. KIERANS: No.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): It was my impression that it would be absolutely necessary to have extensive control measures at the exits to Huron-Michigan—the exits to these lakes—if we are going to be injecting additional water into the great lakes system in order to provide for these flood periods. I understand that a rough estimate had been made by the United States corps of engineers and that this was in the vicinity of \$1 billion for this particular control measure. Now, Mr. Turner has just mentioned additional discharge control items that perhaps would run the bill higher than that.

Mr. KIERANS: Yes.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): So, your reference to the \$1,200,000,000 or \$2 billion relates to the actual canal project between James bay, where the water comes into the lake system.

Mr. KIERANS: Very definitely. But, under that particular suggested arrangement it reduces the need to provide \$1 billion measures on Michigan-Huron to a very minor figure. And, if we found as a result of our investigation that we could export more water to the United States under this optional contract arrangement we probably could get by without any of it. You have to picture that you have the Detroit-St. Clair river system, which is a fixed size tube leading from one very large reservoir to a smaller reservoir. This is a fixed size tube of 85 miles in length with a certain slope to it. Now, at any given elevation of lake Michigan-Huron this tube will take a certain volume of water. If we can control the levels of lake Michigan-Huron by some other means, then the amount of flow down through this tube remains exactly at the particular rate for that elevation and does not vary from it. So, if we could maintain this by some other exits, which cost money—

Mr. TURNER: But, you would have to build.

Mr. KIERANS: Wait a minute. They just become part of a multipurpose thing, which widens the area of benefit. Others are interested in getting these benefits. Now, you suggest to them instead of Canadians paying one half the cost of the works that would have to be provided under regulation only in Michigan-Huron these people who are interested in exporting water, as part of the benefit they get from their ability to get water, provide those works there, and that becomes a charge to them as well as a charge to the total problem of water export, but not a charge against stabilization only which has been affected as a result of that export.

Mr. TURNER: Mr. Chairman, I have a supplementary question. I take it that your answer was that the \$1,200,000,000 included only the canal from James bay to the great lake system.

Mr. KIERANS: Yes.

Mr. TURNER: In other words, it included the cost of collecting and delivering 18,000 cubic feet per second of water.

Mr. KIERANS: Yes.

Mr. TURNER: And, 24,000 through the lakes system.

Mr. KIERANS: Yes.

Mr. TURNER: It did not include the navigation costs of improving the Grand Canal waterway for navigation.

Mr. KIERANS: If you go up to the figure of \$2 billion, it does.

Mr. TURNER: You have to go up to that figure to make it navigable.

Mr. KIERANS: Yes.

Mr. RYAN: But for barges only.

Mr. KIERANS: Not barges only, barges, because barges in this sense are more preferable than the other because they carry more cargo and serve greater areas.

Mr. TURNER: And, loading is easy.

Mr. KIERANS: Yes.

Mr. TURNER: Does the cost of \$1,200,000,000 include your power transmission cost? You would have to transmit a lot of power to pump your water up.

Mr. KIERANS: It includes the power transmission costs.

Mr. TURNER: Those are likely to be considerable.

Mr. KIERANS: It does not include the benefits that you get from the new power plants which it would be possible to build on the southern slopes. It includes the cost of the power plants which are built for pumping purposes on the northern slopes, but not the ones on the southern slopes.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): This morning, when you were showing the slides, you mentioned that you can guarantee 15,000 c.f.s. as export flow from the great lakes system for consumption purposes south of the great lakes. Am I correct in this?

Mr. KIERANS: That is the contract figure.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): There were a couple of things about which I am not quite clear. You mentioned some sort of optional contract arrangement which you have with these people. I was not clear whether you meant that you would only supply water to these people during periods when the water was available or whether you would supply surplus water to these people only when it was available.

Mr. KIERANS: First of all, as far as water in short supply in the north is concerned, we have seen to it and we will see to it that we are providing for adequacy of water. Actually we have 75,000 c.f.s. to provide for 25,000 c.f.s. We think that we will cover this point.

As far as the adequacy of water on the lakes is concerned, we have tied into this whole concept the control capability that you would need in order to maintain the level.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): One point confused me regarding this optional contract business. When you mentioned this were you referring to everything we were supplying to the southern areas requiring water or were you just referring to the surplus water that we might have? It seems to me that we would not get the co-operation of the southern people

who need the water unless they were assured of a steady supply of water all the time in the future. I cannot see them agreeing to a system whereby if water by any chance was in short supply they would be cut off.

Mr. KIERANS: This is not what we do; it is not that kind of contract. As I suggested, there are a number of ways in which this could be stated. You could state it as a contract of a firm 75,000 c.f.s. with an optional increase to 1500 c.f.s. or an optional increase to 2200 c.f.s. If we were to advertise for, say, a river to be purchased by someone in the United States or some area in the United States and if they were to compare this to an ordinary river, the range of flow that they would get on that river under the very best of circumstances would be of the order of five to one. This would be excellent. On the west coast we have ranges of flow of the order of 150 to one from the highest stage to the lowest stage. If we suggested to them that they purchase in fact a river, which is actually what we are suggesting that they do, which has a range of flow of an order of three to one, it would be quite satisfactory. In fact, in speaking to the director of waterways for the Chicago sanitary district I was told by him that it was quite acceptable.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Now in the flooding periods, supplementary to the questions that Mr. Turner asked earlier, do you feel that there would be no problem during the periods of high water to arrange for outlets other than the normal St. Lawrence river outlets?

Mr. KIERANS: That is right.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): You feel that there should not be any difficulty there?

Mr. KIERANS: Well, we have one area that wants it and we have other areas that suggest they want it. To continue to answer that question, it is a far safer way to do it than sluicing the water down the St. Lawrence during periods of high stages in the lakes.

Mr. TURNER: Can I ask a supplementary to that? Let us forget export for a moment, and I am not denying that there is great advantage in our preparing to export water, if we can make the right deal with the United States. Do you think if we brought the existing system of the regulations of lakes under control, without exporting any water, that we have to import any water from the north? In other words, if we were to regulate the entire great lakes system, without considering export, would we need northern water?

Mr. KIERANS: I think we could at least say this about the statement of General Dodge in Chicago on January 25. He said quit clearly that the best arrangement that he could propose was one which would reduce the range of stage of Michigan-Huron from 5.6 feet to 4.2 feet. This would lower the highest level that they had by .3 feet and raise the lowest level by 1.1 feet. Now this seems to me to be not a substantial change of stage from 5.6 to 4.2 feet. It does not seem to me to be a very substantial change, particularly when it is fixed. Once it is built—that is pretty well it. In addition to that it has caused obstruction to navigation. On top of this it has created the danger which should not be overlooked, that what you are actually doing is arranging for a system which, during periods of high water in lake Michigan-Huron, in order to get rid of it for the benefit of lake Michigan and Huron, would sluice it down through the St. Lawrence. What happens if, right at that particular time in the St. Lawrence, when this is being passed down, you have a hurricane Hazel? You have a real problem on your hands at that time.

Now, you have added, mind you, 30,000 c.f.s. to the flow right at that particular time and you do not know when you are going to have one of these things. No one knows. So it seems far safer from the point of view of looking at our system, to get the water out of the system right up at the big lake,

when you can get it out and use every means and every opportunity and before you spend \$1 billion dollars in order to create something which is liable to be a hazard to navigation, very costly and a danger from the point of view of flood,—I do not think that it is then a reasonable thing to say that we should use this kind of approach to bring the lakes under control first.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Just further to this point, I detect here a slight contradiction in what you have just said about the necessity of these outlets which obviously have to be on the American side?

Mr. KIERANS: That is correct.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): And the necessity of studies. You are really recommending that we study them?

Mr. KIERANS: That is right.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Now there is a conflict there between this suggestion on your part, study of the control outlets which are necessary on the American side, and your recommendation that we have this done by the resources ministers' council, because the resources ministers' council would be limited to what we can do here in Canada. If we are going to have a proper study of this subject we are going to have to include not only the measures that will be necessary between James bay and the great lakes but the control measures that will be necessary. Therefore, I do not think in the light of what you have said that perhaps the resource ministers are the right people to refer this to.

Mr. KIERANS: If I might put this into its proper compartments, Mr. Turner has suggested that you have to look at this from the point of view of water as being a great benefit and a great hazard. It could be both and it is the control of water then that you are paying for. You are actually paying for the control of water. If I may put it very crudely; when you want to wash your teeth in the morning, you do not have a bathtub full of water in the bathroom. At the same time, if you want to have a bath you do not want to have as little water as you would use to wash your teeth. So what we are concerned with here is delivering the water in the amount that is required at the particular time. This involves a control system.

In connection with the resource ministers' council, Mr. Turner suggested that before we make this benefit, looking at water now as a benefit available in another area, we should determine how much we need ourselves and how we can use it. Considering all the complexities of the plan it seems to me that the resource ministers' council is a good answer, but I said to Mr. Turner that I do not think it is the only answer. Coincidentally, we have to undertake the International Joint Commission studies.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): If I understand you correctly, you would like to see several studies carried on at the same time, and they would include a study of what we can do in Canada with the James bay diversion to the great lakes system; that is number one. Number two, you would like to see a separate study made of the control measures and the outlet control measures that would be necessitated on the great lakes, which could perhaps be handled by a different group. Number three—and this is something that I have not mentioned so far but it really has not been discussed too much today—there is the question of the United States demand. You mentioned it when you were presenting your slides. Are you aware of any United States study going on at the moment for water needs in the next 20 to 30 years?

Mr. KIERANS: Yes, there was a study conducted in connection with the proposal put forward by the Ralph M. Parsons Company, and I refer to what is the plan that is generally referred to as the Nawaba proposal. A study was conducted by the United States Senate in which they indicated that the water requirements in the United States, particularly in the United States southwest,

were of such a growing magnitude that this \$100 billion scheme should be looked into by Canada and the United States.

Mr. LEBOE: On a point of order, again, the hon. member who is holding the floor here said we would be finished by 6.30, and Mr. Aiken is patiently waiting for an opportunity to ask questions. We have now gone seven minutes past 6.30 and I am just wondering whether we are going to carry on here.

The CHAIRMAN: I was wondering whether the Chairman was the only one who was worried about the clock!

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I have just a couple of more questions.

Mr. LEBOE: If I may make my point, the only thing is that what we are going into now is an investigation not just into whether or not we want to recommend something to study—and this is the purpose of the committee—

The CHAIRMAN: We have had before use the chairman of the Great Lakes Commission, which is formed by eight states adjoining the great lakes. The evidence of that gentleman was very strong on the need by the United States of America. To obtain that again from a Canadian seems to me to be an indirect way of dealing with the problem.

Mr. KIERANS: I think the need for the United States is pretty well authenticated. I can show you a great many documents here which certainly indicate that.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I would like to know what this committee could recommend immediately that could produce some results in obtaining statistics in the United States of their needs so we will know how much they are going to require from us. We will then be able to decide whether it is going to be worth our while to do this sort of job in the north and be in a position to sell the water. We have to know something about the markets available before we decide to spend the money, and all these things should be going on parallel to each other. This is the purpose of my questioning. If we are going to make any decent recommendations in this committee, we will have to make a recommendation that includes something of a statistical approach to the United States needs.

The CHAIRMAN: Do we need to know the answer before we ask anyone to find out if there is a demand or no demand? Your questions were in line with knowing what amount the United States may require. Can we not ask a certain body to inquire if there is any demand or much demand or no demand? That is the point the Chair is trying to make.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I would like to know, and this was the reason behind my questioning, what Mr. Kierans thinks this committee can recommend that will produce information about the United States situation as far as demand is concerned. What can we recommend in this committee that will produce results as far as supplying us with the necessary information?

Mr. LEBOE: That question was answered this afternoon very very fully by the witness.

Mr. ROCK: Mr. Chairman, it seems we are forgetting here today that we have a situation of low water levels in our own lakes, and we are always directing ourselves to the United States and to selling water, instead of thinking now of correcting our own situation. The main point is that we should consider our own low water levels before considering selling to the United States if we have a surplus of water.

Mr. TURNER: May I suggest that the witness should file with the secretary all the information he might have coralled which he feels is relevant to the

future consumptive needs of the United States. Perhaps he can just file the names of documents so this committee at a later stage might look into something along these lines.

Mr. KIERANS: I can see Mr. Watson's point here.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): It is an essential point of our recommendation.

The CHAIRMAN: To shorten this, will the committee be prepared simply to ask Mr. Kierans to leave with the secretary of this committee a list of all the works he knows of that give figures on the questions asked.

Agreed.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): Has Mr. Kierans anything to add that would be helpful to the committee?

Mr. KIERANS: To answer your question very briefly, we had the problem of determining the interprovincial benefits of exporting water; that comes under the resource ministers' council.

There is a problem of whether or not level stabilization is a good thing for the lakes under regulation only, or, as we have suggested, under water level conditioning; and if the International Joint Commission should study this, and in addition, that Canada should set up with the International Joint Commission a study to determine what the needs are for export. In other words, there are three basic areas of investigation: what are the needs; what are the effects if you have the needs, and what it is going to cost Canada in terms of distributive benefits? Does that answer your question?

The CHAIRMAN: Now, Mr. Aiken.

Mr. AIKEN: Mr. Kierans, I just have one question now. You mentioned this morning that the Huron-Michigan lakes were the key to the whole problem of lake levels, and that as far as they were concerned, if you could control them, the water below them would also be controlled. Would your proposition merely include the emptying of water into lakes Huron-Michigan and allowing the downstream lakes and rivers to follow along, or would you have some further control measures?

Mr. KIERANS: Let me ask if I might rephrase your question in order to deal with it.

Mr. AIKEN: Yes.

Mr. KIERANS: First of all, lake Michigan-Huron is the key to the stabilization of the system below it. If you simply have, as we have seen, a regulation system for lake Ontario, it becomes quite ineffectual so far as your ability to control lakes Michigan and Huron is concerned. Now, in order to control lakes Michigan and Huron there seem to be two ways in which it can be done: first of all by a system of regulation whereby you install artificial means of increasing the normal discharge, or artificial means of withholding the normal discharge.

The best that seems to be indicated in this system up to the present time is a reduction of the present regulative stage from 5.6 feet down to 4.2 feet. We are suggesting an alternative method which we call water level conditioning, whereby water is added to the great lakes during a period of low water and is taken from the lakes by means other than natural discharge in order to maintain this balance.

Mr. AIKEN: That is the question I wanted to ask. In periods of high water you propose to withdraw water not through the same system that put it in.

Mr. KIERANS: But through natural discharge.

Mr. AIKENS Where?

Mr. KIERANS: By such means as the Chicago area, or the Green bay area, and possibly by means of lake Superior.

Mr. AIKEN: What about high water periods as far as the Grand Canal is concerned? Would it be turned off completely in your plan?

Mr. KIERANS: Yes, that is right; it would be reversed, or used on the Ottawa.

Mr. AIKEN: You mean water that would normally not be so used.

Mr. KIERANS: No, it would be used for the production of peak power.

Mr. AIKEN: I presume you mean the Erie merely would not be—

Mr. KIERANS: No. It would be used for the production of peak power. That is why we have suggested the means of replacing these reservoirs with a system similar to that installed at Niagara which is a reversible arrangement. During high water on the lakes we would use the pumps to produce peak power, lifting the water during periods of low power needs and letting it flow down during periods of high power needs.

Mr. AIKEN: I understand that. Would the diversion at Mattawa into the Ottawa river be at peak periods only, and if so who would make the decision in respect of when the water would be diverted?

Mr. KIERANS: This would have to be done under provincial agreements. Let me say that our basic and fundamental observation under the Grand Canal scheme—and we do not propose the Grand Canal under any other system—is that the waterways through which it passes would be improved by the building of the Grand Canal.

Mr. AIKEN: The reason for my question is quite obvious. Some people are saying in connection with this canal that it will be used merely to maintain the water levels at Montreal, and that the great lakes system will be penalized.

Mr. KIERANS: I cannot see that as a serious matter. First of all, we are talking about spending very large sums of money in which many people will have to participate. Nobody is going to put up several hundred million dollars unless there is a firm treaty which says that under this and that condition he will get what he pays for.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I believe we could save a lot of time if we had the three different studies going on simultaneously.

Mr. LEBOE: He recommended that this afternoon.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): There is one additional problem relative to our committee report. You mentioned a computer simulated program, going back over the last 30 or 40 years to see what would have happened had this program been in effect in that period?

Mr. KIERANS: Yes.

Mr. WATSON (*Châteauguay-Huntingdon-Laprairie*): I think conceivably that such a program might be a recommendation of this committee. How much would such a program cost?

Mr. KIERANS: It would depend on just how detailed you wanted to make it. It would take about a year and a half to determine the program of the computer and probably would cost upwards of \$100,000 and probably close to \$300,000. We are speaking in terms of between \$300,000 and \$350,000. I do not think I could go closer than that with my knowledge today. However, it is not a million dollar job, or anything like that.

Mr. LEGAULT: From the slides which showed the graphs and the projection of these graphs, we can assume that if this particular measure is not adopted, the water levels on the great lakes will continue to decrease and that we cannot foresee any improvement in the future owing to the growing demand for water which you have projected up to the year 2,000.

Mr. KIERANS: Certainly if the question you are asking me is if we do not add water to the lakes and if the demands for this water from the United States become such that they are prepared to do it unilaterally, then definitely we will suffer; there is no question about that.

Mr. LEGAULT: Necessarily in the future there is no other solution but to import more water to the great lakes in order to satisfy the demand. For the purpose of satisfying off lake demands I do not see any other way of doing it.

Mr. RYAN: Could not water be reservoiried in times of high precipitation in the United States although it may cost considerable to develop these facilities.

Mr. KIERANS: I think you could do it but there are dangers in that.

Mr. LEGAULT: Mr. Chairman, the projection does not indicate any improvement whatsoever unless additional water is brought in, which primarily would justify the study of the Grand Canal and the development of this. This is the main purpose of all this, and we would exploit all the potentialities of it after.

Mr. KIERANS: Well, I do not think my brother and I would have spent five years in this kind of study if we did not think exactly as you are saying.

Mr. LEGAULT: We have to face the fact that no improvements will come about unless this is tackled, and then the recommendations of this committee would be very important in the support of your project.

Mr. KIERANS: I doubt very much whether Mr. Meserow would have taken the trouble to come to North Bay or to this committee meeting if he did not think so, and he was at that time chairman of the Great Lakes Commission. Certainly the mere fact that this important person came to Canada should indicate something.

Mr. TURNER: He came because he was interested in more water and water conversion. But, the question must be fairly put: would the existing system work with or without diversion?

Mr. KIERANS: I see what you mean.

Mr. LEGAULT: I want to point out that the problem will be aggravated with the passing of the years; there are no other solutions but to bring in more water.

Mr. KIERANS: It is a multipurpose type of solution we are suggesting. As we mentioned, there are three basic concerns.

The CHAIRMAN: Have you a question Mr. Mitchell?

Mr. MITCHELL: Mr. Chairman, I would like to put two quick questions to Mr. Kierans. In your brief, which was presented today, you estimate the approximate cost of water which we will have for sale to Chicago is 1½ cents a thousand gallons.

Mr. KIERANS: Yes.

Mr. MITCHELL: I am interested in dollars and cents in this particular project. Have you any indication of what price Chicago would be willing to pay for water?

Mr. KIERANS: Yes, and I have the answer for you. I am quoting from an article which was written by Mr. O. D. Mussey, hydraulics engineer for the United States geological survey. It is printed in the April, 1961 issue of *Water Works Engineering*, and reads as follows:

In water-short areas the cost of water will have a strong effect upon future location or expansion of various activities. For example, the national average cost of water furnished by public water utilities, includ-

ing capital and operating costs, is about 32 cents per thousand gallons. The domestic customer pays from 20 cents to 60 cents, and the industrial and commercial customer from 12 cents to 28 cents per thousand gallons, according to volume used. Large-volume users in manufacturing industries frequently provide their own water supply, much of which may be used in steam generation of electric power, at costs ranging from 5 to 11 cents per thousand gallons.

Industrial establishments requiring smaller quantities may purchase their water from public utilities at prices ranging from 12 to 17 cents per thousand gallons for the larger users.

Now, because of the very large capacity we are suggesting here we can put water into the lakes on the order of $1\frac{1}{2}$ cents a thousand.

Mr. MITCHELL: A return of approximately some 5 to 10 cents.

Mr. KIERANS: Well, depending on what the particular user is. I think the whole thing has to be looked at first. As far as water at Niagara is concerned it is only worth .85 a thousand gallons, and if you get .65, that is fine. If you charge Chicago two cents a thousand gallons, and Mr. Bacon the chairman of the Chicago Sanitary District said he will buy all the water we can give him, that is fine. Perhaps I should retract what I said, but he would buy a substantial quantity of water.

Mr. AIKENS: All the water he needs.

Mr. MITCHELL: I am looking at what profits this project may earn for us. With that in view, I have another question on the sale of water plus any hydro benefits that may come from this development. Have you any idea how long a period this Grand Canal project would take to amortize itself?

Mr. KIERANS: We have estimated this in a very conservative arrangement regarding the Grand Canal project as it appears on page 54 of this brief. We have shown here a very conservative arrangement, and the reason we chose it was that it was very conservative. According to this, 3,000 c.f.s. are withdrawn at \$14 million. If we can increase this to something of the order of 15,000 c.f.s., you will multiply that at \$14 million by five and you will get some idea of the kind of revenue that you will be able to get. What are the needs and what are the alternatives open to the United States? If Chicago had to put back into the lakes the 3,000 c.f.s. that they are now taking, according to the record here, the cost would be \$600 million to them, according to a speech made by Mr. Meserow. This is stated in his talk. I will be very pleased to give the report of this talk to the clerk of the committee in order to save time. He mentioned that the cost of providing alternative works would be \$600 million. You can see why they can afford to spend these large sums of money.

Mr. Mitchell: I have one last question. Have you any idea of how long it would take?

Mr. KIERANS: About 50 years.

Mr. LEGAULT: The point I wanted to put across was the importance of this project. We are trying to exploit all of the various potentialities, and its basic importance is that we must bring more water in order to maintain the present level, if we do have one, in the great lakes.

Mr. TURNER: The point I wanted to make, Mr. Chairman, if I might, is that if there has got to be a distinction between maintaining the existing levels and bringing water in for export, while I agree we have got to think perhaps in terms of the export of water I do not feel the case has been proven that the existing system of the great lakes could not be maintained without the importation of water from the north. That is why I asked Mr. Kierans this question: Aside from export, which may or may not be a good thing but I think

is a good thing, you concede a need for importing diverted water from the northern rivers in order to maintain the existing levels on the lakes.

Mr. KIERANS: As I mentioned, considering the hazards of doing it under "regulation only" of flooding downstream, considering the fact that it is a very costly thing to do, considering the fact that under the best system it is a very limited thing, I think we can do a much better job under a multipurpose arrangement by bringing the water into the great lakes for two purposes, for stabilization and water export.

Mr. TURNER: That is a good answer.

The CHAIRMAN: I believe this concludes our hearing. I wish to thank you very much, Mr. Kierans, for your testimony. I would like also before we leave to thank the reporters and the staff who have remained here while we were having this long sitting. I would like to thank the members themselves for being in attendance.

Mr. TURNER: And I would like to thank the projectionist who helped us this morning.

APPENDIX "A"

Department
Northern Affairs and
National Resources, Deputy Minister

Ministère
du Nord canadien et
des Ressources nationales, Sous-ministre

Osias J. Godin, Esq., M.P.,
House of Commons,
Ottawa, Ontario.

Ottawa 4, January 27, 1965

Dear Mr. Godin:

I am writing to you in your capacity as Chairman of the Standing Committee on Mines, Forests and Waters, to provide you with some facts about the Advisory Committee on Water Use Policy. You will recall that this interdepartmental committee was discussed during the December 8th meeting of the Mines, Forests and Waters Committee.

The *Advisory Committee on Water Use Policy* had its origins in an *ad hoc* interdepartmental committee formed in 1951 to consider the Libby Dam question. The committee became involved in other water-power problems as well, but it had no official status. It became clear, particularly in situations such as the proposed development of the Columbia and Saint John River basins, where provincial, federal and international interests all were involved, that a permanent committee was necessary to represent the various interested federal agencies. Under its terms of reference, the *ad hoc* committee could not meet the need for a body able to consider problems of water use generally, and to recommend long-term solutions based on a consistent federal policy.

Accordingly, on July 28, 1955, Cabinet approved the formation of the *Advisory Committee on Water Use Policy*, under the chairmanship of the Department of Northern Affairs and National Resources, which also was called upon to provide the secretariat. Membership of the committee consists of the Deputy Ministers, or their representatives, of Agriculture, Finance, Fisheries, Forestry, Mines and Technical Surveys, National Health and Welfare, Public Works, Transport, Trade and Commerce; the Under-Secretary of State for External Affairs, the Secretary to the Cabinet and the Secretary of Treasury Board or their representatives. The Chairman of the Canadian Section of the International Joint Commission has also attended or has been represented at each meeting as an observer.

I am attaching a list of the ACWUP meetings to date indicating attendance. I trust that this material will prove helpful to your Committee.

Yours sincerely,

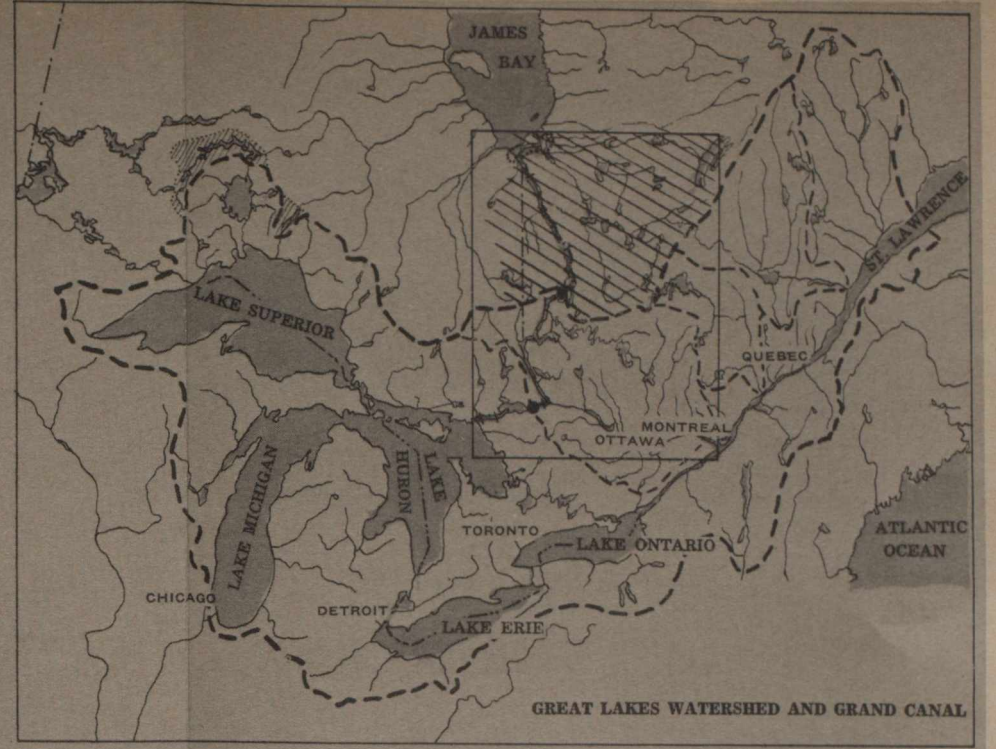
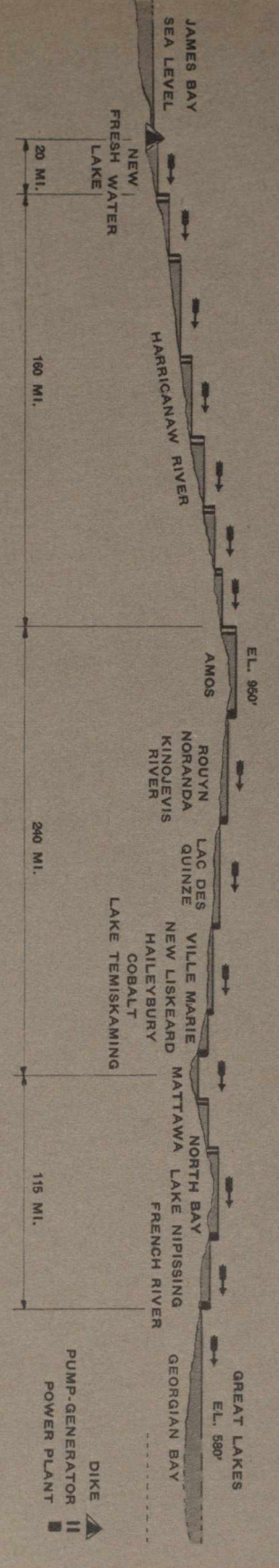
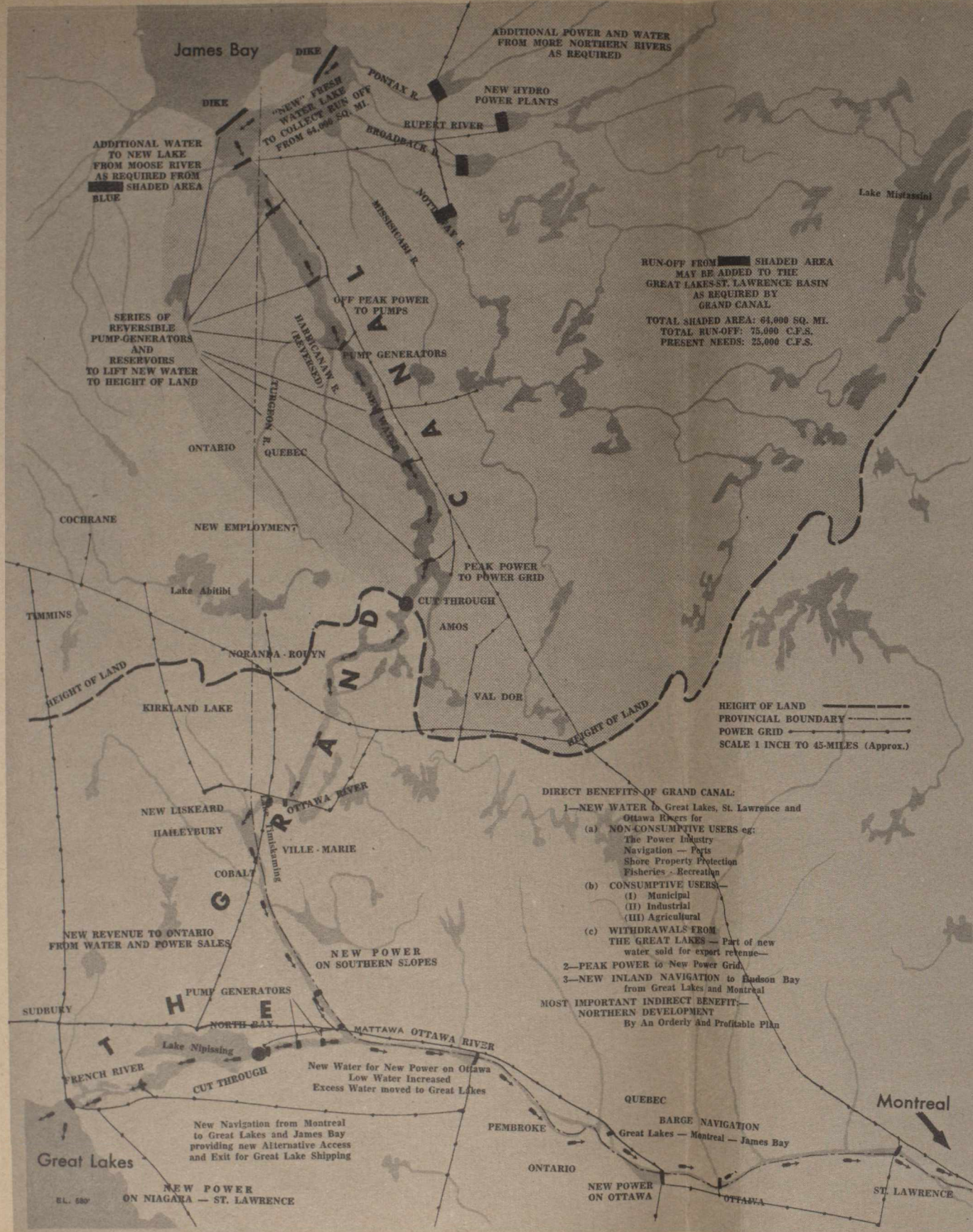
J. A. MacDonald,
Assistant Deputy Minister.

STANDING COMMITTEE

AGENCIES REPRESENTED AT MEETINGS OF THE ADVISORY COMMITTEE
ON WATER USE POLICY—NOV. 8, 1955—DEC. 10, 1964

Meeting Number	Date of Meeting	Northern Affairs	Agriculture	External Affairs	Finance	Fisheries	Forestry	Mines and Tech	National Health and Welfare	Privy Council	Public Works	Trade and Commerce	Transport	Treasury Board	International Joint Commission	Atlantic Development Board	Ontario Hydro
1	Nov. 8 1955	x	x	x	x	x		x	x	x		x			*		*
2	Jan. 12 1956	x	x	x	x	x		x	x			x	x		x		
3	Feb. 28	x	x	x	x	x		x				x			x		
4	May 3	x		x	x	x		x		xx		x			x		
5	May 30	x	x	x	x	x		x	x			x			x		
6	June 28	x	x	x	x	x		x				x			x		
7	July 13	x		x	x	x		x				x			x		
8	Sept. 25	x		x	x	x		x				x			x		
9	Nov. 8	x	x	x	x	x		x	x	x	x	x			x		
10	Jan. 8 1957	x		x	x	x		x			x	x			x		
11	Mar. 7	x	x	x	x	x		x		x		x	x		x		
12	Mar. 15	x		x	x	x						x			x		
13	Mar. 25	x	x	x	x	x		x	x	x		x			x		
14	May 7	x		x	x	x		x	x	x		x			x		
15	May 14	x		x	x	x		x	x	x		x			x		
16	May 30	x		x	x	x		x		x		x			x		
17	July 24	x	x	x	x	x		x	x			x			x		
18	Sept. 13	x		x	x	x		x	x			x			x		
19	Nov. 6	x		x	x	x		x		x	x	x			x		
20	Sept. 30 1958	x		x	x	x		x	x			x			x		
21	Dec. 16	x		x	x	x		x		x	x	x			x		
22	Dec. 29	x		x	x	x		x		x	x	x			x		
23	Feb. 6 1959	x	x	x	x	x		x	x			x			x		
24	Feb. 26	x		x	x	x		x		x		x			x		
25	Mar. 25	x		x	x	x		x		x	x	x			x		
26	Apr. 17	x		x	x	x		x	x	x	x	x			x		
27	May 22	x		x	x	x		x		x	x	x			x		
28	Nov. 4	x		x	x	x		x	x	x	x	x			x		
29	Nov. 16	x		x	x	x		x		x	x	x			x		
30	Feb. 18 1960	x		x	x	x				x	x	x			x		x
31	Mar. 24	x		x	x	x			x	x	x	x			x		
32	Sept. 12 1961	x		x	x	x		x	x	x	x	x	x		x		
33	July 3 1962	x	x	x	x	x		x	x	x	x	x			x		
34	Apr. 25 1963	x	x	x	x	x		x		x	x	x			x		
35	Oct. 15	x		x	x	x		x	x	x	x	x	x		x		
36	Aug. 27 1964	x		x	x	x		x		x	x	x	x		x		
37	Sept. 25	x		x	x	xx		x	x	x	x	x			x		
38	Oct. 26	x		x	x	x		x	x	x	x	x			x		
39	Dec. 10	x		x	x	xx			x	x	x	x			x		

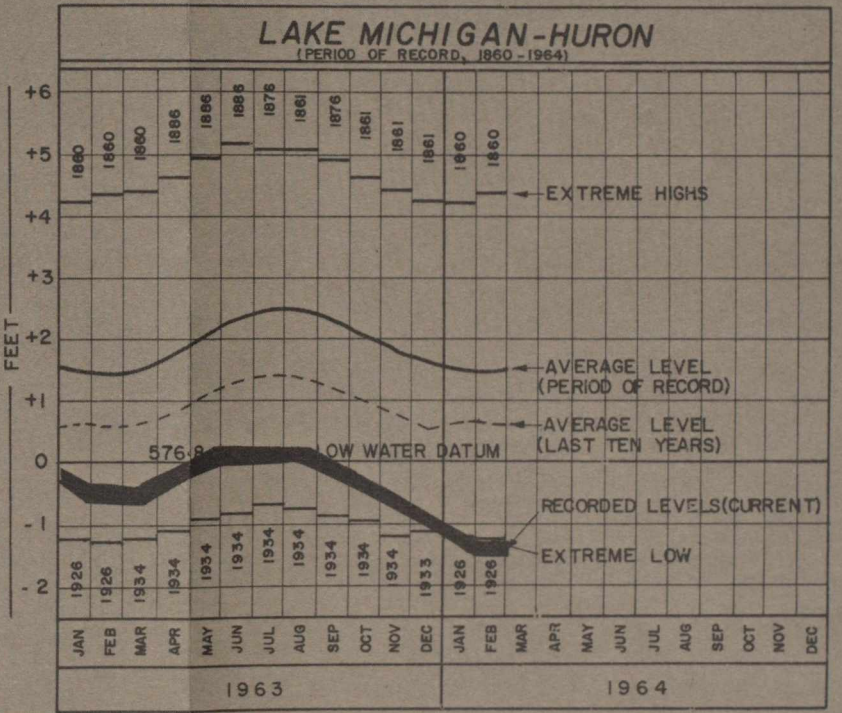
* Attending in capacity of observer.



Present Diversions into the Basin from almost 7,000sq. miles — 5,000 c.f.s.

Proposed controllable Diversion into the Basin from almost 64,000 sq. miles — 75,000 c.f.s.

NOTE: Average flow at Niagara River — 200,000 c.f.s. Present requirement for "New Water" 25,000 c.f.s. Ultimate capacity of GRAND CANAL could be in excess of 100,000 c.f.s. by including other adjacent basins in Ontario and Quebec.



*Since the period of the previous extreme low in 1926, approximately 5,000 c.f.s. has been added from the James Bay Watershed and 7,000 c.f.s. has been reduced from the Chicago withdrawal. Thus, in spite of additional 12,000 c.f.s. we are still moving towards lower lake levels.

HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament

1964-1965

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

MINUTES OF PROCEEDINGS AND EVIDENCE

No. 10

TUESDAY, MARCH 16, 1965

WEDNESDAY, MARCH 24, 1965

Respecting

The subject-matter of the water levels of the Great Lakes system.

Including

THIRD REPORT TO THE HOUSE

WITNESSES:

Dr. G. B. Langford, Director of the Great Lakes Institute, University of Toronto; Mr. Dean Wenborne, President of the French River Resorts Association, French River (Ont.).

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1965

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

Chairman: Mr. Osias Godin

Vice Chairman: Mr. Ian Watson

and Messrs.

Aiken,
Alkenbrack,
Berger,
Danforth,
Davis,
Dinsdale,
Flemming (*Victoria-
Carleton*),
Foy,
Grégoire,
Habel,
Hahn,

Harley,
Herridge,
Laprise,
Leboe,
Leduc,
Legault,
Loney,
Martineau,
McBain,
Mitchell,
Moreau,

Noble,
Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

(Quorum 10)

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

REPORT TO THE HOUSE

WEDNESDAY, March 24, 1965.

The Standing Committee on Mines, Forests and Waters has the honour to present its

THIRD REPORT

1. Pursuant to its Order of Reference of October 2, 1964, your Committee considered the question of water levels of the Great Lakes system.

2. On October 22, 1964, when your Committee first met to consider the said Order of Reference, the following were the members of the Committee: Messrs. Aiken, Alkenbrack, Asselin (*Richmond-Wolfe*), Berger, Danforth, Davis, Dinsdale, Flemming (*Victoria-Carleton*), Godin, Granger, Grégoire, Habel, Harley, Herridge, Laprise, Leboe, Leduc, Legault, Loney, Martineau, McBain, Mitchell, Moreau, Noble, Peters, Rock, Roxburgh, Ryan, Rynard, Scott, Smith, Stenson, Turner, Watson (*Châteauguay-Huntingdon-Laprairie*), Whelan.

During the course of its sittings, Messrs. Hahn and Foy were also appointed to the Committee; Mr. Hahn is at present serving on the Committee.

To prepare its sittings, the Committee appointed a Subcommittee on Agenda and Procedure comprised of Messrs. Godin, Watson, Aiken, Laprise, Leboe, Martineau, Peters and Turner.

3. Your Committee has held 14 meetings to receive information and hear testimony from October 22, 1964, until March 16, 1965.

4. Your Committee heard the following witnesses:

The Honourable Arthur Laing, Minister of Northern Affairs and National Resources

Mr. Max Wershof, Q.C., Assistant Under Secretary of State, Legal Adviser, Department of External Affairs

Mr. Arnold Heeney, Chairman, International Joint Commission

Mr. J. R. Baldwin, Deputy Minister of the Department of Transport

Mr. D. M. Ripley, Chief, Special Projects Branch, Department of Transport

Mr. G. Millar, Chief Engineer, Harbours and Rivers Engineering Branch, Department of Public Works

Mr. T. M. Patterson, Director, Water Resources Branch, Department of Northern Affairs and National Resources

W. E. van Steenburgh, Deputy Minister, Department of Mines and Technical Surveys

Dr. J. M. Harrison, Assistant Deputy Minister, Department of Mines and Technical Surveys

Mr. Ed MacFarlane, President of the Central Georgian Bay Tourist Association

Mr. Albert J. Meserow, Ann Arbor, Michigan, Chairman of the Great Lakes Commission

Mr. D. C. MacCallum, Chairman of the Montreal Port Council

Mr. W. R. Eakin, Member of the Montreal Port Council

- Mr. J. C. Bourguignon, Executive Secretary of the Montreal Port Council
 Mr. Thomas W. Kierans, Consulting Engineer—Mining and Water Resources, Sudbury (Ontario)
 Dr. G. B. Langford, Director of the Great Lakes Institute, University of Toronto
 Mr. Dean Wenborne, President of the French River Resorts Association, French River (Ontario).

5. Your Committee reached the following conclusions and submits the following recommendations:

- (a) There is insufficient co-ordination among the various departments and agencies of the federal government over the regulation of water-flow and water management in the Great Lakes and St. Lawrence River systems.

Recommendation:

Your Committee recommends the federal government consider the immediate establishment of a central agency or authority having the over-all control of water management including water-flow and water measurement.

- (b) The current study by the International Joint Commission of means to extend the regulation of the existing water system on the Great Lakes is of paramount and urgent importance.

Recommendation:

Your Committee recommends the federal government bend every effort to bring about an early report of the International Joint Commission on the feasibility and cost of extending the existing system of controls on the Great Lakes system, particularly at the outlet of Lakes Michigan-Huron.

- (c) A factor in the solution to the problem of maintaining water levels on the Great Lakes and St. Lawrence River systems may be the diversion of northern-flowing rivers in the provinces of Ontario and Quebec back into the Great Lakes system.

Recommendation:

Your Committee recommends that the federal government give immediate consideration to making a preliminary and later a full feasibility study (including costs, benefits and projected needs) of diversions from northern-flowing Quebec and Ontario rivers back into the Great Lakes system; and that the federal government obtain the early consent of Ontario and Quebec to join the federal government in such a study.

- (d) A more immediate solution to the problem of water levels at Montreal Harbour, Lake St. Louis, and possibly on Lake Ontario, may be the construction of down-stream works above or below Montreal.

Recommendation:

Your Committee recommends that the federal government accelerate its current studies of the feasibility of constructing down-stream works above or below Montreal as a short-term and immediate solution to the problem of water levels on the St. Lawrence River and Great Lakes systems.

- (e) There is insufficient information to determine the amount of the loss caused to Canada and the United States by reason of recurring

low water, with particular reference to the tourist and shipping industries and accordingly it is impossible to gauge the benefits that would be derived from a better regulation of water levels on the system.

Recommendation:

Your Committee recommends that the federal government consider instituting a study of the loss to Canada and the United States caused by low water levels and the benefit to be derived by both countries if the water levels were to be maintained on a consistent basis.

- (f) Your Committee was impressed by the evidence given by tourist organizations as to the serious losses incurred by them.

Recommendation:

Your Committee recommends that the federal government give careful consideration to the problems of water access of affected riparian interests.

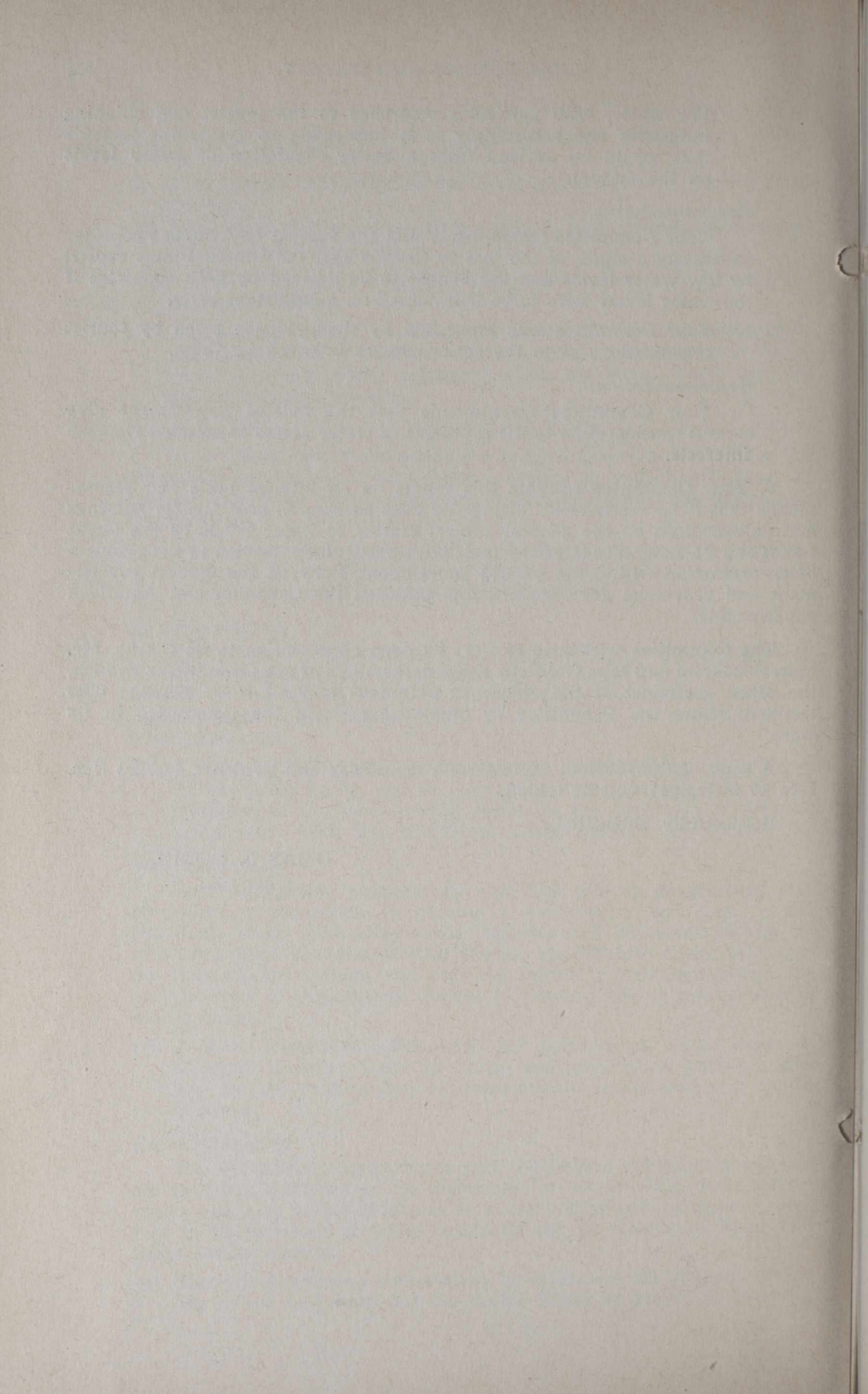
6. Your Committee submits this report on an interim basis and recommends that it be reconvened during the next Session to continue its hearings and deliberations on the general subject matter of water levels of the Great Lakes and St. Lawrence River systems with particular attention to the problem of co-ordination within the federal government, between the federal government and provincial governments, and between the Canadian and American governments.

The Committee wishes to express its deep appreciation to its Clerks, Mr. Marcel Roussin and Miss Gabrielle Savard, members of the Committees Branch, the other personnel of the House of Commons and all those persons who testified before the Committee or otherwise assisted the Committee in its work.

A copy of the relevant Minutes of Proceedings and Evidence (*Issues Nos. 1 to 10 inclusive*) will be tabled.

Respectfully submitted,

OSIAS J. GODIN,
Chairman.



MINUTES OF PROCEEDINGS

TUESDAY, March 16, 1965
(14)

The Standing Committee on Mines, Forests and Waters met at 10:25 a.m. this day. The Chairman, Mr. Osias J. Godin, presided.

Members present: Messrs. Aiken, Dinsdale, Godin, Hahn, Herridge, Leboe, Legault, Loney, Moreau, Rock, Ryan, Rynard, Stenson—(13).

In attendance: Dr. G. B. Langford, Director of the Great Lakes Institute, University of Toronto; Mr. Dean Wenborne, President of the French River Resorts Association, French River (Ont.).

The Chairman introduced Dr. Langford who made a statement on the Great Lakes Institute and on the problems created by the low water level of the Great Lakes.

The witness was examined.

The Committee directed the Chairman to ask Mr. Heeney, Chairman of the International Joint Commission, if there was a report available on the study now being carried on by the Committee.

The Chairman introduced Mr. Dean Wenborne who read a prepared brief already distributed in English to the Members of the Committee.

The witness was questioned.

The Chairman informed the Committee that the next meeting would be on Tuesday, March 23rd when the Draft of the Report to the House prepared by the Subcommittee on Agenda and Procedure would be considered.

It being 12:45 p.m. the Committee adjourned to the call of the Chair.

WEDNESDAY, March 24, 1965
(15)

The Standing Committee on Mines, Forests and Waters met *in camera* at 10:10 a.m. this day. The Chairman, Mr. Osias J. Godin, presided.

Members present: Messrs. Aiken, Alkenbrack, Berger, Dinsdale, Godin, Hahn, Laprise, Leboe, Legault, Loney, McBain, Mitchell, Peters, Rock, Roxburgh, Ryan, Rynard, Turner—(18).

The Chairman referred to correspondence received since the last meeting, and on motion of Mr. Leboe, seconded by Mr. Rock,

Resolved,—That

1. A letter dated March 19, 1965, addressed to the Chairman by Mr. D. G. Chance, Secretary to the International Joint Commission;
2. A letter dated March 17, 1965, addressed to the Chairman by Dr. G. B. Langford, Director of the Great Lakes Institute of the University of Toronto; and

3. A letter dated March 16, 1965, addressed to the Clerk of the Committee by Mr. Thomas W. Kierans,

all three containing information requested by the Committee, be appended to the Minutes of today's meeting (*See Appendices "A", "B" and "C"*).

The Committee considered a draft "Report to the House", regarding the subject-matter of the water levels of the Great Lakes system and made certain amendments.

On page 4, on motion of Mr. Turner, seconded by Mr. Alkenbrack,

Resolved,—That the recommendation should read as follows:

Your Committee recommends that the federal government give careful consideration to the problems of water access of affected riparian interests.

The draft report, as amended was adopted unanimously.

On behalf of the Committee members Mr. Turner, seconded by Mr. Dinsdale, expressed appreciation for the Chairman's ability and fairness and for the very objective and non-partisan way in which the Committee's proceedings had been conducted.

At 11:05 o'clock a.m. the Committee adjourned to the call of the Chair.

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

Appendix "A"

INTERNATIONAL JOINT COMMISSION

OTTAWA 4, March 18, 1965.

Osias Godin, Esq., M.P.,
Chairman,
Standing Committee on Mines,
Forests and Waters,
Room 449 D, Centre Block,
Ottawa, Ontario.

Dear Mr. Godin,

I refer to your telephone conversation of March 18, concerning the possibility of Mr. Heeney appearing before your Committee again.

After speaking to Mr. Heeney he has asked me to say that he has reviewed his statement of October 29 last and has concluded that the International Joint Commission has not reached such a further definitive stage in its investigations as to provide additional information of interest to the Committee.

Yours sincerely,

D. G. Chance,
Secretary.

Appendix "B"

UNIVERSITY OF TORONTO
GREAT LAKES INSTITUTE

TORONTO 5, Canada, March 17, 1965.

Mr. Osias J. Godin, Chairman,
Committee on Mines, Forests and Waters,
House of Commons,
Ottawa, Ontario

Dear Mr. Godin:

In the discussion, both in the Committee and after, I was asked for suggestions on what type of organization might be required to administer the affairs of the Great Lakes, I have given this matter a considerable amount of thought and make bold to offer the following comments.

1. The Great Lakes are such an important part of our national life, are so complex, and are unique, in that they are half in Canada and half in the U.S.A., that they require consideration by themselves and not as part of an existing branch of government.
2. They may be dealt with by a new branch of the Federal Government of Canada with the hope that the U.S. will set up a similar agency and the two can then work together, using the I.J.C. as a referee when the two agencies are unable to agree. Such an agency or branch would have executive power and be directly responsible to the House of Commons. It seems to me that a new Department would best fill this role.
Such a Department could gather together all the scattered bureaus, commissions, etc. that now exist and there would be one Minister who could speak with authority on all aspects of the Great Lakes. I am sure that such a Department could work out satisfactory relations with Ontario and Quebec to overcome the provincial rights problems.
3. Such a Department would be much better than an advisory committee such as the C.C.O. One of the difficulties with such committees is that they have no executive powers and therefore are still at the mercy of the many scattered bureaus, commissions etc. that now exist.
4. I am quite satisfied that any move to change the Boundary Waters Treaty of 1909 would be a long and difficult task. For this reason alone it would seem advisable to let "sleeping dogs lie", the I.J.C. could continue its useful and necessary role of judicial, investigative and arbitral body.

I was happy about the reception which your Committee gave me and wish you the best in your deliberations.

Yours sincerely,

G. B. Langford,
Director.

Appendix "C"

THOMAS W. KIERANS
250 Edmund Street
Sudbury - Ontario

MARCH 16, 1965.

Gabrielle Savard,
Clerk, Parliamentary Committee on Mines, Forests and Waters,
House of Commons,
OTTAWA, Ontario.

Dear Madam:

As requested at the Committee Meeting on March 11th, I am listing below a partial list of publications dealing with future water needs in the U.S.A. from the Great Lakes:

Publications of the Select Committee on National Water Resources U.S. Senate,
—Future Water Requirements for Municipal Use—Committee Print #7.
—Land and Water Potentials and Future Requirements for Water—
Committee Print #12.
—Estimated Water Requirement for Agricultural Purposes and their
effects on Water Supplies—Committee Print #13.

Great Lakes Water Resource Plan.

—Albert J. Meserow—Chairman Great Lakes Commission—Aug. 14,
1963—Speech before American Bar Association, Chicago, Ill.

Water—Scientific American—Sept. 1963—Roger Revelle, Dean of Research,
University of California, President of Committee on: Oceanographic
Research of the International Council of Scientific Unions, etc. etc.

Water Works Engineering April 1961.

"The Great Lakes St. Lawrence Water Resource"—Michael Chevalier—April 10,
1964—University of Pennsylvania.

The Ralph M. Parson Co., Los Angeles—Statement to the Calgary Chamber of
Commerce, Dec. 11, 1964.

Will There Be Enough Water—John C. Maxwell, Chairman, Dept. of Geological
Engineering, Princeton University—Fall 1964—Talk to Princeton
Faculty Alumni Forum.

Great Lakes Water Supply—The Years Ahead—H. W. Poston—Division of
Water Supply and Pollution Control, U.S. Public Health Service,
Chicago, Illinois.

There are many more references with regard to this problem not examined
in detail by this writer.

It seems certain that among other areas of urgently needed research, an
objective study of future Canadian and U.S. Water needs is of great importance
to Canada and should be undertaken with the least possible delay.

Yours very truly,

T. W. Kierans,
Consulting Engineer.

EVIDENCE

TUESDAY, March 16, 1965.

The CHAIRMAN: Gentlemen, you will please come to order. I now see a quorum. To speed up matters I shall be very brief. There is no steering committee report to present. We are fortunate this morning in having as our witness Dr. Langford of Toronto, director of the Great Lakes Institute of the University of Toronto. We have heard his name during the course of our proceedings and I would like him to come up to sit at my right. He may remain seated for his testimony.

Without more ado I must tell the committee that unfortunately Dr. Langford had no time to prepare a written brief. I understand his intention is to let the committee know his views on the problems of water level on the great lakes, and following that I presume members of the committee will be pleased to question him further. It is all yours, Dr. Langford.

Dr. G. B. LANGFORD (*Director of the Great Lakes Institute, University of Toronto*): Mr. Chairman, and members of the committee, I am very pleased to have this opportunity to appear before you this morning. I have read with considerable interest the evidence that has already been presented to this committee and I have been most pleased at the depth at which you are investigating this matter. I am quite sure that your painstaking investigation will show up in your findings.

My evidence this morning will be some views which I have concerning the problems you are dealing with, and perhaps by way of introduction I might state that we do not know nearly as much about these lakes from a scientific point of view as we should.

You may wonder why these lakes here have not been studied ever since the time the settlers first settled around them. The chief reason why they were not studied in detail was that it takes quite a bit of money and ships and gear to do scientific work on a body of water the size of the great lakes.

It was not until the last war that oceanography got great encouragement from the military viewpoint. They developed ships and methods and gear, and now we are transmitting these into the great lakes. So now we have new tools to use. We receive support from governments, and we are virtually engaged in what might be called fresh water oceanography.

The real studies began in the lakes about a decade ago when the Ontario department of lands and forests set up a small unit to support this work. They got the loan of a ship from the Canadian government, the *Port Dauphin*. But after a year or so of operations they decided that this was a pretty expensive business and that it went beyond their requirements as a department. They were very glad to have the university take it over which we did in 1960 when the Great Lakes Institute was established at the University of Toronto. We took over the ship, and the staff. We did find that the operation of a ship like that was quite a chore, so the Department of Transport through its meteorological branch very kindly took over the operation of the ship, for the Great Lakes Institute, and it is now part of the Canadian coastguard, operated by the Department of Transport meteorological branch.

The purpose of the institute is to carry out fresh water oceanographic study, and also to train graduate students, so that they may graduate from our university at Toronto as full time oceanographers.

Although the institute is situated at the university, we co-operate with other universities who want to co-operate with us. Their graduate students can work with us in the summer time and we will employ their staff. The institute just happens to be situated at the University of Toronto, but that does not mean that it is solely interested in the affairs of our university.

My personal interest in the lakes survey started about 20 years ago when I was director of the department of planning and development for the Ontario government. It has continued ever since then, and it has been growing. Now it is my chief occupation at the university to conduct all the affairs of the institute.

The institute over the past few years has worked in co-operation with the University of Michigan, which is the American university most actively interested in great lakes work. We have held a series of conferences, one year at Ann Arbor and another year at Toronto. At the conference last spring in Toronto there was a paper by two of the senior officials of the United States department of public health, and I would like to take your time to read it. It is quite short. This summarizes the situation very simply:

Since the turn of the century, the lakes region has set a rapid pace in economic development, continuously matching, often outstripping all other parts of the countries on both sides of the border.

The great lakes themselves constitute a massive and unique resource, more difficult to understand, to measure and to predict even than our great rivers. Development of the lakes has moved at a slow but now increasing pace. Except perhaps for a few giant visionaries, the generations behind us were not able to foresee present developments. Neither is it likely that we grasp the extent and complexity which future development—physical, economic and social—will assume. Nevertheless, we are committed to a great lakes development program that must look only to immediate wise use but far into the future if we would preserve the rich legacy that is ours in this unique basin.

What shall be our guidelines? Water policy to meet the rapidly changing conditions of our society must, above all, be flexible. A lack of preciseness need not be viewed as weakness: on the contrary, flexibility to meet change is a main strength of our common democratic institutions.

That rather sets the tone of the situation as we see it in the great lakes today. As I pointed out, this is a fast developing area. From the things I have seen, as well as what I have been told by many people, and my own observations, it seems that the great lakes are fast becoming the very industrial heart of North America. There is no other area which has been developing as fast, and the predictions are that it will continue. There are some 30 million people living in the drainage area of the great lakes. And if you break this down, it means that about one third of the population of Canada is located in this area. So the problem of the great lakes is much more than one for Ontario or Quebec. It is a national problem. What happens here is going to affect the whole nation. Therefore I think it is most fitting for a committee such as this of the federal government should be formed to have a very close look at it.

We might ask ourselves why is this so favoured? And there are many reasons. I think the major ones are the great supply of fresh water, transportation, and power. As long as we can maintain these three things, we can maintain the basis of our economic prosperity in Canada. But just let anything happen to them, and we are striking at the very roots of our prosperity.

I would like to point out briefly that things are happening to all three of these factors. We must look at them not as just simply a matter of academic interest, but as of vital interest to our progress as a nation. Others have dis-

cussed the supply of water, and such things as rainfall, precipitation, evaporation, and how the difference between those two is where the water comes from. But in this regard I wish to mention something which has not been very much stressed in the presentations made before you.

How far can we go in predicting these two conditions? If we are ultimately to regulate the flow of water through the lakes, it would be of great help to think that we are doing it with some prediction for a month, two months, or three months, as to what the supply is going to be, so that we may anticipate it by either holding the water back or letting down the excess.

We have been making studies in the Great Lakes Institute in co-operation with the meteorological branch of the evaporation area of the lakes. We think we are getting to the point where we can calculate evaporation with a certain amount of assurance. That is looking backwards. But when we get to know more about it we hope to look forward.

It may seem like a very fanciful term, but as you know, this matter of the forecasting of the weather situation has made great strides in recent years. I am hopeful that if we get to know anything about meteorological conditions on the lakes as they affect evaporation we should be able to make some forecast to guide us in the regulation of the lakes.

These have included changes in the channels and what they have meant, and changes in flow from lake to lake, because this is very important respecting levels. But you have undoubtedly been a little puzzled by the difference in the figures given, depending on whom you asked. I sometimes have a little difficulty understanding why this is so. I think it depends on which school of mathematics a person attended. But one thing of which we can be sure is that the outlet of lake Huron has been enlarged periodically since about 1904, and there is no question about it that when you enlarge the outlet of a lake, more water is going to go down.

I recall reading a book recently "The Tiger of Canada West", in which the author spoke of the difficulty they had in navigating the rapids getting into lake Huron in order to bring loaded canoes up from their home at Goderich. But these have long since gone. This shows the major changes that have taken place.

The situation in lake Huron may be likened to a person in a bathtub. If he takes out the plug and turns off the water, the level is going to go down. This is what happens when you enlarge a channel; and when you are given two or three years of reduced rainfall, with a coincidence of these two things, this causes the waters to go down in a rather disastrous fashion.

I am not greatly interested whether someone sets it at six inches, 11 inches, or 15 inches. All you have to do is to go and look at it and you can see the results. It is most puzzling. I mean the figures that they bring to your attention. They are very, very theoretical, since they depend on the school of mathematics from which a particular calculator may have come, or it may be a result of the I.B.M. machine, which he comes up with.

Now, let us look at what this thing will do to shipping in this country. At a conference held in East Lansing last summer Admiral Hershfield, president of the Lakes Shipping Association in the United States estimated that the loss to the bulk carrier industry fleet, of which there are some 230 units, amounted to \$13 million, and that the loss to our particular companies is over \$13 million in iron ore alone. This is the point. If something happens to our shipping, it is going to affect our economy. There are over 100 shipping ports in the United States on the great lakes alone, and of these 64 are major ones. Most of them are affected by this low water.

A deficiency of one inch means a loss of from 60 to 100 tons in cargo to a carrier. And when a ship makes 40 round trips in a season, you begin to see what is meant.

I got in touch with the president of the Upper Lakes Shipping in Toronto and he gave me these figures yesterday. He made a detailed statement for 30 ships in the fleet of Canadian bulk carriers which had a normal draft of 25 feet or more. He set an arbitrary figure for seasonal loss on them, and he made an estimate for the other ships in the fleet of smaller size. He said it would be approximately \$5 million. He was figuring on one foot of decrease in level. In addition to that, ocean ships could lose a total of \$2,500,000 per season. When you consider that loss to the Canadian economy with the present low water, it means about \$7,500,000 for each foot of reduction in water levels. These figures will emphasize what is happening to our shipping industry with this present loss or reduction of water level on the lakes.

Our tourist industry is suffering as well as our cities. I did not have time to get all the information I wanted, but I was able to get two or three instances. Dominion Foundries at Hamilton have to put in a new water intake, and the city of Toronto has to put in a new pumping plant. Municipalities on lake Ontario have been saying that this winter they have had more difficulty with ice getting into their water intakes than at other times because the water is shallower over the intakes.

The Hydro Electric Power Commission reports that they are spending \$15 million for coal this year to give replacement of power. This is getting to be a rather serious matter. So you can see the basic things. Shipping and power in this area are suffering. Now there is a rather unusual situation which I would like to mention. Lake Superior, as you know, has been regulated since the 1920's. Lake Ontario now has regulatory works in the river at Iroquois for the purpose of maintaining the level in lake Ontario. Why then, we may ask, does lake Ontario suffer from low water? Lake Superior has no regulatory works to keep it between rather narrow limits. But Ontario has regulatory works and is still suffering from low water this year. During February it was within one quarter of an inch from the all time low.

Well, this is due to the policy of operation of the lakes. There I think we have a situation which will appeal to all of us as being somewhat ridiculous. There are two interests which must be maintained by regulatory works at Iroquois: the interests on lake Ontario, and the interests at Montreal. To maintain a proper depth in the harbours in lake Ontario, harbours such as Hamilton and Toronto, you have to hold water back to raise the levels. In order to maintain a proper depth of water in the Montreal harbour, you have to let a great flood of water down through the river, because the only way of controlling the depth in Montreal is to have the river full of water. This is like a seesaw, what is good for Lake Ontario is bad for Montreal and vice versa, particularly in times of low water. Therefore, the commission operating these dams is caught between two conflicting sets of conditions. From my study of the information it seems that they are trying to satisfy two sets of conditions which are quite incompatible. This is a ridiculous situation but is one which is there now and one that needs some regulation.

As one looks at this whole situation and at conditions like those I have mentioned, it becomes quite apparent that what we need is regulation through out the whole system. We have spent hundreds of millions of dollars developing the great lakes as a seaway, the greatest seaway in the world. There is more traffic in eight months going up the Detroit river, which is about the centre point, than going through the Suez and Panama canals combined. We have the greatest seaway in the world and yet we have not finished it. We have built it up and then we stopped and told nature to dictate the terms on which we can use it, and nature is not too co-operative. Although we are suffering from low water and all the ills that go with it, if things run true to form in the next decade, there will be high water and we cannot do anything but sit back and take it. I think there is too great a financial stake in this thing for us to sit back and let this present situation continue.

I would like to bring to your attention two statements made by people whom I consider to be very authoritative. I could make the same statements myself, but you know that a prophet is not without honour, and so on. Sometimes we like to hear what others have to say. With the forbearance of the committee I would like to read some of these statements. They are rather short and I think they are quite appropriate.

Norman F. Billings is the assistant executive secretary of the Michigan Water Resources Commission. He had the following to say at the conference I have mentioned in East Lansing.

Unless artificial controls are devised and effected for lakes Michigan, Huron, St. Clair and Erie there is nothing to indicate that levels won't continue to fluctuate in the future as they have in the past. Although we can hope that the extremes so far experienced, both high and low, mark the ramparts beyond which future deviation will not reach, there is nothing to support that hope.

Unfortunately, there is no assurance whatever that worse is not to come. Worse combinations could occur among the already recorded extremes of causative factors and there is nothing at all to indicate that any of these extremes cannot readily be exceeded. Now we are confronted with two alternatives; we can resign ourselves to living with the problem as best we can, hoping for the best but preparing for worse than has yet happened; or we can take decisive action by seeking such artificial improvements as our science can devise and our economy can bear.

The vice chairman of the Hydro Electric Power Commission of Ontario, at the same conference last summer, made the following statement:

A comprehensive over-all regulation plan, having in mind all interests involved, would confer, however, great benefits and it is considered to be essential for the future.

A man whose judgment I think we must all respect in this matter is the chief of the great lakes hydraulics branch of the U.S. Corps of Engineers. This is a very fine engineering organization and they made a feasibility study of the matter of regulating the great lakes. He made the following statement:

The earlier lake regulation studies had as their primary purpose the improvement of lake levels for navigation. The more recent studies have sought benefits for riparian and hydro-electric interests as well. Benefit to riparian interests would result from a reduction of high lake levels, which would reduce damage to shore property from wave erosion and inundation. Benefit to navigation would result from a raising of low lake levels, which would increase navigable depths. Raising low levels would benefit recreational boating also. Power would be benefited, if the minimum lake outflows were increased, particularly if dependable flows were increased during the high-load months of the year.

To accomplish in some measure the several purposes of lake regulation, two facilities must be provided in the outlet river of the lake to be regulated. First the discharge capacity of the outlet must be increased, so that, at times, larger releases of water from the lake than would occur without regulation can be made in order to reduce high levels. This requires channel enlargements in the outlet river. Second a gated control structure must be provided, so that, at other times, smaller releases than without regulation can be made in order to raise the low levels.

From an engineering standpoint, these lakes could be regulated to reduce the extremes of stage that have been experienced.

There is one other quotation along this line which I consider to be quite appropriate. It appeared in a pamphlet put out by the water resources branch of the Department of Northern Affairs and National Resources. You have probably all seen it. I therefore presume it has the sanction of the minister and his senior staff. In case you have forgotten it, I will quote it to you as follows:

A third possible solution is regulation of all the lakes. Two only of the four great lakes are regulated now. We should study what might be done with the natural supplies through co-ordinated regulation of the four lakes before adding water to the system.

This proposal is being considered by the federal governments of Canada and the United States. If the technical problems can be solved this would enable larger amounts of storage to be set aside at the beginning of dry periods to maintain flows through times of low lake levels and water shortage. One of the most difficult problems would be the development of improved long-term weather forecasts.

That is the opinion of our own federal government in this matter.

There is another point that comes to my mind at this point. We all realize that the study of water levels has been referred to the International Joint Commission. According to their traditional method of operating they have set up an advisory board consisting of three members in Canada and three in the United States. This advisory board has started out in the traditional and time-consuming method by holding meetings where people can tell them all about these things. I would like to point out that the three members on the board in Canada are three senior civil servants. The man whose department is responsible for the quotation I just cited is the chairman of the committee. Another member is from the Department of Transport, and a third one, I believe, is from the Department of Northern Affairs and National Resources. These are the men whose departments should know all about water levels from beginning to end; they are the ones who should have been able to advise us that the policy of deepening the river without putting in some sort of compensatory work was a bad policy. They have been set up to pass judgment on their own sins of omission. It seems rather stupid. The head of the committee has already committed himself on what he thinks of this, and still they are going to waste a year to talk, talk, talk.

There are other problems regarding the lakes which I should like to mention to you. I think that some of them have a very definite bearing on the work of this committee. I noticed that you did deal shortly at one of your meetings with pollution. Although that is a problem that I think is much more serious than water levels, I suppose it will be the next matter that this committee will deal with.

You may think I am reading you a lot of quotations, but there is one here which will cover the whole situation as scientists see it. It is a quotation of Mr. Kehr with whom we worked closely. Mr. Kehr is from the United States public health service. I think he has a story here which will be of considerable interest to the committee. The quotation is as follows:

The quality of great lakes water, although undergoing inexorable deterioration, is on the whole, still very good. Protection of that quality poses the number one problem in wise management of the resource. Without such protection, the incalculable value of the lakes can be destroyed. Warning signals are already out in many areas—and water quality must not be taken for granted. Corrective and preventative measures, both immediate and long-range, are needed. We need to know a great deal more about the physical, biological and limnological aspects of this aquatic environment . . .

In the meantime, those actions for which the need is already clearly indicated should be taken. These actions need not and should not await the acquisition of knowledge from further research and study.

Finally, it is not our intention to sound a cry of doom: the problem can be approached with optimism. But it must not be viewed with complacency.

There are other problems. I hope, Mr. Chairman, that I am not getting away from the topic with which you are most concerned, but I think the following has a very important bearing on it. Anything we do in the lake to control the level or pollution or anything else comes back to the jurisdictions that are involved. This, it seems to me, is a problem which I would like, with your permission, to put before you briefly because you are the people who make the laws and decide what these jurisdictions are.

The CHAIRMAN: That is certainly in order.

Dr. LANGFORD: A recent article written by Dr. Berry, the former managing director of the Ontario Water Resources Commission, estimated that, dealing with the lakes, at the federal, provincial, state and municipal level, there are some 200 different agencies all with a finger in the pie, or a finger in the lakes. This gives you some idea of the complexity of this problem. In the government at Ottawa there are eight departments all of which have some responsibility in regard to the lakes. In those departments there is a multiplicity of agencies and commissions, which, according to my figures, add up to about 40. I find great difficulty when I come to Ottawa to try and get funds for the Great Lakes Institute. I go from one door to another. The people I talk to are honestly concerned and recognize my problems and believe in them, but they say "unfortunately we have not got the jurisdiction to support you". I have worn a path round here in Ottawa, and it is always the same story. It is not that they give us the brush-off; I have known many of these people for many years, but they just do not have the jurisdiction to act. The only agency which can give out money for work such as ours is the national research council.

We in our province with the great lakes must compete with everything seesaw between the federal and the provincial right, If you think of the great national resource, the greatest problem we have on our doorstep. In Ontario we have at least six departments having to do with the great lakes. There is the seesaw between the federal and the provincial right. If you think of the great lakes from the point of view of natural resources, water, then it is the provincial responsibility. If you think of it from the point of view of navigation, then it is the federal responsibility. If you think of power it is the provincial responsibility, and so it goes. There is much interference up and down the line. I suppose the same thing exists down river in Quebec, but I do not know the details there. However, the same thing exists in the eight states bordering on the lakes on the south side. So, as you see, there is a terrific tangle here.

Those of us who are trying to do something in this area have realized this. I find that we can do more unofficially than officially. What little success we have had has been achieved quite unofficially and, I suppose, quite illegally, but it has got results. A good example of this was when we realized, a few years ago, that the United States people were investigating the lakes and doing a lot of work here. We were also doing a lot of work there. They wanted to do work in Canadian waters and we wanted to do work in the United States waters. What authority do we have for sending research ships and gear and so on, putting out buoys in the other fellow's water? We had two or three meetings, when we realized the importance of the situation, and we established a completely informal group known as the great lakes study group. On the United States side there is the United States Corps of Engineers, the United States public health, the United States weather office and the University of

Michigan, as well as other agencies of that nature. They have their counterparts in this country. We meet informally twice a year. We have no constitution; we have no authority; we have no money, but the will of the people to get a job done as well as to prevent duplication and to see that there is proper coverage and that we know what the other fellow is doing. This has worked very well. The United States Corps of Engineers has undertaken to establish, and they have established at the lake survey station in Detroit, a repository. Everybody doing research on the lake files a statement of what he is doing and all the resources and so on. This is filed with them and then it is distributed. Everyone working on the lakes therefore knows what everyone else is doing. They are also setting up a repository for all the data collected so that anyone wishing to do work on the lakes can go there and find out what has been done. This is the sort of thing we are doing.

Last summer the public health service was short of ships and they wanted to put out 20 buoys with instruments on them on lake Erie. Our ship was there, so we put them out for them, in return for which they lent us certain gear which we still have. This is the way we are co-operating. This is done at a completely informal level. Already this year there have been two meetings held between civil servants in Ottawa and civil servants in Toronto to try and see what can be done to work out some means of co-operation at the scientific and administrative level on these matters. I think this is one of the things that does need straightening out. It is now quite apparent that what we need in Ontario is a strong provincial committee which would bring together all the interests and which can act in an advisory capacity to the provincial government. It would look very much as though the same thing were needed here in Ottawa. There is one such committee now, the committee on oceanography which advises the government on all matters having to do with oceanography. It is a very strong committee made up of senior members of the civil service here. It is very effective, and it is an advisory committee. A similar body having to do with the great lakes, I think, would be very productive of results.

There is a large field regarding jurisdiction which has to be unscrambled because, although the informal arrangements work up to a point, sooner or later you are going to get to a position where you have to stand up and be declared, and you will find you have nothing to declare because you have been working *sub rosa* getting things done; I admit it.

I think that is the sum and substance of the remarks which I had to make, Mr. Chairman.

The CHAIRMAN: Thank you very much. We now come to the other phase, Dr. Langford, when the members may wish to ask questions to enlighten them on some of your remarks and references.

I have on my list Mr. Rock, Mr. Aiken and Mr. Hahn.

Mr. ROCK: Mr. Langford, you have made certain claims. You said the main reason for the low water level was the enlargement of the channel. Of course, you did state, but in a soft voice, that lack of rainfall was also a reason for this situation. You did not emphasize the lack of rainfall, but you rather emphasized the usage and the drainage of the water. You put a great deal of the blame on the enlargement of the channel. You also made serious charges against the port of Montreal, putting a lot of the blame on them. You said that the need for water at the port of Montreal acted as a see-saw with the need of the power authorities in Ontario.

I would like to know whether you have any details which would substantiate your claims in this regard. In other words, where is it that they draw this water so fast? What gates do they open to feed the port of Montreal for this purpose?

Mr. AIKEN: Mr. Chairman, I am sure Dr. Langford can meet the request, but I think Mr. Rock really overstates what Dr. Langford said. I did not hear any charges.

Mr. ROCK: If you want to change the word "charge" to "claim" I will be satisfied. However, I come from the area of the island of Montreal and you come from an area west of that, the lake area and—

The CHAIRMAN: Mr. Rock, this is not—

Mr. ROCK: I see nothing wrong with the question.

The CHAIRMAN: This was not a point of order, of course. The member has phrased his question and I am sure Dr. Langford will be able to give a satisfactory answer.

Mr. LANGFORD: There were two or three parts to the question. The first part of the question asked about the effect of deepening the channel out of lake Huron.

I emphasized the fact that the channel deepening had been important for the reason that in this regard man has interfered. Man has not been able to interfere with the supply of water; that is what nature has done. Man has interfered by way of the channel deepening. If I seemed to emphasize it, it is because this is something for which we as human beings are responsible. I realize that the shortage of rainfall has been with us for two or three years, and this is a coincidence. The two happened at the same time.

What was the second part of your question?

Mr. ROCK: I would like you to substantiate your claim about Montreal. You mentioned the see-sawing between the requirements of the power authorities of Ottawa and the demand for water in the port of Montreal. What I would like you to do is to substantiate your claim and state what gates are opened in order for Montreal to draw so much water.

Mr. LANGFORD: The gates at Iroquois. The dam at Iroquois was largely put in for the regulation of levels in Ontario.

Mr. ROCK: Is there a power project there too?

Mr. LANGFORD: No, the power project is below that.

Mr. ROCK: How many gates are open at the power project below Iroquois? It would be Cornwall where you have the Ontario Hydro power project?

Mr. LANGFORD: I do not know the number of gates, but I know the flow has been running at about 200,000 c.f.s.

Mr. ROCK: Are the gates open or do they go through the turbines?

Mr. LANGFORD: I imagine they mostly got through the turbines because the turbines are short of water. The dams which regulate lake Ontario are at Iroquois and there is a lock at Iroquois. Most of the time ships go through that lock without the gates being closed. In other words, the water on both sides of the dam is at the same elevation, so they are not holding back any water at the dam at Iroquois; they were letting the whole river flow through.

Mr. ROCK: I took it from the way in which you made your statement that the whole blame should be placed on the port of Montreal. I do not like this. I think we should put some of the blame on the Ontario Hydro authorities because they badly want that water from lake Ontario to draw water for their projects. They are short of water and they are taking this water as fast as the port of Montreal is receiving it.

Mr. LANGFORD: I think I must have been misunderstood. I was not trying to attach blame to anyone. I was just stating the situation as it exists and saying how ridiculous it is to have two controls on opposite sides which are diametrically opposed. It is impossible to do it effectively. This is the point I was trying to make.

Mr. Rock: The port of Montreal has as much water there as the lakes of Michigan and Huron. I have a summer home on lake St. Francis which is not too far from Beauharnois. The maintenance of the level there usually fluctuates about eight inches, depending upon the amount of the draw of water for the power of that area. In years gone by there used to be three to four gates open wide at the dam at Valleyfield. In the past three years this has practically been shut off and only one gate has been opened—and that only a little—to let a certain amount of water out, because they must have a certain amount of water at that part of the river. Most of the water goes through the power project of Beauharnois and hardly any of it is let out to the port of Montreal. Therefore, I do not understand why my confrere, Mr. Cowan, has stated in the newspapers a few times that we have such low water levels just to satisfy the port of Montreal. I want to make the statement that I do not think this is actually true.

Mr. COWAN: You do not know what you are talking about.

Mr. ROCK: I live in the area, and I know that there is just as much shortage of water in lake St. Louis as there is in the two large upper lakes, Huron and Michigan. Therefore the same situation arises.

I believe the trouble has been caused by the lack of rainfall.

I wanted to bring out this point because I thought you had implied in your statement that the shortage was caused by the requirements of the port of Montreal, and I wanted to show by this statement that such is not actually the fact.

Mr. LANGFORD: When dealing with the port of Montreal, there is another point that should not be overlooked. At present, they are suffering from low water; everyone knows that. They had difficulty last year in maintaining a 35 foot draft. At the same time as they had that difficulty, there was difficulty in lake Ontario. You cannot satisfy both under present conditions, and this must be faced.

With the changes that are being made in the profile of the river in connection with Expo '67, what is going to happen when there is excess rain? You will be flooded out. This has not been given proper consideration either, in my opinion.

Mr. Rock: What type of body do you suggest should be organized within the federal jurisdiction to embrace the provincial authorities and the authorities of the United States?

Mr. LANGFORD: It is a rather large order. I did not come prepared to make a specific recommendation.

Mr. Rock: You can understand that our questions are put to you so you may help us to find answers to incorporate in a report which we must submit to parliament in this regard. I think it is interesting to have suggestions from people such as you.

Mr. LANGFORD: Perhaps the International Joint Commission should be the agency. If the act that set it up—the boundary waters treaty—is modified or if the rules of procedure for the International Joint Commission could be changed, I think this would be the best agency. It must be an international agency. As you all know, it is very difficult to start from scratch to work out a whole new international treaty. I think it would be easier to amend what we have.

The International Joint Commission has established an outstanding reputation, and it is accepted on both sides of the line. Books that I have read have greatly praised the commission for what it has done. It is an example to the rest of the world of co-operation in matters of this sort. I think this should perhaps be strengthened and changed to fit the new conditions. Do not forget, it was set up in 1909 and things have progressed and conditions have changed greatly since then.

I suggest we should perhaps look at the boundary waters treaty and the clauses affecting the organization of the International Joint Commission to see if it cannot be brought up to date. This is the one thing that has been in my mind on several occasions in this regard.

Mr. Rock: I have just two more questions.

Let us suppose that during years gone by when we had the fluctuation of low and high water, lake Huron and lake Michigan had been dammed in the same manner as lake Ontario and in the same manner as, years ago, lake Superior. Would we have the same serious condition today in the port of Montreal and in lake Ontario if these two lakes had been dammed years ago?

Mr. LANGFORD: I quoted a statement made by Mr. Lawhead, the chief engineer of the Hydraulics Division of the Corps of Engineers. One page of his report that I did not read pointed out that for the regulation of the lakes not only would you need gated structures to hold back the water in times such as the present, but you would also need enlarged channels to pass more water through in times of excess. He told me personally, though he could not state it officially, that one has to think in terms of a billion dollars for his job because one has to create channelways for more water. The water has to go right down the river; it cannot be stopped at lake Ontario. The water has to go to Montreal and right out to tide water.

In existing conditions we are wasting 200,000 cubic feet of water per second; this is going down to the sea although it is needed in Montreal to maintain the water levels there.

My thought is that the port of Montreal should establish a situation in which the water levels there would be independent of this great flow in the river so they can be established and maintained at what is required, irrespective of whether 300,000 c.f.s. or 100,000 c.f.s. is going past Montreal.

As you know, in the present situation the only way in which the levels can be maintained is to push over to the left bank some of this great volume of water which is rushing down. This is the only way to maintain the level at Montreal now. I do not think it is sound to waste that amount of water. I think there must be a dike structure, and perhaps gates at Montreal harbour, and locks for the ships.

I know there are certain people who raise their hands in holy horror at the thought of such a thing, but I would simply refer them to the fact that in the port of London, at the King George V docks and the East India docks, there are gates and ships can only get in and out at high tide. This does not seem to have worked to disadvantage in the port of London. If the facilities are sufficient in the harbour and the locks are of such a type that ships can get in and out easily, the ships will go to the port.

Mr. Rock: The statement you have just made is very important.

My last question concerns the idea of converting water from James bay to our lakes system. Have you any comment to make in this regard?

Mr. LANGFORD: I have heard Mr. Kierans explain his story at great length, and it is very interesting. But I do not think it is necessary. That is something for the next generation. In the great lakes we still have the largest reserve of fresh water in the world. We do not need to add to it. We need to use what is there and not waste it. We have plenty of water for our generation. When it comes to the year 2000 and after, then they can see about bringing in water from our northern slopes and exporting it to the United States.

We in Canada have one fifth of the fresh water in the world. We have a very small population compared to the rest of the world. Therefore, we have a great national resource which we may be called upon to export to the United States, but for the purposes of our generation, we do not need to bring in this extra water. Let us use the water that is there, this 200,000 cubic feet of water per second which goes through the harbour of Montreal.

I am not being critical when I say that in 24 hours enough water goes by the port of Montreal to satisfy all the municipalities in Ontario for a year. That is the rate at which it is going to waste. If Montreal could have its levels protected by other means and if that amount of water could be kept for other purposes, there would be plenty. But the water is being used improperly.

Mr. ROCK: The first part of the first question I asked was not answered directly. If the two large lakes that are not dammed, Michigan and Huron—

Mr. LANGFORD: And Erie.

Mr. ROCK: —had been dammed, we would be in the same serious situation today, would we?

Mr. LANGFORD: No, because a percentage of this water that has been going down the river all the time would be going down the lakes. The people who would suffer would be the power interests, because there would not be as much rushing through. But we only have to refer to the treaty of 1909 to see the priorities. The first priority is domestic, the second is navigation and the third is power. The treaty also states very definitely that the following order of precedence shall be observed among the various uses enumerated and no use shall be permitted which tends to conflict or restrain any other use which is given preference.

So the power people suffer because there is not much going through. I think the navigation and the domestic users must be given the preference to which the treaty entitles them.

Mr. AIKEN: Dr. Langford, Mr. Rock has touched on a point that I want to raise. Perhaps we may go into it a little more deeply.

You feel, I gather, that a regulation system could be established to maintain lake levels through normal periods, and even somewhat abnormal periods, without additional flows of water.

Mr. LANGFORD: Yes, I do.

Mr. AIKEN: Would there be any substantial shipping blockage in such a system? One of the objections that is raised is that if you put in locks you slow up the shipping and interfere otherwise with the purpose of the great lakes system. Would it be a major factor?

Mr. LANGFORD: Not if your locks are large enough and efficient enough. It is the delay to which the shipping people object. If you have to tie up a ship for a day while it is waiting to get through a lock it may cost \$300 or \$400; but if it is only for a few hours, this is no more than the time frequently wasted in turn-arounds in a port. I think this is the answer: if the locks are large enough and can handle the shipping efficiently, the ships will use them.

Mr. AIKEN: I have heard the suggestion made that part of such a regulation system might be the installation of some works below Montreal, which would slow down this outrush of which you speak. Have you heard of any feasibility study of a project which would slow down the outrush from the whole system?

Mr. LANGFORD: No, I have heard it mentioned by hydraulic engineers that there would have to be works in the river below Montreal, but they will open up weirs to divert the water into a central channel rather than locks, so you would always be assured of a sufficient depth in the centre channel and get over the problems we now have in Montreal with low water and the constant dredging that is required.

Mr. AIKEN: I wonder if you could tell me whether the United States Corps of Engineers or the International Joint Commission, or anyone with whom you have had contact, are giving any thought to an immediate project at the outlet of lake Huron? We keep hearing about it all the time. Some say

that this would be a temporary relief, while others say, of course, that it would merely create greater problems downstream.

Mr. LANGFORD: The corps of engineers, I understand, are making model studies of the situation in the outlet of lake Huron, and they are trying to experiment to see what sort of submerged dam or weirs would be required to compensate for the excavation that has been taking place since 1960. The flow of a river is a function of the cross sectional area; and when you have excavated the bottom you increase that area so that more water can go through. So they put in works to increase that cross sectional area from what it was originally.

What is going to happen when you have excess water and you have no control over it? That is the problem. Now we have no control over that situation. That is why the law recommended that there would have to be a gated construction to hold back the water in large channels and to let through more if need be. So present plans are very much in a formative stage at the present time. They are still making model studies.

Mr. AIKEN: We had the Canadian member of the International Joint Commission before the committee last fall when we rather got the impression that there would be some preliminary report furnished by now. Actually we have heard nothing. We rather take it from your observations that you do not feel they are proceeding with the dispatch that they might.

Mr. LANGFORD: Do you refer to the corps of engineers?

Mr. AIKEN: No. I refer to the International Joint Commission.

Mr. LANGFORD: Well, to my knowledge the Canadian board has held one closed meeting at Toronto, and another meeting in the United States. But they were closed meetings with just invited organizations. They have been talking about more closed meetings and more open meetings, so it will be some time before they get around to finish their task.

Mr. AIKEN: We cannot expect very much in this navigation season.

Mr. LANGFORD: Or the next, I am afraid.

Mr. AIKEN: Dr. Langford, that brings me to another subject. I felt from the first part of your remarks that the International Joint Commission was not moving with dispatch, and yet in answer to Mr. Rock's second question you said you felt it was really the only body. I recognize that here again there are two conflicting principles. One is the tremendous job it would be to build up another organization, and the other is the fact of getting the International Joint Commission moving.

Do you think that if the International Joint Commission were given a specific job, as a specific group they could do the co-ordinating of all these 200 agencies, and would they take any advice from these agencies, or would they be a law unto themselves, as they have been?

Mr. LANGFORD: When I have pipe dreams of the situation I sometimes think that we shall have to form a new principality in the great lakes. Policing is the great problem, and the regulation of waters having to do with it. For instance, if a ship is going down the lakes and it decides it wants to clean out its oil tanks and pump out its sludge, in many cases it may do so.

If they are spotted by an American aircraft, they claim that they are in Canadian waters, and vice versa. This makes it impossible to enforce regulations. Every jurisdiction on the lakes has its own idea of pollution and control of the use of the waters. There has been very little done in trying to get uniformity. You know what this means when it comes to administration, and you have all the various police agencies. Whether the International Joint Commission could do this, I do not know.

Mr. AIKEN: This is really beyond their normal and accepted jurisdiction.

Mr. LANGFORD: Oh, yes, it is far beyond anything expected of them in the first instance.

Mr. AIKEN: Would you feel that the magnitude of the problem of the great lakes as an international problem would justify the creation of a new body to which both federal, provincial, and state governments might delegate some authority at least to co-ordinate the whole problem of the great lakes? Is there enough there to justify such a move?

Mr. LANGFORD: I must admit that this is getting into a realm in which I have had very limited experience. But I do know that the Canadian Institute of International Affairs has become very much interested, and they are setting up a group of lawyers and people of experience in that line to study this particular problem. I have been assisting them in any way that I could. I think they could give you a far more reasonable answer than I could, since I am not a lawyer.

Mr. AIKEN: Thank you, Dr. Langford. I know there are many others who wish to ask you questions.

The CHAIRMAN: Now, Mr. Hahn, you are next.

Mr. HAHN: I just want to look at one phase of the problem of regulation, recognizing that many other problems exist. You feel without a lot of hearings and further work that the problem has been closely identified now so that we could proceed to start planning regulatory works which would be of definite benefit?

Mr. LANGFORD: I have not always been at a university. I have been in industry for many years, with a big mining company, and I really know what the procedure is. However, if I were in a mining company and met with this problem I would say that we now have enough information and that we should get on with the job.

Mr. HAHN: As I understand your thesis, you would put in regulatory works which would protect Montreal, and you would put in regulatory works which would protect lakes Michigan and Huron, and they could be designed to stop the water up at times of low water, and open it wide to cope with flood conditions, and by this means we could control within reasonable limits the level of the whole system.

Mr. LANGFORD: Yes, but that is not my thought. This is what the law hopes, and those who speak with some authority.

Mr. HAHN: You also indicated that in order to achieve this at times of low water we would have to pay the penalty of reduced flows through the system, hence the loss of power. But you cannot have everything.

Mr. LANGFORD: That is right.

Mr. HAHN: We have been given the information that it takes a very long time for the factor of lake precipitation or increased evaporation to spread itself throughout the lakes. Do we have information available to us now which would enable a reasonable response to these factors? Can we determine, or can we in fact achieve, reasonably close controls?

Mr. LANGFORD: It is pretty well understood that it takes from two and one half to three years for releases from lake Superior to be effective at Montreal, with corresponding lesser time respecting the other lakes. This is why I am very anxious to see it pushed vigorously. It is a matter of being able to predict these supplies. So let us hope that six months in advance we can say that we are going to have an excess of water to deal with on lake Huron, so that the people in charge of the regulatory works may start letting water down. It is only when these two things have been maintained that we can at any time co-ordinate our works with the forecast.

Mr. HAHN: If we do not make any improvement in this area would the works still be able to cope with future problems at flood time?

Mr. LANGFORD: The fact that they are going to put in channels to allow the passage of more water than at the present time means that if lake Huron returns to a build-up, you can pass much more water than you can at the present time. This means that they should be able to relieve high water.

Mr. HAHN: You do think we have enough information about the actual changes taking place from day to day in lake levels so that we could with works regulate the levels, and not store up great amounts of flood water which suddenly would be causing reverse problems lower down?

Mr. LANGFORD: Yes. It is my understanding that they can handle these. That is what the hydraulic engineers say.

Mr. HAHN: I have one final point. If we were to establish a series of works such as we have been talking about, would those works preclude us at a future date, do you think, from bringing extra water into the lakes should this ever become desirable? In other words, would regulatory works established now, make it impossible 50 years from now to put in the Grand Canal scheme if such a scheme were thought desirable?

Mr. LANGFORD: I did not bring my crystal ball with me. That is rather a difficult question to answer. My thought about the Grand Canal and similar things like that is to export water to the states so that the amount of water which is brought in would be taken out and put down the Ohio, or the Mississippi or on whatever river it is needed, and would not remain in the great lakes, because I still think there is enough water in the great lakes.

Mr. HAHN: So we would just add water to the system as additional outlets for it were found.

Mr. LANGFORD: We would add water on a cost basis.

Mr. HAHN: Thank you.

The CHAIRMAN: Now, Mr. Rynard.

Mr. RYNARD: I am a little confused between Mr. Rock and some of the arguments that have gone on. You say that navigation is the control, or that it gets the first call over power.

Mr. LANGFORD: That is according to the Boundary Waters Treaty Act.

Mr. RYNARD: If this is true, the port of Montreal will draw from Ontario and lower the water there. How do they run this seesaw, if this is true?

Mr. LANGFORD: They try their best to get a compromise between the two. Now, the interests in Montreal that are affected are the shipping interests, and the interests on lake Ontario which are affected are also the shipping interests. If they try to satisfy both and cut between them, there are the power interests who want as much water going down as possible. But I think the primary concern must be according to the treaty, that navigation gets the first consideration.

Mr. RYNARD: Therefore, the port of Montreal would get first consideration, because the shipping companies would demand control.

Mr. LANGFORD: You must not overlook the fact that shipping in lake Ontario is also a factor, with ports at Hamilton, Toronto, Oshawa, and so on.

Mr. RYNARD: Yes, but it would be much greater at the port of Montreal because there you have 35 feet of water. How much water do you have at Toronto?

Mr. LANGFORD: Twenty-seven feet is the draft throughout the great lakes system. Ships require about 28 feet of depth to operate there. Montreal has sea-going ships, such as the Canadian Pacific liners which require an excessive draft over anything used in the upper lakes.

Mr. RYNARD: In other words, the St. Lawrence seaway is not big enough now to take those ocean going vessels.

Mr. LANGFORD: No.

Mr. RYNARD: So more and more the St. Lawrence seaway becomes obsolete for the carrying of ocean-going vessels as ocean-going vessels get bigger and bigger.

Mr. LANGFORD: You are getting into the logistics of shipping which is something with which I am not familiar.

Mr. RYNARD: The trend today is to build bigger ships and to cut down your labour costs. Is that not right?

Mr. LANGFORD: Of course ships which are carrying great bulk cargoes from one port to another is one thing, but where you have them carrying lesser amounts and distributing it at several points, they do not want the same great bulk carriers. They want smaller ones.

Mr. RYNARD: Your cost is greater than it was.

Mr. LANGFORD: You have to be competitive. Your draft is to a great degree the ruling factor. We have two types coming up river, the bulk carriers such as the iron ore boats from Seven Islands, and the package freighters. The iron ore boats are ships built for lake work. I refer to the great ore carriers and the wheat boats which are used for inland shipping. It is my understanding gained from the shipping companies that you could not use them for ocean traffic, because the longer ocean waves would break those ships in half.

Mr. RYNARD: Therefore, as our economy grows you will have more great lakes shipping and less ocean going vessels in our great lakes. That would be logical, would it not?

Mr. LANGFORD: It may mean a greater increase in transshipment at Montreal, because it is more efficient to use bigger ships in the lakes. Operations at the port of Montreal should expand along with the seaway. It should not be thought of as being opposed.

Mr. RYNARD: That is the point I wanted to make. And my second point is this. We could control this rate if we put in something to stop the water at the port of Montreal.

Mr. LANGFORD: The first thing is to give Montreal the depth of water she requires having regard to the flow on the river.

Mr. RYNARD: Do you mean by putting in locks?

Mr. LANGFORD: Yes.

Mr. RYNARD: Why was this not thought of before? They have a weir on the north branch of the river.

Mr. LANGFORD: It has been thought of before, but I have heard various agencies in the government condemn it very bitterly because they said that the ships would not use it.

Mr. RYNARD: Why?

Mr. LANGFORD: This I cannot understand, because ships elsewhere in the world use them, such as in England and in western Europe where many harbours are locked.

The CHAIRMAN: Now, Mr. Dinsdale.

Mr. DINSDALE: I am interested in the respective claims of Ontario and Quebec in this problem. I have been interested in the confident manner in which you indicated you felt there is sufficient information to deal with this and to meet the problems of the great lakes water level by means of regulation. Now, at another point in your testimony you also indicated that we have very little information concerning the meteorological aspects of the problem.

Is it true that evaporation for example, in a particularly warm year could account for two thirds of the loss of precipitation on the great lakes.

Mr. LANGFORD: Our studies have indicated that on lake Ontario normal evaporation will take off 30 inches of water from that lake. We do not think this is unusual. So if you get the functioning of these meteorological effects, it can be seen that it will take several inches away in one year on one lake.

Mr. DINSDALE: With variations in climatic conditions, how would it be possible to regulate the great lakes system adequately and satisfactorily with the present limited meteorological knowledge?

Mr. LANGFORD: Well, we do know that in the past there has been a natural regulation, and we do know the limit of it over the 100 years when there have been records kept of it, and we know that it has never gone beyond the large side or the low side. So we can set them as our targets. Having structures working to hold back the water at this time, having enlarged the channels, so we can let down water at the high stage. So it is a matter of modifying the limits under which nature has allowed fluctuation in the past, by enlarging the channels at certain times and restricting them at others, so that we can improve on the regulatory devices of nature. But we do so as we want it done, not as nature dictates.

Mr. DINSDALE: How long would it take high water to go through the great lakes system. Is it a matter of months or years?

Mr. LANGFORD: It is a matter of two or three years from lake Superior to Montreal. If you permit a big release at lake Superior, it may not become effective until three years later at Montreal.

Mr. DINSDALE: This involves a pretty complex system of regulation.

Mr. LANGFORD: It would, but if we enlarge the channels we can handle more water all the way through. Let us say that there is high water on the lakes, and if we pass more water through, it would drown Montreal. That is the limiting factor. They must enlarge the channel at Montreal so that more water can be handled out of there; and in a period of low water Montreal would not suffer because it would have a gated structure to preserve its harbour levels, and what they want, irrespective of the flow of the river. But having larger channels to pass the water out is just as important as having restrictive channels to hold the water back. That is the basis of successful control.

Mr. DINSDALE: The point has been made before the committee that control of lake Huron could handle a big part of the problem, inasmuch as all this seems to be reflected right down the system.

Mr. LANGFORD: It would handle most of the problems, but we must take advantage of the storage facilities of each lake which relates to the area. If we only had controls in Huron, Michigan, we would have no way of equalizing that over lake Erie so as to make full use of the storage capacity of the area of Erie and Ontario. This is the way of alleviating the problem. Last summer there was an excess of rain in lake Superior. That is why they were able to let down this great excess of water from lake Superior. It came down and spread out of lake Huron, and it did not amount to anything material in the way of raising the level. This just shows you how the situation on lake Superior was alleviated by using the storage capacity in the next lake down. This can be handled all the way down, except in lake Ontario which cannot be relieved by any storage capacity down river because there is none.

Mr. DINSDALE: In the light of the information you already have on this system what would be your order of priorities in the regulatory measures dealing with these immediate problems?

Mr. LANGFORD: I think we would have to forget about the immediate problem because no matter how quickly we start it, it would be several years

before we have any effective operation. We hope nature will look after that, but we must take a long term view that we want this great waterway of ours to continue to be the greatest waterway in the world. The essential purpose is at all times to guarantee to ships from all of the world as well as to local ships that they will have the depth of water which they require, and that they can move through there with their maximum cargoes without any danger of scraping the bottom.

Mr. DINSDALE: What control measures do you think should be tackled first, the controls in the Montreal harbour or on lakes Michigan and Huron?

Mr. LANGFORD: If there were controls in Montreal harbour, then that would make a great difference in the operation of the dams at Iroquois; they would not have to let so much water out of lake Ontario. Therefore, it seems to me that to relieve Montreal should be pretty high on the priority list. Montreal now advertises it has a thirty-five foot draught in the waterway. We know that last summer they were not able to maintain it at all times. What will a ship do when it expects a thirty-five foot draught, does it have to unload at Quebec? Montreal is the biggest port in eastern Canada and if it is going to fulfil its functions, it must have the conditions under control as far as the depth of its water is concerned. The people in Montreal should be able to control those conditions locally and not have to depend on the amount of water in lake Ontario and how fast it can come down.

Mr. DINSDALE: Otherwise shipping will have to be diverted to Port Churchill in Manitoba.

Mr. AIKEN: Now your interest is coming out!

Mr. LEGAULT: Mr. Chairman, my question is supplementary to Mr. Dinsdale's. I was interested when you, Dr. Langford, talked about evaporation. The whole picture seems to indicate that if there is more interference by man, the whole balance will be upset. You have not elaborated at all on the question of evaporation. We know that the whole drainage basin of the great lakes is very small, as a matter of fact the basin itself is half of the whole drainage basin covering all the tributaries. Do you feel, Dr. Langford, that a further study concerning this evaporation should be made? My reason for saying all this is, for instance, all the forest fires we had. I might bring to your attention, perhaps, the Mississagi forest fire which raged for two months. The population around the whole of the basin is increasing. Evaporation would suffice for about a third of all the water supply, and any remedial measures that we could take would only be a fraction of what could be accomplished after studying this particular aspect of the problem.

Mr. LANGFORD: Do I take it you are suggesting the possibility of things happening on the land having a great bearing on the level itself because of greater evaporation taking place on land owing to deforestation? Several people have looked into this from a statistical point of view and tried to compare the levels of the lakes over the last hundred years together with the developments on land. They have not come up with anything very convincing proving that deforestation of land has had an effect on producing either high or low water, that the general average seems to fluctuate about a fixed line. There is no doubt that forest fires of growing timber would increase the run off. I do not think anyone has ever tried to do a detailed study of what this might mean. This is largely a statistical study.

However, there is a factor that is also to be considered. They are now talking of a continuous urban development from Kingston right through to Chicago. There is a tremendous expansion, industrialization and urbanization there. As you get communities building up, more land is covered with buildings and roads and the run off goes up quite markedly. How much this is going to affect the lakes I do not know but it is something that we must watch and

of which we must be continuously aware. This is something that has been missing in the past. No group or agency of the government took upon itself the responsibility for learning about these lakes and all the influences on them. Now we have started but we only have a very short period on which to base our judgment, four years of work in our institute.

This is the first institute of this kind to be established in Canada. This is a pretty small foundation on which to make projections. This is one reason why work such as our institute's needs to be pushed very vigorously so as to try to catch up on the backlog of information we do not have.

Someone this morning asked me about currents in the lakes. From the preliminary studies we made we find that currents in the lakes seem almost as complex as currents in the air. No one has studied them until now. We have two or three men working on it. There is also the movement of pollution, as well as all movements of the lakes.

You were talking about evaporation. We continue to study it. The meteorological branch of the Department of Transport is going to embark on a new type of investigation this summer. It has an aircraft which will fly over the lakes and, with a reflection thermometer, it gets the surface temperature of the water all over the lakes. This is an important function of the rate of evaporation. It is the first time it has been done. Next week our ship has a rendezvous in lake Ontario. We will measure the surface temperatures there.

Mr. LEGAULT: The thing I had in mind was that this evaporation would not necessarily be evaporation from the surface of the water, but also evaporation off the land which feeds the basin itself.

Mr. LANGFORD: Most of that has been a statistical study. I would like to see the forestry and agricultural people begin to make more precise studies of this matter.

Mr. LEGAULT: My second question relates to the port of Montreal. We have to consider that a great portion of that water comes down from the Ottawa river and it has no bearing at all on lake Ontario or the seaway above Montreal. This would not have any bearing on the level of the water there. Do I understand that the waters coming down from lake Ontario are mainly passed through the turbines, and do not necessarily flow freely in order to satisfy the port, that they would be used to satisfy the Ontario hydro interests?

Mr. LANGFORD: There is a point there on which I have not got all the information I want. An act was passed in the Ontario legislature which stated that hydro controlled all the water without reference to anyone. I think there have been amendments to that act since then, but I have not been able to put my hands on these amendments to see what they meant. The regulation of flow in the St. Lawrence river requires that there should be a certain amount of water sent down there to satisfy the conditions in the Montreal harbour. It does not matter whether it comes through the gates or whether it comes through the turbines; it is the quantity of water which must be there. From the evidence given before you by Mr. Heeney, I gather that he stated the method. I think it consists of a conference between those people who are controlling the gates and those who are controlling the hydro. They get together weekly and decide how much water hydro is going to pass through there so that the sum total would be what they need. According to Mr. Heeney, this is the basis on which they operate.

Mr. LEBOE: Some of the questions that I had, have already been answered. First of all, I might say I am from British Columbia and therefore not personally interested in any particular phase of this situation as it affects individuals. However, I am interested in this from the national point of view.

Following up the statement regarding the relative position of the port of Montreal, it would seem to me that, for the development and use of the great lakes system which you anticipated, power is a very vital and important factor in anticipating this growth, is it not?

Mr. LANGFORD: Yes, it is.

Mr. LEBOE: If that is the case, I want to ask you a question in connection with the supplying streams to the great lakes. Perhaps you could answer this question regarding the flood control situation on those supplying streams. Have we done anything to any great extent in regulatory flood control of the supplying streams to the great lakes basin?

Mr. LANGFORD: Up in the north of lake Superior hydro has plants on the Michigan river, which is one of the largest rivers coming in there. That can be regulated using the storage on lake Nipissing.

Mr. LEBOE: But that would not be all of the water coming into the lakes. This would be minor, would it not?

Mr. LANGFORD: As you look around the lakes you will see there are no large rivers coming into them other than the Ottawa river, so that the regulation of any individual river would not mean a great deal because they are all small.

Mr. LEBOE: I am greatly interested in this transshipping statement. Do you believe that along with the studies in connection with the port of Montreal which you have already mentioned there should possibly be a commission of some kind set up to look into the whole problem of transshipping from the great lakes area? For instance, we are talking about Montreal being now a great port. Perhaps it might be far better to have the transshipping point in the northern shores of New Brunswick or at some other place. I am speaking now as a Canadian, from the over-all point of view rather than any local point of view.

It would also seem from your remarks that we should have a study of shipping because we are using these large barges which we call barge trains in places where there are no high waves or surface disturbances on these shipping lanes. Do you think this should be something that would perhaps parallel your studies?

Mr. LANGFORD: I think that all those aspects such as shipping and the industrial growth of the whole area, as well as regional and urban developments, sociological and legal problems, need to be studied and knit into a co-ordinated plan. There will have to be some sort of umbrella under which these things can be studied. However, this whole thing is so vital to the economy of Canada that I think we should not leave any stone unturned.

Mr. LEBOE: I was especially interested in this. I think we have to be a little more imaginative and daring, and almost reckless in changing some of our traditional concepts. From what you say I understand you agree that some study of our shipping methods should be made along with the other matters.

Mr. LANGFORD: I agree heartily. I am not one to worship tradition for the sake of tradition. So many of the things we are doing were set up in the Victorian or the Edwardian period and we are still sticking to them.

Mr. RYAN: I would like to ask Dr. Langford a few questions. I have been out a few times answering telephones so if I tend to ask repetitive questions please bring me to order, Mr. Chairman.

Would you agree that most of our moisture laden areas come up from the gulf of Mexico to the great lakes?

Mr. LANGFORD: A great deal of them do. Living in the Toronto area we are very conscious of that.

Mr. RYAN: Are there any other tracks followed by moisture laden air that would arrive at the watershed of the great lakes which you have been able to define?

Mr. LANGFORD: I am afraid I am not the one to give you the answer to that question because it is outside of my field of activities.

Mr. RYAN: In your endeavours to get the various jurisdictions together to give you some kind of formal authority, have you had any talks with the resources council of the ministers?

Mr. LANGFORD: The federal and provincial ministers, you mean? I know the minister from Ontario, Mr. Sooner, quite well. I have had some informal discussions with him, but I have never had any formal discussions. I hope to do it. They have a new secretary general and I have met him. I have an invitation to see him in Montreal and discuss some of these things.

Mr. RYAN: Do you think this body would offer you any hope of getting the various jurisdictions together if we were to encourage it to do so?

Mr. LANGFORD: It seems to me that this committee deals in a pretty high and rarified atmosphere. It is a policy making level and I am at the working level. I have not had occasion to find out what they are prepared to do or what they can do at the policy level. They do not have anything going at the working level.

Mr. RYAN: Would it be this committee which would decide it would be better to simply regulate the great lakes or go into proposals such as the one which Mr. Kierans suggests?

Mr. LANGFORD: One of the difficulties there is that you have the 10 provinces and the federal government all involved in this. Essentially this is a problem involving two provinces and the federal government. You are going to dilute the effort if you have the other 10 provinces going into it. It seems to me there are certain aspects which must be dealt with locally.

Mr. RYAN: What about dealings with the United States sector? What body would you think could do this for Canada in a preliminary way?

Mr. LANGFORD: The United States have the same problems as we have in coming together. They have their great lakes commission which brings together the eight states at a political level, represented by the governor or his appointee. They meet quite regularly. They are more concerned with jurisdictional matters than with the development of the lakes from a physical viewpoint.

Mr. RYAN: So we have nothing at the moment which could be the equivalent of the great lakes commission? Is this the case?

Mr. LANGFORD: I think that is correct.

Mr. RYAN: On neither side is there a body that is presently authorized to deal with the problem we are dealing with, which is mainly the stabilization of water levels?

Mr. LANGFORD: I have a feeling that the great lakes are so important nationally to this country that they justify a ministry having to do with the great lakes.

Mr. RYAN: A federal ministry?

Mr. LANGFORD: Yes.

Mr. RYAN: In your evidence you stated that a flooding problem could arise in the Montreal island area, particularly in respect to the harbour, owing to the alterations in the river for Expo '67 purposes. Could you enlarge on this?

Mr. LANGFORD: They are enlarging the islands there to obtain more area. If they enlarge the islands it means encroachment on the river, does it not?

Mr. RYAN: Are they not making channels between the islands? Those are very shallow waters.

Mr. LANGFORD: Yes, but I wonder if they have done it to accommodate a flow of 300,000 c.f.s., which is what happens in flood time.

Mr. RYAN: What about the ice barrier?

Mr. LANGFORD: The new barrier they are putting in?

Mr. RYAN: Will that cause any flooding problem?

Mr. LANGFORD: I have not seen details of it. I have merely seen references to it in the press. I understand its purpose is chiefly to deal with the ice situation. It cannot act as a dam to restrict the flow because there is no storage behind it.

Mr. RYAN: It is just a worry in your mind? You have nothing concrete?

Mr. LANGFORD: This is a worry in my mind, and I have not seen any statements by competent engineers which say just what is happening.

Mr. RYAN: You have stated that there is plenty of water in the great lakes for our generation if we regulate it properly. What about the export situation? Is there anything for export in these conditions?

Mr. LANGFORD: The one place to which we are exporting at the moment is Chicago. Chicago, and other municipalities in the lakes, have been expanding tremendously. There are many satellite towns around it, and they all look to Chicago for their water supply. It is a similar situation to that which exists in Toronto. All the municipalities expect Toronto to supply them with water and to handle their sewage. Chicago finds itself embarrassed. The problem is how to supply more water and treat more sewage with the existing restrictions on the amount of water they can take out of the lake. Chicago has asked for more water. It does not matter whether people live in Chicago or Timbuctoo; they must have water. Would it not be more logical to hold back the water that is now going to waste and perhaps sell Chicago additional water to satisfy their needs?

Mr. RYAN: The only reason for a restriction on Chicago's consumption is that it does not return to the basin the water it takes; it puts it over the watershed into the Mississippi. Is this the sole reason for a limitation?

Mr. LANGFORD: Yes, it is taking water out of the system. The city of Chicago made an application for more water and was refused, so they suggested the possibility of returning the effluent from their sewage plants into lake Michigan. Then the United States department of health became concerned about what this would do to lake Michigan. On this basis they have been making a very exhaustive study of the situation because Michigan does not have a big river flowing in and out as have the other lakes. The movement of water through that lake is very slow, and they are afraid of it becoming a stagnant pocket.

Mr. RYAN: It would be stagnant?

Mr. LANGFORD: Yes. So Chicago—a big city like that—has to export; it has to put the sewage down the Mississippi and let them handle it.

Mr. RYAN: If they were not doing this, they would come under Article VIII of the boundary waters treaty, which gives precedence to domestic and sanitary purposes?

Mr. LANGFORD: Yes.

Mr. RYAN: It would therefore seem that either of two things would have to come to pass: either the International Joint Commission would have to be so satisfied with the regulation of the lake that they would approve of more export to Chicago, or we would have to bring more waters into the lake Michigan-lake Huron basin and south.

Mr. LANGFORD: Either that or we would have to hold back the water that is now going to waste into the sea and make it available on the upper lakes—200,000 c.f.s.

Mr. RYAN: That is what I mean by regulation.

Mr. LANGFORD: Yes. You see, if you grant Chicago the right to take a lot of water out, the cities on the south shore of lake Erie may want the same because the height of the land is similar and the same thing should be done there. It would greatly help our pollution problem if the big cities put their sewage effluent into the Ohio river.

Mr. RYAN: In Mr. Kierans' evidence before this committee he stated:

On January 25, 1965, the U.S. Army Corps of Engineers indicated that the best plan they could devise under "regulation only" would reduce the range of stage on lake Michigan-Huron from a range of 5.6 feet to one of 4.2 feet, and this would involve very extensive dredging and control works in the St. Clair-Detroit river along most of its 85 mile length and its eight foot sloping descent to lake Erie. The objective would be to provide for controlled increases in discharge capacity amounting to 30,000 c.f.s. above normal when required.

This plan would also involve providing a system of works at several points down the river to cause similar artificial reductions in flow. Coincidentally it would be necessary to carry out similar types of works at the lake Erie discharge and other key locations downstream, as far as Montreal. As we have said, the total cost has been estimated to be in excess of one billion dollars.

Would you agree with this quotation from Mr. Kierans' presentation?

Mr. LANGFORD: The figure of a billion dollars is one that I obtained from an entirely different source. We have to start thinking in terms of a billion dollars. Whether it is up or down, that is the order of money we have to begin to think about.

Mr. RYAN: Mr. Kierans qualified his evidence by saying it was not a formal report of the United States Army Corps of Engineers as yet; it was from a sort of leap from this report that he was basing his remarks.

Mr. LANGFORD: The statement I reported by Lawhead was made by him at a conference last summer in a report on the feasibility of the regulation. The figure of \$1 billion was given in a quite informal off-the-cuff statement because, as I understand it, they are at present engaged in an economic study of what this would mean in terms of dollars.

Mr. RYAN: If it is a fact that the range would only be reduced from 5.6 feet to 4.2 feet, it does not give you very good stabilization of these upper lakes, does it, particularly of lakes Huron and Michigan?

Mr. LANGFORD: I do not agree with that, because when you have a fluctuation it is the top six inches that are bad. As I was saying to Mr. Dinsdale, it is a matter of improving on what nature has provided. Nature has six feet and you are reducing it to four feet; that is quite an improvement.

Mr. RYAN: Would you agree with Mr. Kierans that once you have improved the levels of lakes Huron and Michigan there is improvement all the way down the line through Erie, Ontario and the St. Lawrence river itself?

Mr. LANGFORD: Yes. You should have facilities at the outlet of lake Erie to regulate the level.

Mr. RYAN: That would be necessary?

Mr. LANGFORD: Yes. One of our difficulties just now is that we have only partial control. We must have complete control.

Mr. HERRIDGE: Like Mr. Leboe, I am a British Columbian member who is very interested in the development of water resources. I am one of those who think we were "done in the eye" on the Columbia river treaty.

Mr. ROCK: It was a good deal, a very good deal.

Mr. HERRIDGE: I say this based on statements made by certain officials concerned with the development of water resources in the United States to the effect that they knew much more about the development of Canadian water resources in Canada than we know ourselves.

My question is this. Would you say that the United States army engineers have made a much more detailed study of the great lakes problem and have more information than any agency of Canadian governments? And have you any knowledge of what has been expended by the United States army engineers on a study of the great lakes question as against what has been expended by Canadian federal or provincial governments?

Mr. LANGFORD: A simple answer to that may not be fair.

The United States Corps of Engineers is a very complex agency. It is doing the work that several of our department of government do, and it is certainly doing more than any one of those departments. I think it is doing more work on the lakes, when you take this into consideration, than are the Canadian departments. Not only is it interested in lake levels, a record of which it keeps, as does our hydrographic survey, but it publishes navigation maps; it dredges harbours; it undertakes shore erosion works, and studies of the development of the lakes for the International Joint Commission; and it makes reports such as we have mentioned.

The United States Corps of Engineers does all of the things in one great organization. It is the northwest division of the corps of engineers which is established in Chicago with a general in charge. It is a very large organization. Most of its personnel seem to be civilians, not army personnel. I do not think we have the counterpart of that in Canada working on the great lakes. In fact, I know we have not.

Mr. HERRIDGE: Would you say, Dr. Langford, that it is about time we in Canada began to co-ordinate our activities on this and other water resource problems in order to have something comparable to that organization of the United States army engineers?

Mr. LANGFORD: I agree with that as far as the great lakes go, and they are the only ones I am prepared to speak about.

The CHAIRMAN: Mr. Herridge was the last member I had on my list.

I wish to thank you, Dr. Langford, for taking your time to enlighten the committee on so many aspects from your obvious extensive knowledge of great lakes problems. I am sure this committee will take due note of many of your recommendations when they prepare the report, which we expect to submit to parliament early next week.

With the thanks of the committee, may I say that we have appreciated your coming here today.

Mr. DINSDALE: Is there any possibility, Mr. Chairman, that we may have a preliminary report of the International Joint Commission's investigation?

The CHAIRMAN: Do you mean that we may have one presented to this committee?

Mr. DINSDALE: Yes.

The CHAIRMAN: That was not expected. Do you know if there is one?

Mr. DINSDALE: No, I am asking you.

The CHAIRMAN: The chairman of the International Joint Commission testified before this committee. Mr. Heeney was here. All the views of the

International Joint Commission were put to the committee through his testimony.

Mr. DINSDALE: That was before their investigation. I wondered if there was any further information available as a result of their investigation.

The CHAIRMAN: The Chair does not know that they are ready to make any further report than Mr. Heeney was able to make when he testified a month or so ago.

Mr. AIKEN: I think Mr. Heeney expected some sort of preliminary observations early in the new year. Furthermore, Mr. Heeney stated they would be prepared to come back before the committee if there was anything further they could add.

I suppose we will have to prepare our report very shortly—within the next few days.

The CHAIRMAN: That we all realize.

Mr. AIKEN: It might be possible for the Chair to make inquiries to find out whether there is anything further. The International Joint Commission is the one body that has given some undertaking to make a further report.

The CHAIRMAN: Is it agreeable to the committee that the Chair undertakes to contact Mr. Heeney or others, by telephone, to see if they are in a position to add to their previous testimony? If that is agreeable, I will so inform the steering committee.

Mr. AIKEN: I would like to suggest that course of procedure if the committee agrees. It was left open when Mr. Heeney appeared, and we have heard almost all the testimony since he appeared.

The CHAIRMAN: Mr. Dean Wenborne of the French River Resorts Association is here. I know the representatives of the association had intended leaving here on the "Canadian" which departs at approximately four o'clock. Would anyone be prepared to stay another four or five minutes to hear from the association? They have a four or five page brief, and I think perhaps it would be very helpful to all the members if we were to hear the brief from the gentlemen who have come here on behalf of the French River Resorts Association.

Mr. AIKEN: I would like to hear the brief. I have to leave for a 12.30 meeting, but I would like to hear the brief before I leave.

The CHAIRMAN: Dr. Langford, may I extend to you the thanks of the committee for coming here today.

Mr. Dean Wenborne is the president of the French River Resorts Association. He is from the area which extends roughly from North Bay running to Georgian bay where Mr. Kierans's grand canal would enter the great lakes.

Mr. DEAN WENBORNE (*President, French River Resorts Association*): Thank you, Mr. Chairman, members of the committee. I will try not to keep you too long.

We do appreciate the opportunity to submit this brief. I will go through it as quickly as possible, and then if anyone has any questions we will try to answer them to the best of our ability.

Mr. Chairman and members of the standing committee on mines, forests and waters, the French River Resorts Association is a trade organization made up of most of the licensed tourist outfitters on the French river and geographically representing the French river area from lake Nipissing to Georgian bay.

Our submission deals primarily with the problems of fluctuating water levels and their effects on the French river. Though not directly related to the committee's study of the great lakes, we feel that the French river watershed

is a significant source of supply for lake Huron and so its pattern of flow is relative to your studies. The proper and effective control of all the water draining in to, or out of, the great lakes basin, must be of concern to this committee.

We will review in brief the history of the problem on the French and present our suggestions concerning the future of this situation.

To give you some facts about the industry there is attached an appendix which I will go through quickly before continuing with the main portion of the brief.

In order that you might have a better knowledge of the French river tourist industry located west of the Chaudiere dams at lake Nipissing, the following information will be of interest to you.

This area covers some 500 square miles and takes in all of the French river west of lake Nipissing to the Georgian bay, and the lower Pickerel river which is part of the watershed and effected by the water levels of the French river.

In this area there is located, directly on the waterway, 41 licenced tourist establishments which have an investment in excess of two million dollars. These tourist establishments provide accommodation for 1,500 persons per day, and will accommodate some 15,000 tourists in the course of a season. They provide employment for some 500 persons and create employment for many more in allied industries. The estimated annual gross income of these establishments is around \$800,000.00. Therefore, based on present statistics wherein less than 20 per cent of the tourist dollar is spent on accommodation, this would mean that this part of the French river tourist industry is annually responsible for bringing into Ontario some four to five million tourist dollars, much of which is spent in the surrounding areas. This then will emphasize the importance of the tourist industry to the overall economy of this part of the province.

This area also has to support several thousand freelance campers who invade the area during the summer months, so that the total number of tourists coming into the area could very well be in excess of 20,000 every year.

In addition to the above there are upwards of 1,000 private summer cottages which represents a further investment of some three million dollars. Many of these cottages are rented during the summer months so that the number of persons using these facilities could very well reach to some 10,000 persons.

The permanent population of this area is about 3,500.

From the foregoing it is reasonable to presume that the part of the French river in question has to provide recreational activities for over 30 thousand persons annually whose main interest in these waters is—fishing, the number one attraction.

From this you will see the importance of sport fishing to the French river and to the overall economy within the boundries of North Bay, Sudbury and Parry Sound which receive vast revenue from the fishing tourists who visit and vacation within the area.

As water levels—particularly during the spawning season—play such a vital and important part in sport fishing and the propagation of these species of fish, you will realize the importance of properly controlled water levels at all times.

Attached to this brief as appendix 1 is a short resume giving you some indication of the economic and physical size of the tourist industry on the French river proper both in investment and revenues. As our concern with these water levels encompasses the whole of the Nipissing-French river watershed area, the scope of the tourist industry and the dollar values involved must be magnified several times. A greater portion, if not all, of this capital investment exists because of the valuable natural resources of the region, i.e.

scenic beauty of forests and hills, miles of beautiful pure water, but most particularly, the sport fishing. The depletion or destruction of any of these resources, and more especially, the sport fishing could, and is, having serious economic repercussions on our industry.

The present water level situation

While following the testimony of previous witnesses before this committee, we noted the evident hardships caused to tourist and other commercial operators on Georgian bay by varying water levels. Variations now of 5 to 7 feet from normal. Gentlemen, we on the French river, normally have such variations during the entire year every year. In fact, on Dry Pine bay, the variation has reached as much as 8.5 feet from high to low. You can quite readily imagine the hardships and chaos such conditions cause. Our people must always be concerned with the problems of maintaining docks, beaches and waterfront buildings in the knowledge that next day, next week, or next month, the water level may move up or down 5 to 6 feet, without any prior warning.

However, while operators may learn to at least live with this situation, the fish don't and, as a direct result, the fishing has deteriorated over the past years.

Effects of water level variations

Over the years many dollars have been spent by residents in trying to cope with fluctuating water levels. The federal government has spent a considerable sum in effecting a partial control. Because this partial control has, on occasion, been improperly effected, the federal government has had to reimburse some of our members for damages caused by unreasonably high levels caused by excessive flows released from lake Nipissing.

However, by far the most serious effects have been the decline in the sport fishing. The problem, very simply stated, is that when these controlled levels are artificially changed immediately after, or during the period when the fish are spawning, this results in a large percentage of the natural propagation being lost forever. It makes no difference whether the change is up or down or a change of only 6 inches or 6 feet, the results are disastrous. When this happens year after year, it is easy to see what is happening to the fishing. The northern pike of the French river have been very seriously depleted because of this factor. The damage by the loss of one year's spawn is far greater than many years of fishing pressure. The pike are particularly vulnerable to such damage as they spawn in very shallow waters and at a time when attempts at reasonable stability of levels is all but impossible, at the present.

I would ask, gentlemen, that you bear in mind that all species of fish are affected and that the Ontario department of lands and forests biologists maintain that reasonable stability of water levels under normal conditions is the only way to improve the situation. It is also worth mentioning that normal fluctuations are about 5 feet and, although there are patterns in the annual record of water levels, these can, and do, deviate from time to time.

Problems of control

Mr. Chairman, we, on the French river, recognize the considerable problems involved in controlling water levels on a system such as ours. Having followed previous testimony given to this committee, we are more than ever aware that no one at present has the answers to such problems and that extensive hydrological research is necessary.

At the present time, on the upper reaches of the lake Nipissing-French river water shed, there are three different agencies exercising varying degrees

of control over levels and flows. Each of these independently of the others, establishes certain objectives in the management of these waters.

The Ontario department of lands and forests, Ontario Hydro, and the federal Department of Public Works are these present agencies. The major part of our problem stems from the fact that each agency has different objectives. None of them, except the federal Department of Public Works, takes into account the effects of their day to day, or long range water management decisions on the levels of the French river.

The Department of Public Works attempts to help us by increasing, or reducing, outflows from lake Nipissing. There are no further control works down river to effect stability of levels.

Recently, there has been a much better attitude on everyone's part to improve the spawning situation on the river, but it is an extremely complex situation as each agency is concerned with its primary water management objectives. At the present time, an advisory committee is being formed which should help to co-ordinate the efforts of these agencies to establish some stability of levels in the French river.

We respectfully submit, however, that in the end, control works on the whole system will be required to effectively obtain reasonable long term stability. It does not seem reasonable to us to assume that controls at one point on the waterway—specifically the source of the French river—can provide any stabilizing effect on the waters of the lower end where no controls exist. In actual fact, the lower reaches are continually subjected to the whims, so to speak, of the control authorities on the upper reaches.

More details could be given on the effects over the years, of actions by control agencies on this watershed. However, we believe this general outline should provide some insight into this problem.

Efforts of the French River Resorts association

Our association has been working over a period of fifteen years towards a solution to this problem. As a result of its efforts, several events have occurred that have helped to some extent.

First, we made it known to the Department of Public Works that they must assume a degree of responsibility for physical damages that occurred from their mismanagement of the Chaudiere control works and that when they were making operating decisions they should have some thought as to downstream effects. Bluntly speaking, they had to think of more than just lake Nipissing. It took legal action to establish these responsibilities.

We then learned of the tremendous damage that was occurring to our fish population through the department of lands and forests and worked to obtain a closer degree of co-operation between the department biologists and the control authorities—especially at spawning times.

Continuing in this vein, we now are on the verge of establishing the aforementioned advisory committee. This should prove to be a very real asset to the entire watershed area.

Realizing that no real solution is satisfactory that does not encompass the entire system, we are now enjoying a much better liaison with the other interested agencies.

We feel that several things are important in reaching a final solution to the problem. Number one, we believe that studies should be undertaken, with all possible speed, to establish the feasibility of additional control works on the system to ensure more reasonable variations in levels.

Further, we suggest there should be an overall authority having jurisdiction over the actions of all controlling agencies located in the watershed. This single authority would be responsible for ensuring the most beneficial use of these waters for all who are located on the waterway, or use its facilities.

Mr. Chairman, the French river resorts association specifically asks your committee to support our request for immediate hydrological studies on the French river system. We believe that only this type of study will finally make known the feasibility of down river control measures. Further, we would ask your committee for any guidance, or direction, you may find would assist in solving this long standing problem on the French river. Again, we would emphasize the need for all possible speed in initiating remedial action.

Conclusion

The French river and lake Nipissing, in their natural state, comprise one of the best known and loveliest of all waterways in Ontario. Man made improvements, well conceived, can, and should ensure that this tremendously productive water is not depleted, nor deteriorated in any way. Our association feels that we are obligated to the public to see that this waterway remains a productive resource and is not allowed to become yet another useless, barren and polluted waste. We respectfully request assistance from this committee in this effort.

We are sincerely appreciative of this opportunity to present our brief to you, gentlemen, and hope you seriously consider our thoughts and requests. Thank you.

The CHAIRMAN: Thank you, Mr. Wenborne.

Mr. WENBORNE: I would like to mention one other thing: in listening to Dr. Langford and members of the committee I think that on a much smaller basis we have a very close parallel to the great lakes in our own little system at home. Control of part of the watershed or river just does not seem to bring the desired benefits or results in the area without it all being controlled.

The CHAIRMAN: I have Mr. Legault, and Mr. Aiken. Now, Mr. Legault.

Mr. LEGAULT: First let me compliment you on your short but very accurate brief. Would you feel that the lack of control below lake Nipissing and below the Chaudiere dam has been accentuated since the sluiceway has been cut adjoining the Chaudiere dam?

Mr. WENBORNE: The answer to that question carries some political connotations. The sluiceway was constructed, as you know, almost 15 years ago and it has never been used simply because it could not be used. The existing control works at the Chaudiere dam failed to cope with the discharge of water on the French river except in maximum control periods. This was built because the member from the area would have liked to have North Bay and the Nipissing interests feel more at ease in the event of high water.

On the basis of that we did sue and won a lawsuit for high water at the lower end of the river, and they have never been able to use it. They had to use the heights of level in the lower portion of the river. They actually fixed the heights where, if the level existed all through, we could launch a suit again. But let me relate it more specifically. The lower river can handle approximately 15,000 c.f.s. when the Chaudiere control would not discharge that much. But the sluiceway water would discharge at 15,000 c.f.s. and we cannot handle that amount of water there, so it has never been used.

Mr. LEGAULT: The particular problem arose in 1958. I would go along with you and say it was due to the lack of control that all these misfortunes happened and that the lower branch had a little flooding with 30,000 c.f.s. This sluiceway was used to alleviate or correct the problem above the dam itself.

Mr. WENBORNE: Yes.

Mr. LEGAULT: The only solution would be in co-ordination and complete control of the watershed above lake Nipissing itself.

Mr. WENBORNE: Yes, and also on the lower reaches. They would have to be included in it, because, to put it very bluntly, it is difficult to stabilize levels

in the lower reaches unless there are control works down there. In other words, if they discharge water at the prescribed rate through the Chaudiere works, it means that a certain level would be reached at all stages of the river within a few days, and this might or might not be adverse to good fishing. It might mean that without control works the stabilized water level on the lower reaches would not affect it sufficiently as far as we are concerned; and it should be borne in mind that if there were works at Chaudière installed to control the lower levels of lake Nipissing and nothing else—of course there is nothing wrong with that—I think they should continue to control the works down the river.

The CHAIRMAN: Now, Mr. Aiken.

Mr. AIKEN: You, I presume, have heard in general terms about the Grand Canal proposal.

Mr. WENBORNE: Yes.

Mr. AIKEN: It would use the French river as an outlet. Has your organization considered the effect of this Grand Canal system on you? Would it not aggravate considerably your present situation if you had fluctuating flows of water through the French river?

Mr. WENBORNE: I think probably the Grand Canal system or scheme is of such a nature or size that it would completely take it all out of present thinking altogether. We have not given it much serious thought simply because I have heard engineers from the Department of Public Works state that it would need 20 years of feasibility study before they could even institute it. We are concerned with the next 20 years.

Mr. AIKEN: And in fact such a scheme would probably see you all out of business.

Mr. WENBORNE: At least we would have to be relocated; and as I understand Mr. Kierans's program it means power supply, a ship canal, and that North Bay would theoretically become a lake port. I do not know just how much is involved in the over-all scheme. Certainly it cannot be of concern to us because if it is instituted we are all out of business in any event as we know it now; and if it is not, we are anxious to get on with what we have now over the next 20 years.

Mr. AIKEN: The level of Georgian bay would not affect you in any great measure. That is where your problem is.

Mr. WENBORNE: Only for the operators at the mouth of the river.

Mr. AIKEN: You say only for the operators at the mouth of the river. There is no great number of them as compared with those of you who are further up, and who are affected by the river.

Mr. WENBORNE: That is correct.

Mr. AIKEN: Your submission, after having heard Dr. Langford, really points up that you have more of a problem in a similar way.

Mr. WENBORNE: I think you could almost draw an exact parallel. We have upper reaches where some parts are controlled and some parts are not, and lower reaches which are in bad shape as a result. That is the way it would sound on the lakes with everything from the St. Mary's river down being in bad condition on the great lakes, and that is the way it works for us.

The CHAIRMAN: Perhaps I might be permitted to ask you one question. Do you think that the solution would be by works below the French river as it enters Georgian bay? Would that in itself appear to you to be the solution? I know that Dr. Langford indicated that something below Montreal would solve the problem at Montreal. But do you see it in the same fashion for the French river?

Mr. WENBORNE: No, not quite, because the regulation from the Chaudière control works to Georgian bay comprises several different stages of elevation. We have heard public works officials tell us that this is one of the most difficult of waterways on which even to do hydrological studies because of its nature, since it flows backwards from the original intention of nature.

On the type of control works, it seems to us, as laymen, that our requirements are more in the nature of weirs at different stages which would maintain the stability, with the provision for heavier outflows at flood condition times. And much as Dr. Langford stated, we would like to maintain stable levels. But at the same time provision has to be made to get rid of more water when there is too much on hand. This applies just as much to us as it does to lake Nipissing. When the water is high, they have to get rid of it.

The CHAIRMAN: I understand that the gates you discussed are the only ones on the great lakes portion under federal government authority, the Department of Public Works, and that it does not function properly. Do you see a remedy for it.

Mr. WENBORNE: Well, possibly it could be remedied. The Department of Public Works has stated to us that there are only two control measures of this type in Canada, and they only got into this thing incidentally. They are provincial waters and they do not have any jurisdiction.

They did not really have any jurisdiction, but under the terms of reference under which they worked 50 years ago I believe they thought this was an occasion for them, with the navigations factor entering into it, to take control. I know they would not like to have control of it because it is a hard thing to handle. I know the province does not want to take it. I do not know just exactly what is going to happen in the end. We do know that we would like to see the Department of Northern Affairs and National Resources and the Department of Public Works make more extensive surveys to determine the feasibility of control works down the river. We feel that this is where this committee could support us strongly. I do not think that any one of our members believes that a vast amount of money should be spent which could not be accounted for. No one knows how much money is required until the studies are made, and this is what we would like to have.

The CHAIRMAN: Are there any further questions?

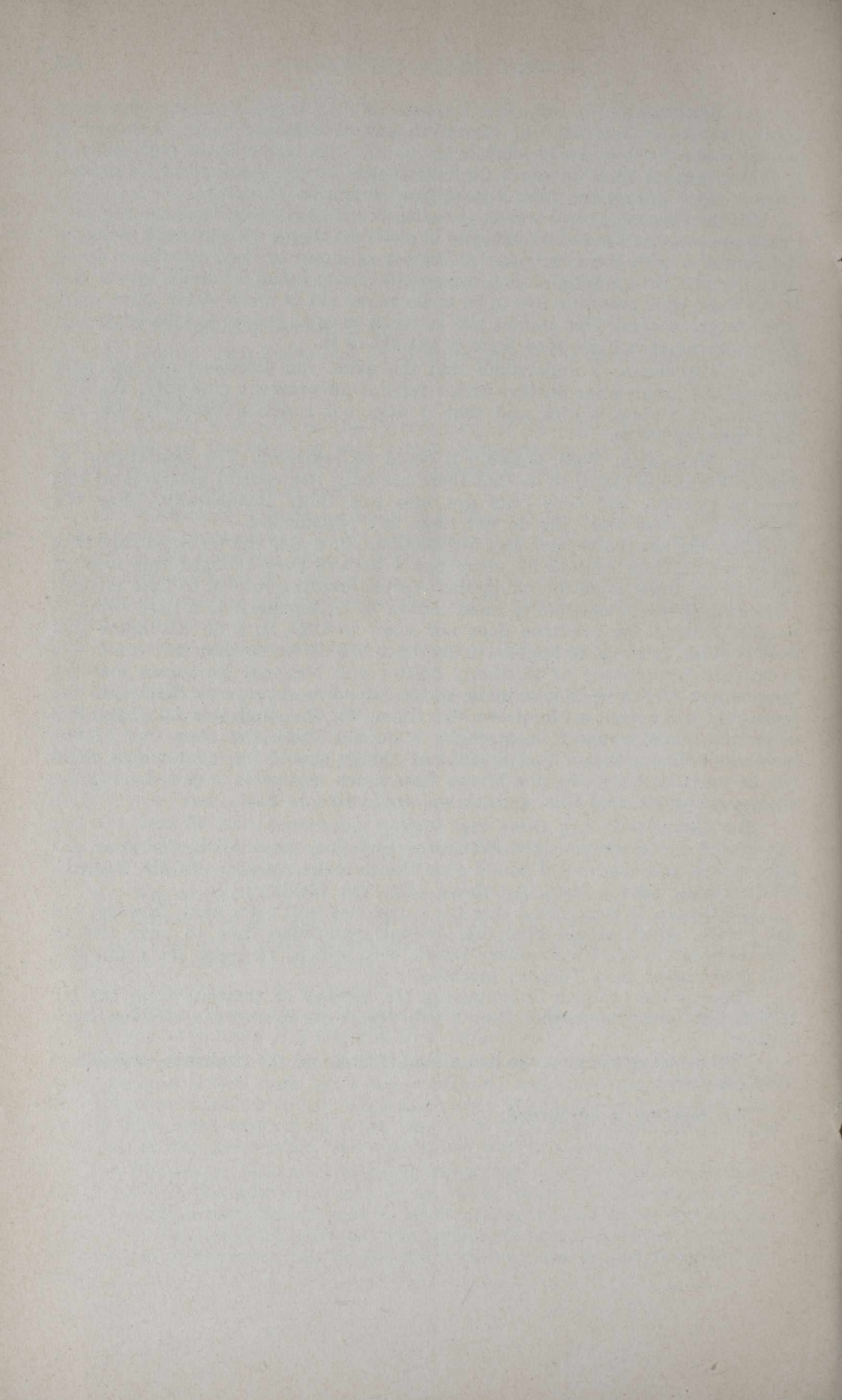
I wish to thank you, Mr. Wenborne and your association, for your enlightenment this morning. I would also like to make reference to Mr. Rysdale, the secretary, who is here in Ottawa with Mr. Wenborne.

Gentlemen, it is expected that the committee will meet next Tuesday, but not before, which would give the steering committee time to have one or two meetings to draft a summary report with which, we hope, the committee will deal maybe next Tuesday morning.

There is the problem of contacting Mr. Heeney or someone from the International Joint Commission, but I will report on this to the steering committee.

Thank you, gentlemen, we had a long sitting and the chairman appreciates your good will.

The meeting is adjourned.



HOUSE OF COMMONS

Second Session—Twenty-sixth Parliament
1964-1965

STANDING COMMITTEE

ON

MINES, FORESTS AND WATERS

Chairman: OSIAS GODIN, Esq.

PROCEEDINGS

No. 11

THURSDAY, APRIL 1, 1965

Respecting

The subject-matter of the water levels of the Great Lakes system.

FOURTH REPORT TO THE HOUSE

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1965

STANDING COMMITTEE ON MINES, FORESTS AND WATERS

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Vice Chairman: Mr. Ian Watson

and Messrs.

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Moreau,

Noble,
Peters,
Rock,
Roxburgh,
Ryan,
Rynard,
Scott,
Smith,
Stenson,
Turner,
Whelan—35.

(Quorum 10)

Gabrielle Savard,
Clerk of the Committee.
(*ad hoc*)

ORDER OF REFERENCE

FRIDAY, October 2, 1964.

Ordered,—That the subject-matter of the water levels of the Great Lakes system be referred to the Standing Committee on Mines, Forests and Waters for their consideration and report and that the Committee be empowered to engage technical and clerical personnel as it may deem necessary.

Attest

LEON-J. RAYMOND,
The Clerk of the House.

REPORT TO THE HOUSE

THURSDAY, April 1, 1965.

The Standing Committee on Mines, Forests and Waters has the honour to present its

FOURTH REPORT

On March 24, 1965, the Committee reported on the subject-matter of the water levels of the Great Lakes system.

A copy of the relevant Minutes of Proceedings and Evidence (Issues Nos. 1 to 10 inclusive) is tabled herewith.

Respectfully submitted,
OASIS J. GODIN,
Chairman.

