

228
Commission of Conservation

CANADA

Conservation in 1918

BY

JAMES WHITE, F.R.G.S., M.E.I.C.

*Assistant to Chairman, Deputy Head,
Commission of Conservation*

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Reprinted from the Tenth Annual Report of the
Commission of Conservation

OTTAWA—1919

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*Constituted under "The Conservation Act," 8-9 Edward VII, Chap. 27, 1909, and
amending Acts 9-1 Edward VII, Chap. 42, 1910, and 3-4
George V, Chap. 12, 1913.*

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Assistant to Chairman, Deputy Head:

Mr. JAMES WHITE.

Conservation in 1918

BY

JAMES WHITE, F.R.G.S., M.E.I.C.

Assistant to Chairman, Deputy Head, Commission of Conservation

GENTLEMEN: Before presenting the Annual Review of the work of the Commission of Conservation during 1918, I desire to read a letter from Mr. Babcock, our Commissioner in British Columbia. We had hoped to have a paper by Mr. Babcock with respect to fishery conditions in British Columbia, particularly with reference to salmon. Mr. Babcock says:—

"I am just getting around after an attack of influenza, hence my failure to reply to your notes. I shall be unable to attend the Annual Meeting, and I take it it is now too late to supply you with data as to fishery conditions in this province."

"I may say that the pack of salmon is the largest on record, due entirely to the increase from, and the utilization of, the autumn grades of fish, which have only recently come into demand. The run to the Fraser was very much the smallest ever known. The river may be said to be fished out of sockeye, and the run of pink salmon, which was not used previous to the war, is fast disappearing."*

Unfortunately, this is an exact fulfilment of the prediction that Mr. Babcock made when he addressed us at our last annual meeting.

You will learn with much regret that, owing to ill health, your confrère, Dr. Fernow, is unable to attend the meeting. He has written expressing his regret, and has requested that his letter be read to the meeting. It is as follows:

3 February, 1919

In answer to your announcement of the meeting of the Commission, I regret to say that my physical condition will forbid my attending the meeting.

As I wrote you some months ago, I intended to discuss in a summary way the difficulties, silvicultural, economic and political, in developing forestry methods in Canada, and I would have taken advantage of the opportunity to congratulate the Commission

*The formation of an International Commission consisting of two members each representing Canada and the United States is provided for in the draft of a proposed treaty between the two countries, governing the sockeye fishing industry in the Fraser river in the Dominion, and the lower portion of the strait of Georgia and Juan de Fuca strait, in the state of Washington. The Commission it is proposed to establish would conduct an inquiry into the life history of the sockeye salmon hatchery methods, spawning grounds and other matters affecting the industry. The Commission will be empowered to recommend modifications of the existing regulations under the terms of the draft treaty. The treaty is aimed to prevent the depletion of the sockeye fishing industry. The limiting of the number of licenses is one of the measures suggested to prevent the extinction of the sockeye salmon in these waters. It is proposed to limit the licenses to resident Canadians in British Columbia or to companies licensed to do business in that Province. The same condition would be imposed in Washington by limiting licenses to American citizens or authorized companies.

on the work it has so far done through its Forestry Committee and through the Chief Forester of the Commission, who deserves unstinted praise for his active push, persistency and efficiency.

The Commission has to its credit, first of all, the inauguration of most thorough control over forest fires along railways, which was brought about through co-operation with the Railway Commission and with Provincial and Dominion authorities. In this connection, it has to its credit the publication of some three volumes of discussion on means of suppressing fires and has successfully stimulated private endeavour in this direction.

In this connection, also, the Commission has made an extensive study and demonstration of the result of cutting and subsequent fires on cut-over lands with regard to reproduction. This study was made on a 2,000 square mile sample, the Trent watershed, and a similar investigation has been made in British Columbia, showing that our optimistic anticipations of natural replacement of the valuable timber without human assistance are largely doomed to disappointment.

The Commission was very properly engaged early in ascertaining the status of our forest resources and has completed and published exhaustive forest surveys of two provinces, Nova Scotia and British Columbia, and has surveyed part of a third, Saskatchewan. It has been also instrumental in bringing about, encouraging and aiding stock-taking in a fourth province, New Brunswick.

These are all legitimate and praiseworthy activities of the Commission, whose functions are largely educative. But I would have particularly applauded the latest development of the Commission's forestry work, namely, the establishment of permanent sample plots to study in detail the results in reproduction and growth and different treatment and logging of our pulpwoods. This work has been conducted by Dr. Howe, in co-operation with several paper companies. The readiness with which this co-operation (financial and otherwise) was secured is proof of the practical value of this investigation. Indeed, this is the first systematic attempt to lay a basis for silvicultural practice, without which the forester is helpless, and the Commission is the best agency for securing this fundamental knowledge, as could be readily argued.

That this work of the Commission is done largely in co-operation with the staff and students of the Faculty of Forestry of Toronto University is, of course, specially gratifying to me.

There is one more important political direction in which the Commission, in my opinion, should exert itself, namely, the transfer of the forest resources of the Middle Provinces to those provinces. Such transfer would undoubtedly lead to the exploitation of these resources. Forestry is provision for the future, and such provision means present curtailment of revenue or present outlay for the sake of future revenue. Will and can the provinces afford such a financial policy?

Wishing you a successful meeting,

Sincerely yours,

B. E. FERNOW

Sir Clifford
Sifton's
Resignation

Since our last annual meeting, Sir Clifford Sifton has resigned his position as Chairman of the Commission.

Pending the appointment of his successor, the Acting Chairman, Hon. Senator Edwards, has instructed me to prepare an annual statement of the operations of the Commission along much the same lines as Sir Clifford has done in the past.

First, I desire to refer to the great loss the Commission has suffered by reason of Sir Clifford Sifton's resignation. His untiring energy, his broad outlook, his ability to grasp the factors of a problem and arrive at its solution, and his master mind were well summed up by Augustus Bridle in his *Sons of Canada*, when he said that Sir Clifford is "the greatest constructive statesman that Canada has yet produced."

When we commenced our operations we were without any precedent to guide us, inasmuch as we were a unique organization. No other body, governmental or private, had ever undertaken conservation work on a large or comprehensive scale. The organic Act establishing the Commission, draughted by Sir Clifford, provided for the appointment of representatives of the Dominion Government, of the Government of each province, and of at least one university in each province. At the same time, it also provided for the appointment of representatives from each province and representatives who were interested in our great natural resources.

Efficiency and
Economy of
Operation

In commencing the work of organization, Sir Clifford laid down some basic rules, which are worthy of record. First, he gave instructions that all materials, printing, binding, etc., were to be purchased in the cheapest market, irrespective of politics, religion, nationality, or other consideration. Second, that the staff should consist of a limited staff of experts, so selected that, in a general way, we would have one expert adviser respecting each of the great natural resources, and that these advisers should, so far as possible, be assisted by clever members of the weaker sex. Third, that when special investigations which could be carried to completion in a limited space of time were undertaken, special investigators would be employed only until the investigation was completed, such action permitting the payment of ample remuneration without, in the aggregate, incurring excessive total cost. Fourth, he suggested that the work of the Commission could be carried on with the maximum of advantage if the work were apportioned to committees, one for each great natural resource and one on publication.

As a result, the Commission can fairly claim that its achievements are out of all proportion greater than its expenditure. An

enormous mass of data has been collected, and much of it has been incorporated in published reports. These publications have made this information available to the public in such enduring form that they will be standard works of reference for many years, particularly as our efforts have been steadily directed to the production of exhaustive reports rather than pamphlets of a superficial or transitory nature.*

**Concentration
of Effort**

Owing to our limited financial resources, we were, from the very beginning, forced to adopt the plan of temporarily spending more money upon one or two investigations than upon any others. Thus, for a time, we expended a maximum upon agriculture, particularly upon our illustration farms.

*The *Atlantic Monthly* for March, 1919, pp. 381-391, contains an article by Mr. Arthur D. Little, intitled 'Developing the Estate.' Mr. Little is the head of the firm of Arthur D. Little Company, and has devoted special attention to the subject of conservation. His firm has been employed by the Canadian Pacific Railway to report on the possibilities of development in the territory traversed by their lines.

In his article, Mr. Little refers only to the United States. He reviews conditions created by the war, the best means of utilizing their natural resources, and the betterment of conditions. He discusses methods of increasing agricultural crops, drainage of swamps, irrigation, prevention of destruction of the forests, better roads, increased use of water-power, more efficient utilization of coal and many similar problems.

It is highly gratifying to find that Mr. Little, after a survey of these problems, and after a comprehensive study of conditions in Canada, recommends for the United States the establishment of an Economic Commission. Though Mr. Little dubs it an 'Economic' Commission, its constitution and functions make it almost a replica of our Conservation Commission.

The testimony of this skilled investigator is so lucid and compelling, that the recommendations are quoted below. Mr. Little says:

"No Congressional Committee, no academic council, no ephemeral organization can cope with the stupendous problem. The mutually entangled intricacies of its component elements can be gradually reduced to order and woven into the majestic tapestry of an adequate general plan, only, it would seem, by a permanent commission, as detached from partisan politics as the Supreme Court, comprising in its membership the best executive, economic, and technical brains in the country, and planning and operating over long years. This commission should stand in close relationship to the Chief Executive and to the Congress, its members being appointed by the President, subject to confirmation by the Senate. It should be compact, with no more than fifteen members, including the Secretaries of Agriculture, Labour, Commerce, and the Interior, through whom the chiefs of the scientific bureaux of the government would be brought into its deliberations. Above all, its members must be drawn chiefly from the great constructive and productive agencies of the country, and must be truly representative of the aspirations and interests of our citizenship. Whether its individual components are members of House or Senate, Republicans or Democrats, should, in this relationship, be of interest only to their biographers.

"Such an Economic Commission would evolve from many economic studies and proposals for specific betterments co-ordinated plans which would bind together in a close articulation the attainable benefits of each. In the exercise of an intrinsic function, it would submit to Congress recommendations for the required legislation, and apprise the country of the need and reason for its demands. To it should be assigned ultimate responsibility to Congress, through the President, for the execution of its duly authorized proposals."

Having demonstrated the great value of such farms as forcible educative agents, we transferred the farms to the Federal Dept. of Agriculture. Through the results obtained, we thus demonstrated to the farmers of the neighbourhood that one of themselves was obtaining these results without any assistance other than the advice of our experts and at no greater cost than their own farming operations. It was a demonstration that, by following our advice, our illustration farmer could obtain an increased yield, and that practically the whole of the increase was profit.

At another period, we expended a maximum upon water-power investigations, and we may fairly claim that, throughout Canada, we excited interest in this great resource. We published a general work on the Water-Powers of Canada in 1911, followed by the Water-Powers of the Prairie Provinces in 1918, and the Water-Powers of British Columbia will be issued this year.

For a time we devoted special attention to Town Planning and Housing, and we now see the partial fruition of our efforts in the appropriation of \$25,000,000 for housing.

War Conditions
Emphasize
Conservation

Conditions created by the war have directed attention to the necessity of adopting measures of conservation. It is not too much to say that the subject of conservation is uppermost in the minds of the thinking men of the world. The United States has been called the 'most wasteful nation in the world,' but a survey of conditions in Canada, and the high cost of living indicate that Canada is pre-eminent in that respect—a pre-eminence of which we have no reason to be proud. It is axiomatic that the nation which can produce at lowest cost is the nation that will obtain the trade of the world. Hitherto, Great Britain has been the greatest exporting nation, and Germany's failure to oust Britain by a thoroughly unsound system of bounties, special freight rates, subsidies, and special privileges which eventually became an almost unbearable domestic burden, was one of the principal causes of the war.

Canada must
Husband
Resources

We are now endeavouring to re-adjust ourselves to post-war conditions, but it must be borne in mind that, if we burden ourselves with extravagant and wasteful methods of developing or of utilizing our natural resources, if we destroy our created resources by fire, if we lock up our floating capital in unremunerative works, we are fatally handicapping ourselves in the great race for world trade or for any considerable portion of it.

Since our last meeting, the great world war has practically ended. Our Commissioner, Hon. Dr. Béland, has at last been released

by the Germans. We had hoped to have an opportunity to give Dr. Béland a warm welcome, and to express our deep sympathy with him for the hardships and injustice that he has suffered from the Germans since our meeting in January, 1914. The Acting Chairman, Hon. Senator Edwards, endeavoured to have Dr. Béland address you, but an engagement to give an address in the United States, made several months ago, prevented his accepting.

I regret to have to record that in October last, Miss Norma Johnston, my private secretary, succumbed to influenza. As a result of overwork in the autumn of 1917, while picking fruit on a farm in Dundas county, Ont., her resistant powers were so reduced that she was unable to combat the disease. Able, full of zeal for her work, and a charming personality, she gave her life as a result of patriotically trying to 'do her bit.'

MILITARY SERVICE OF STAFF

Before dealing with the general work of the Commission, I desire to record the military service of the staff during the war.

Pte. P. M. Baldwin, Canadian Army Medical Corps—Mr. Baldwin is Assistant Editor. He twice endeavoured to enlist in combatant corps but was rejected on account of defective eyesight. Determined to do his bit, he enlisted as stretcher-bearer in the Canadian Army Medical Corps in 1916. Later, he was transferred to the 1st Canadian Field Ambulance Corps. After considerable service in France, he obtained a transfer to the 1st Battalion, Canadian Engineers, and is now in Germany.

Pte. James Carroll, 199th Battalion, Duchess of Connaught Irish Rangers—Mr. Carroll was a messenger. He was reported missing August 15th, 1917, and has since been reported 'officially dead.' It is believed that he was either blown to pieces or was buried by a shell.

Bom. Allan Donnell, 46th Queen's Battery—Mr. Donnell is also Assistant Editor. He was badly wounded by a gas shell at the battle of Vimy Ridge. He was invalided to Ottawa, and on Dec. 31st, 1917, discharged as unfit for further service in the army.

Capt. G. H. Ferguson, M.C., Canadian Engineers—Capt. Ferguson is one of our engineers. Commissioned Nov. 1st, 1914, in the Canadian Hydrological Corps, with the rank of captain, he reverted to the rank of lieutenant to go overseas with the Canadian Engineers. He was promoted for duty in France and was decorated with the Military Cross. He was continuously on duty in the forward area until the end of June, 1918, when his leg was broken. Due

to continuous exposure, he suffered from complications. He returned to Canada for a rest, and was convalescing when the armistice was signed.

Col. C. A. Hodgetts, M.D.—Col. Hodgetts is our Medical Adviser. He went overseas in October, 1914, as Commissioner of the Canadian Red Cross. It is sufficient to say that the Canadian hospitals were better equipped, both as regards staff and material equipment, than any other. Col. Hodgetts resigned his position as Red Cross Commissioner in April, 1918. From that date till December last he acted as Deputy Commissioner of the Medical Staff of the Ministry of National Services, serving three months as Assistant to the Commissioner in Ireland. He returned to Canada Dec. 25th, 1918.

Lieut. E. Carruthers Little, 3rd Canadian Ammunition Corps—Lieut. Little was one of the engineers engaged on our civic survey of Ottawa. He enlisted in Sept., 1916, and, later, was given a commission. For his services he has been awarded the Belgian Cross and has been mentioned in despatches. Lieut. Little advanced to the Rhine with the Canadian Forces, and is now in Belgium.

Pte. Oliver Master—Mr. Master is Assistant Secretary. After rejection by the infantry and artillery on account of defective eyesight, he enlisted as a private in the Queen's Ambulance Corps and went overseas. Subsequent to his arrival in England, he obtained a transfer to the infantry. In August, 1918, Mr. Master's platoon was on outpost duty and was surrounded by the Germans in a counter attack. Only three men, including Mr. Master, were able to fight their way back. Later, he was recommended for a commission and was taking his officer's training course when the armistice was signed. You will regret to hear that he is now in Canterbury hospital, England, suffering from the after-effects of injury to his knee from a spent machine-gun bullet.

Pte. Frederick N. McKay, late 77th Battalion—Mr. McKay is a messenger. He went overseas, but was invalided back to Canada and discharged as unfit for further service in the army.

Frederick Corp, one of our messengers, and a married man, endeavoured to enlist, but was rejected by the combatant branches of the service and, later, by the non-combatant branches.

HOUSING

Mr. Thomas Adams will address you on 'Housing in Canada,' and I will only refer briefly to the subject. The Dominion Government has appropriated \$25,000,000 for housing, to be expended

under the direction of the Housing Committee of the Cabinet, and, on December 12, Mr. Adams was appointed to assist the committee in carrying out this very important work.

In Great Britain, it has been found that the shortage of houses exceeds 300,000, and the Government is going "full steam ahead with building," to quote Dr. Addison, President of the Local Government Board.

A general scheme for the Dominion, drawn up by the Housing Committee, has been approved by the Provincial Governments and is now being used as the basis of legislation for each province. This scheme has received general approval both in Canada and in the United States.

The Order in Council authorizing the loan of \$25,000,000 provides: (a) Upon request, the Minister of Finance may make loans to the Government of any province of Canada; (b) the maximum amount loaned to any one province shall be the proportion of the \$25,000,000 which the population of said province bears to the population of Canada; (c) maximum period of loan shall be 20 years, the provinces being permitted to repay whole or part of the principal at an earlier date if they so desire; (d) interest shall be charged at 5 per cent, payable half-yearly upon advances from the dates thereof, respectively; (e) bonds, debentures or other forms of security, if approved by the Minister of Finance, may be accepted as evidencing the indebtedness of any Provincial Government; (f) advances shall be made from the War Appropriation; (g) advances may be made as soon as a general scheme of housing shall have been agreed upon between the Dominion Government and the Government of the province applying for a loan.

Loans will be granted to Provincial Governments on the following four conditions:

1. Each province shall submit to the Federal Government, for approval, a general housing scheme, setting out the standards and conditions to be complied with in connection with local housing schemes.

2. As the object is to facilitate the erection of dwellings, at a moderate cost, for workingmen, particularly returned soldiers, the following maxima have been fixed:

- (a) Detached or semi-detached dwellings, with walls constructed wholly or partly of frame, stucco on frame, brick veneer, inclusive of the capital value of the site and necessary local improvements: with 4 or 5 rooms, exclusive of bathroom and summer kitchen, \$3,000. With 6 or 7 rooms, exclusive of bathroom and summer kitchen, \$3,500.
- (b) Detached, semi-detached, groups of three or more or duplex (cottage flat) dwellings, with walls of brick, hollow-tile, stone or concrete, and roofing of fire-proof materials, inclusive of the capital value of the site and necessary local improvements: with 4 or 5 rooms, exclusive of

bathroom and summer kitchen, \$4,000. With 6 or 7 rooms, exclusive of bathroom and summer kitchen, \$4,500.

3. Public money may be advanced for building houses on sites owned by (a) The Provincial Government or municipality, (b) housing societies or companies, comprising groups of citizens associated to promote good housing, dividends payable by such societies or companies being limited to 6 per cent, (c) or owners of lots for the purpose of erecting houses for their own occupancy.

4. The Federal loan will be repayable by the province over a period of 20 years, provided that it may be extended to 30 years in respect of any portion of the loan which the Provincial Government may decide to re-lend for thirty years for such purposes as purchasing land or erecting buildings of a more durable class. Repayments by the provinces on account of federal loans may be made quarterly, if so desired, or otherwise as may be agreed upon.*

The Halifax disaster occurred shortly after our Ninth Annual Meeting. Our Town Planning Adviser, Mr. Thomas Adams was requested to visit the city and prepare a report respecting the reconstruction and planning of the devastated area. The schemes recommended by him were adopted by the Relief Commission and by the City Council of Halifax. The latest information, however, indicates that the plans are not being carried out in their entirety. The first steps in connection with the preparation of a scheme for the whole city have been taken, but it is regrettable that the Relief Commission has no expert adviser.

The St. John town-planning scheme has reached the final stage but still awaits the approval of the City Council and of the Provincial Government. The results obtained are not, however, completely satisfactory, as no accurate topographical map of the area was available, and the city was unable to find the money for the surveys. We are endeavouring to induce one of the Federal Departments to undertake the work of making such surveys of the vicinity of the principal cities of Canada.

The Province of Prince Edward Island has passed into law the Town-Planning Act draughted by the Commission. When the Development Board, authorized by this Act, is appointed, Mr. Adams will co-operate with them in the formulation of a town-planning scheme for the new town of Port Borden.

At the request of Hon. Mr. Taschereau, Minister of Public Works for Quebec, Mr. Adams is preparing a draft Town-Planning Act for that province. If passed, British Columbia will be then the only province without such legislation.

Mr. Adams has supervised the town-planning of the town of Kipawa, Que., for the Kipawa Fibre Co. The present plan provides

*For further details respecting the loan for housing, see Appendix V.

for a population of 2,000 to 3,000, and provision will be made for the anticipated growth. Sewers and water mains are being laid in the sections in which the first buildings are being erected. Thus, the development will proceed evenly and gradually, the conveniences and utilities being constructed to serve built-up sections instead of the usual method, namely, providing for a mixture of buildings and vacant lots.

A Department of Municipal Affairs has been created in Quebec and doubtless will effectively co-ordinate the work of the municipalities.

We are urging that Montreal build a model village, erecting, say, 50 types of houses, thus illustrating in the most forcible and practical way the best ideas in housing and town-planning.

An amended Planning and Development Act has been passed in Ontario which, while an advance on previous Acts, does not go as far as is desirable. We are urging that this act be further extended and widened.

Plans of Hawkesbury Garden Village, Ojibway and Hamilton have been submitted to Mr. Adams for approval and comment. He has also been consulted respecting town-planning and housing at Renfrew, Oshawa, Belleville, London, Chatham, Windsor, etc.

The Ontario Government has appropriated \$2,000,000 for housing, to be loaned to municipalities, and a strong committee has been appointed to prepare a report on housing.

During the war, the Manitoba Government has not taken action under its Town-Planning Act, but there are promising indications that the province will appoint a director of housing and town planning. If such official be appointed we may confidently anticipate effective work.

Conferences have been had with the officials of Calgary and Edmonton respecting the threat that certain subdivisions would be taken out of those cities. Every endeavour is being made to assist them to decrease their financial difficulties. To quote Mr. Adams: "The idea is that the land will be planned in such a way that the money now being wasted on local improvements will be saved in the future by carrying out such improvements as will be required to deal with the growth of the population and not with the extraordinary pictures conceived by real estate owners with vivid imaginations."

PUBLIC HEALTH

As Colonel Hodgetts will address you on the general subject of Public Health, particularly with reference to advances made during the last five years, a brief reference will suffice.

**Benefits to Health
due to War**

With so much of evil resulting from the war, it is a satisfaction to find some good results from it. The *Lancet* states that, in Great Britain, functional nervous diseases among the civil population practically disappeared. In Vienna, it was found that all degrees of diabetes were favourably influenced; in males almost without exception and in females, frequently but not universally. Whereas not one of 39 slight diabetics before the war could be regarded as cured, 33 out of 39 became sugar-free under war conditions.

The *Lancet* does not speculate why these good effects were produced. The starvation method of treating diabetes may throw some light on the matter, but it is also not improbable that the great mental and nervous strain involved in the concentration of the mind on outside circumstances may have reacted favourably upon the whole economy.

**Work of
British Medical
Research Council**

On the other hand, many nervous affections, that it is customary to call 'shell shock,' have affected our soldiers. As a result of the work of the British Medical Research Committee, it is now possible to take a wider and a more hopeful view of the nervous diseases of the war. Incidentally, mental disease generally has passed from the region of mere expectancy to a reasonable anticipation of beneficial results under proper treatment. Here, again, the war has left a legacy of benefit.

**New Medical
Diagnosis**

The *London Times* points out that, during the last four years, a new medicine, which fundamentally alters the whole attitude to disease, has arisen. A few years ago disease was supposed to be either acute or chronic, infectious or non-infectious, curable or incurable. The patient was said to have dyspepsia or lumbago or Bright's disease or any other disease.

In so stating it, the doctor was, as a rule, only saying that a certain organ had broken down and had become the seat of 'fibrous change,' just as the feet become the seat of fibrous change when corns grow on them. In that conception, the fibrous change constituted the whole disease and was not, as we now know, one of the results of the disease. Doctors thought of the heart or liver or lungs when they should have been thinking of great bodily changes due to assaults upon the whole organism.

**Advances in
Bacteriology**

Bacteriology has demonstrated that infection with certain germs will result in certain fibrous changes which we call disease. Though it had been recognized that such diseases as tuberculosis and syphilis were of bacterial

origin, till recently, the old conceptions respecting many affections, such as heart disease, still prevailed.

The war revealed young men with all the symptoms and signs of heart disease, kidney disease, etc., but the fibrous change was absent. The majority of these men recovered, though suffering from what we had hitherto called 'incurable' diseases.

Germ's the Basis of much Disease Dysentery, trench fever, scarlet fever and other diseases were found to be followed by heart and other organic troubles, which showed that these diseases were due to the invasion of the body by germs. It became evident, therefore, that the so-called fibrous changes, are, in reality, signs of Nature's struggles against disease.

The new medicine does not shake its head over heart murmurs; it seeks the infection, whether in the teeth or throat or alimentary tract or elsewhere, and attempts to eradicate it. "The shining truth, that, if we can prevent or stay infection, we can probably prevent all the effects of infection—that is to say, the bulk of disease—has not yet been seen by all. When it is seen, it will no longer be necessary to conduct an A1 Empire on a C3 population."*

Chronic Disease Due to Teeth The new medicine has demonstrated that the public should concentrate their attention on one disease almost above all others, namely, decay of the teeth. This disease lowers the health of the child and predisposes it to tuberculosis and disease generally. It is estimated that at least 20 per cent of all chronic disease in Great Britain is due to the teeth.

The president of the Dental Association of New Zealand, in urging the establishment of dental bursaries, stated that 95 per cent of the school children of New Zealand had dental caries. He said that, if cows were similarly affected, they would not be tolerated for one month.

Dr. Sim Wallace, the dental surgeon, states that the chief cause of dental disease is the "adhesive and easily fermentable nature of the modern diet; also meals between meals, and especially the bread-and-milk at bed-time. The last named leaves a poultice over the crevices of, and between, the teeth during the night;" nascent lactic acid forms, attacks the enamel and starts the disease.

*London Times, Jan. 6, 1919.

INFLUENZA

Deadlier than War

From a health standpoint, the most important occurrence during 1918 was the world-wide epidemic of influenza and pneumonia. Had the same death rate prevailed during the four-and-a-half-year period commencing July, 1914, it would have caused the deaths of 108,000,000 persons, or five times deadlier than the war. The medical correspondent of the *London Times* says that "never since the 'Black death' has such a plague swept over the world, illustrating, as never before, the need of a new survey of health measures."

It has been stated in the press that game in northern Saskatchewan is being 'decimated' by influenza, that moose are dying from it. On the other hand, scientists have found it impossible to transfer the disease to any of a long list of animals; monkeys alone showed a toxic effect, but true influenza did not develop. These investigators assert that the disease which attacks animals is what is commonly known as epizootic, which, a quarter of a century ago, attacked horses, and thus seriously affected transportation in Canada and the United States.

GOITRE

Investigation Undertaken

Alarmed by statements respecting the prevalence of goitre in Alberta and British Columbia, and its baneful effects, the residents of these provinces requested the Commission to investigate this question. Enquiry among some of the best authorities indicated that there was no foundation for the 'scare,' and we were naturally averse to the expenditure of money and time on an investigation which did not promise commensurate results. Eventually, as we were requested by the Provincial Board of Health of Alberta and, as the alarm, instead of decreasing, seemed to be increasing, we agreed to investigate it. It would obviously have been improper to request that the enquiry be undertaken by any one who had taken part directly, or indirectly, in the discussion of the occurrence of goitre in Alberta. We, therefore, requested Dr. Shepherd, of Montreal, Emeritus Professor and late Dean of the Faculty of Medicine, McGill University, and one of the highest authorities in North America, to undertake the investigation. Dr. Shepherd agreed to do so, visited Alberta, and calmed the apprehensions of the people respecting the prevalence and the effects of the common form of goitre. Later, Dr. Shepherd contributed a pamphlet on *Goitre*, which is now in the press and will be issued at an early date. It is proper, also to acknowledge the indebtedness of the Commission and of the people

of Canada to Dr. Shepherd for his valuable services, which have been rendered without remuneration, other than his travelling expenses, and were rendered when his time was fully occupied with his work on the Hospitals Commission.

FORESTS

At the present time we are expending more money upon the investigation of our forests than upon any other resource. Bearing in mind the important part that timber will play in the work of reconstruction, it is peculiarly fitting that we plan to maintain and to increase its economic importance.

Forests and the War

The importance of forests in the war is well known, but, only since the armistice, have we known that cutting in France had reached such a stage that continuance of the war would have necessitated commencing operations in mountainous regions, heretofore considered inaccessible. In Great Britain at the end of the reserves of firs and pines, the trees in greatest demand for military requirements, was in sight. To repair the cutting during the war the British Government has appointed an authority with power to make arrangements for developing afforestation in the United Kingdom. This authority has power to obtain seed, raise nursery stocks, train foresters, make surveys, and initiate schemes of afforestation and replanting and to expend up to \$500,000 for these purposes.

Canadian Forestry Corps

The operations of our Canadian Forestry corps in Great Britain and France are reported to have saved ocean tonnage sufficient to carry food for 15,000,000 people. In addition, these men will return to Canada with a new viewpoint. The destruction of the forest by fire will no longer be regarded as unimportant. They will return with a tremendously increased realization of the importance of our forests.

Statesmen and business men have repeatedly emphasized the part that the further development of our natural resources must play in reconstruction after the war. Any such programme must take full account of the forest. Such increased development will assist materially in providing against unemployment, through the building up of new forest industries, in addition to the 5,000 wood-using industries already in existence. It will be a large factor in stabilizing economic conditions generally.

Export Trade in Timber

A large export trade is particularly essential to Canada, to redress her unfavourable trade balance. In this direction, our forests hold a position of peculiar strategic importance, both actual and potential. In British Columbia, for example, it has been shown that the annual lumber cut can be

increased five-fold, under good management, without impairing the forest capital stock. This means an enormous export trade, to which the shortage of shipping is still the greatest obstacle.

The present and potential value of Canada's export lumber trade is indicated by the order recently placed by Great Britain for lumber from Canada, aggregating around \$40,000,000 in value. It has been estimated that reconstruction in France and Belgium will require 25,000,000,000 feet.

Pulp and Paper Industry

Mr. F. J. Campbell, President, Canadian Pulp and Paper Association, estimates the value of the output of Canadian pulp and paper mills during 1918 at \$110,000,000 to \$115,000,000, as compared with about \$85,000,000 in 1917. During the half-year ending September 30, 1918, Canada exported pulp and paper to the value of \$40,636,919, as compared with \$31,074,168 during the corresponding period of 1917 and \$20,040,745 in the same half-year of 1916. If our exports were maintained at the same rate during the second half of the fiscal year they would aggregate about \$80,000,000, or, allowing for a decrease since the armistice, say \$70,000,000. During the six months ending September 30, 1918, we exported 980,652 cords of pulpwood, valued at \$9,327,901, or at the rate of \$18,750,000 per annum.

In 1917, the output of the 3,000 timber and woodpulp plants in Canada aggregated 4,142,711,000 feet. The total cut of spruce was 1,466,558,000 feet; white pine, 791,609,000; Douglas fir, 706,996,000, and hemlock, 332,722,000.

One-fourth of the newsprint used in the United States comes from Canada, and fifteen per cent of the pulpwood consumed in that country is the product of Canadian forests.

Forests must be Recognized as a Crop

As repeatedly stated by Dr. Fernow and Mr. Leavitt, transmuting the wealth-producing possibilities of our forests into permanent actualities requires the general acceptance of the fundamental principle that the forest is a crop rather than a mine, and that cutting operations on non-agricultural lands must be conducted always with a view to the perpetuation of the forest as such.

The practice of silviculture is still in its veriest infancy in Canada, as it is over most of North America. There is still far too strong a tendency toward the practice of forestry anywhere except in the woods. At the same time, it must always be realized that forestry is essentially a business proposition, and that business considerations place definite limitations upon what it is feasible to do in the direction of intensive methods.

On the other hand, the forest lands of Canada are predominantly Crown lands, and are, therefore, for the most part, the property of the people of the country. It follows that the public interest, from a long-time viewpoint, should govern in determining the conditions under which exploitation should take place. With the present increased stumpage values many things in the direction of better management are now becoming economically feasible which would have been out of the question in years past.

Notwithstanding war conditions, remarkable progress toward better forest conservation has been made during the past year. Mention of these developments may serve to accentuate the respects in which action is still most urgently required.

NOVA SCOTIA

Provincial Forester Required A conference, under the auspices of the Canadian Forestry Association, was held at Halifax in December last. The necessity of appointing a Provincial Forester was emphasized by the severe fire losses in Nova Scotia in 1918. This appointment was authorized in 1913, and it is hoped that, by a co-operative arrangement with the Agricultural College at Truro, and a small contribution by the lumber interests, it will be made. Improvements in the administration of the fire laws were suggested.

As nearly all the forest lands in the province are in private ownership, it is highly desirable that an educative campaign be carried on, urging forest fire prevention. In addition to this campaign, the Provincial Forester, by co-operating with the Dominion Railway Commission, could render very valuable assistance in preventing fires along railway lines in the province.

NEW BRUNSWICK

The most important development has been the enactment of legislation respecting forestry and forest fires. The Provincial Forester is now charged with forest protection, forest surveys, land classification, enforcement of cutting regulations, scaling timber and enforcement of fish and game laws, thus giving him more comprehensive powers than any other forestry official in Canada.

Advancement in Forest Service The adoption of the merit system of appointment to the Forest Service, under civil service restrictions, ensures the high degree of efficiency that the Commission of Conservation has steadily advocated since its inception.

The timber sales policy with reference to limited areas of timber has been adopted. This system is also in operation in British

Columbia for timber areas of limited extent and for all areas in Dominion forest reserves. The 400 square miles disposed of on the timber sales basis last year yielded from \$5.50 to \$7.75 per M., as compared with an average of less than \$3 for spruce, under the old system.

Forest Survey and Land Classification	In 1918, forest surveys and land classification of 465,000 acres were completed; the total area thus examined to date is 1,665,000 acres, or 22.2 per cent of the Crown lands. The cost last year was slightly over 3 cents per acre.
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QUEBEC

The field of operations of the Provincial Forest Service has been much increased by the addition of the administration of fire protection, including the railway fire protection work.

Work of Fire Protection Associations	It is gratifying to note that approximately 80 per cent of the licensed timber lands of Quebec is protected by the St. Maurice Valley, Ottawa River, Laurentian and Southern St. Lawrence Forest Protective Associations. The efficiency of their work has steadily increased, through improved personnel, education of the local public, increased use of modern equipment, and improved means of transportation.
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Legislation to compel fire patrol on unprotected licensed lands is contemplated. Lack of adequate patrol on lands within association territory but not held by members of an association, constitutes a danger to surrounding territory.

The Provincial Forest Service has established a fire-ranging system in the Abitibi district, along the Transcontinental railway, west of Parent, and north of the territory of the Ottawa River Association. In this area, 18,500 acres of settlers' slashings were burned under permit, with no loss of green timber.

ONTARIO

During 1918, a maximum number of 1,044 fire rangers were employed. They were directed by 32 district chiefs, assisted by 41 deputy chiefs. There are four inspection districts, with headquarters at Cochrane, Nipigon, Sudbury and Parry Sound, under the general supervision of the general superintendent of fire protection at Sudbury, the whole organization being directed by Mr. Zavitz, Provincial Forester, Toronto.

Of the 30,172 acres burned during 1918, 60.5 per cent was logged-over land, containing hazardous slash, indicating the urgency of the disposal of logging slash.

Settlers' Permits for Burning For settlers' clearing fires, principally, 9,590 permits were issued during 1918—an increase of 175 per cent over 1917. The fire-fighting equipment was materially strengthened, and 304 miles of trail was constructed. One-fourth of the forest revenue from the Crown lands of the province—\$500,000—was appropriated for the work of the Forest Branch.

A Civil Service Commissioner has been appointed in Ontario. As, however, his authority only extends to employees receiving \$1,000 per annum and upwards, he has no control over fire-rangers who are employed for the summer only. As the regulations in effect in New Brunswick, British Columbia and in the Federal Forest Service include fire rangers, it is hoped that the Ontario law will be amended to cover such employees.

Supervision over Cutting To perpetuate the forest through wise use, supervision over cutting operations on all Crown lands should be placed under the Provincial Forestry Branch. Similar action has been taken in New Brunswick, Quebec, British Columbia and in the Dominion forest reserves, exclusive of licensed lands. In the United States the Forest Service is in full charge of cutting operations on 160,000,000 acres of National forests. Leaving technical work of this nature in non-technical hands means, simply, that the forests are administered for immediate revenue only, and that their perpetuation receives little, if any, consideration.

DOMINION LANDS

Abolition of Patronage The most important development has been the abolition of the patronage system. Both field and office staffs of the Dominion Forestry Branch are now under the merit system of appointment, and governed by Civil Service regulations. This very important reform has been steadily advocated by the Commission of Conservation for years past, and nothing but increased efficiency and economy can result from it.

Alberta Fire Legislation Requires Revision Improved forest fire legislation is now in effect in Manitoba and Saskatchewan. It is hoped that Alberta will also revise its legislation to make it more applicable to the northern portion of the province. The introduction of the permit system of regulating settlers' clearing fires is necessary to prevent serious damage to

the forests. Revision of the Prairie Fires Ordinance along lines advocated by this Commission is also anticipated.

Representations have been made to the Government of Alberta* respecting its provincially-chartered railways, aggregating some 350 miles, which are not under the jurisdiction of the Dominion Railway Commission, nor is there adequate provincial legislation respecting railway fire prevention and protection.

We have again to deplore the anomaly whereby the Dominion Forestry Branch, with its staff of trained foresters, has no control over cutting of timber on licensed lands in the forest reserves.

* Since the annual meeting, the Legislative Assembly of Alberta has taken action along the lines suggested. By the Statute Law Amendment Act (Bill No. 63 of 1919), effective May 17, 1919, Alberta has, partly as a result of representations made by the Commission of Conservation since the date of the annual meeting, taken partial action with respect to the recommendations submitted by the Committee on Forests. Section 17 of said Act (amending the Railway Act) authorizes the Board of Public Utility Commissioners of Alberta to make regulations with respect to the use of fire-protective appliances on locomotives on provincially-chartered railways. Section 19 (amending the Prairie Fires Ordinance) authorizes the Chief Fire and Game Guardian of the province to make regulations with regard to fireguards and the use thereof by railway companies, and as to the patrol of any line of railway and neighbouring land. Action with respect to the permit system of regulating settlers' clearing fires still remains for the future.

The portions of Bill No. 63 of 1919, above referred to, are as follows:—

"An Act to amend The Factories Act, The Liquor Act, The Soldiers' Home Tax Exemption Act, and certain other Acts and Ordinances."
(Assented to April 17th, 1919.)

17. THE RAILWAY ACT, being chapter 8 of the Statutes of Alberta, 1907, is amended as follows:

3. Section 2: By adding thereto the following new clause:

" 23. 'Board' shall mean the Board of Public Utility Commissioners."

7. Section 192: By adding to subsection 4 thereof the following:

"The Board may make regulations with respect to the use on any engine of nettings, screens, grates, and other devices which may be deemed by the Board necessary and most suitable to prevent, as far as possible, fires from being started, or occurring upon, along, or near the right of way of any railway subject to the provisions of this Act."

19. THE PRAIRIE FIRES ORDINANCE, being chapter 87 of the Consolidated Ordinances of the Territories, 1898, is hereby amended by adding as section 11a the following:—

" 11a. The Chief Fire and Game Guardian may make regulations with regard to fireguards and the use thereof by railway companies, and as to the patrol of any line of railway and neighbouring land. Such regulations shall, unless the Lieutenant Governor in Council shall otherwise direct, conform, as nearly as the circumstances of the case permit, to the regulations issued by the Railway Board of Canada with respect to the same subject matter."

BRITISH COLUMBIA

Wood Products Laboratory Established The timber-testing laboratory, recommended by us in 1916 and 1917, has been established under a co-operative arrangement between the Dominion Forestry Branch, the Imperial Munitions Board, and the University of British Columbia. Attention has been devoted to war work, principally timber for aeroplane manufacture. It is understood that future work will be supplementary to that of the Forest Products Laboratories at Montreal, particular attention being given to local problems of wood utilization.

Last spring a forest-ranger course for returned soldiers was inaugurated at Vancouver. This winter an extended course will be given.

The Provincial Forest Branch secured a hydroplane for patrol work in the Coast district, but, unfortunately, it was wrecked before it was available for use in the field. The branch is using light automobiles and gasolene launches in patrol work, with excellent results.

AIRCRAFT FOR FORESTRY WORK

The tremendous development of aircraft during the war, and the impending disbandment of our very efficient air force, has directed attention to the possible uses of air machines in times of peace.

Among other suggested uses are forest-fire patrol and photography. It is anticipated that during the coming season, hydroplane fire patrols will be established by the British Columbia Forest Branch, by the St. Maurice,* and, possibly, by other forest protective associations.

Aerial Photography for Survey Work For aerial photography the maximum of result could probably be obtained in connection with work in our northern territories, where the canoe constitutes practically the only means of transportation. Airmen, in conjunction with a surveying party, operating along canoe-routes, could obtain valuable information respecting the country on both side of the routes traversed by the surveyors, particularly as such areas are often practically inaccessible by land except at a disproportionate cost of time, money, and energy.

If such aerial work is to be carried out, the services of our disbanded airmen should be procured, and the value of such work determined by experiment. If not carried out on too large a scale, the cost would not be excessive.

*The *Toronto Globe*, April 30, 1919, states that the St. Maurice Association "has made an arrangement whereby two hydroplanes will start on the task of patrol work of their forests by June 1st."

RAILWAY FIRE PROTECTION

National Railway System under Railway Commission Though the Canadian Northern system has been absorbed by the Canadian Government railways, its lines are still subject to the Railway Commission. It is understood that, during next session of Parliament, legislation will be had which will place the Transcontinental, Intercolonial and Prince Edward Island railways under that Commission.* Such action would increase the railway mileage under the jurisdiction of the Railway Commission from 85 per cent, as at present, to 96 per cent. Notwithstanding conditions created by the war, fire losses due to railway agencies have remained satisfactorily low, with some local exceptions.

As it is a reform the Commission has steadily advocated since its very inception, members of the Commission will be pleased to hear that this legislation is at last to be had.

WHITE PINE BLISTER RUST

This disease has a firm foothold in Ontario south of lake Nipissing, and, in Quebec, it has been found on the currant and gooseberry. Controlling the disease involves the eradication of wild and cultivated currants and gooseberries in and near the region to be protected.

Protection in British Columbia

To protect the white pine of British Columbia, an order in council should be passed prohibiting the transportation of currant or gooseberry plants or other *Ribes* from infected districts into the Prairie Provinces or British Columbia. Such shipments from the Eastern States to the Western States have been embargoed by the United States Government, and similar action by Canada is necessary, particularly as the effect on the nursery business is negligible.

Fungous Diseases

The very serious injury to our forests from fungous and other diseases urgently demands the appointment of a forest pathologist to study such diseases in co-operation with the Division of Forest Insects of the Dominion Entomological Branch. Investigation has shown that logging slash constitutes a breeding ground for destructive insects and fungi, and that the losses due to such insects and fungi are very much greater than the losses by fire.

*Since the foregoing was written, Bill 70, "An Act to Incorporate Canadian National Railway Company and respecting Canadian National Railways", has been assented to. Section 14 of Bill 70 provides that:

"Notwithstanding anything in the *Government Railways Act* or any other Act, the provisions of the *Railways Act* respecting the operation of a railway (as distinguished from the provisions of such Act respecting the construction or maintenance of a railway) shall apply to such of the Canadian Government Railways as would but for the passing of this Act be subject to the *Government Railways Act*, during such time as the operation and management thereof is entrusted to the Company under the provisions of this Act."

In this connection also we desire to acknowledge our indebtedness for the assistance we have received through the able co-operation of Dr. C. Gordon Hewitt, Dominion Entomologist, and of Mr. J. M. Swaine, Chief, Division of Forest Insects, Entomological Branch.

FOREST PLANTING

The large areas of non-agricultural lands that have been completely denuded of forests by unwise methods of cutting, or by fire, can only be restored to productivity, in a reasonable length of time, by planting.

Forest Planting by Pulp Companies

In Quebec, the Laurentide Company and the Riordon Pulp and Paper Company have realized that Nature, if unaided, makes very slow progress toward restoring the pulpwood species on cut-over lands. To date, the Laurentide Company has planted 680,000 trees, mostly spruce, on 453 acres. The company expects to plant 500,000 in 1919, 700,000 in 1920, and 1,000,000 in 1921. The Riordon Company has planted 780 acres to spruce and pine. From 1920, the company expects to plant 1,000,000 spruce and 100,000 white and red pine per annum.

In 1918, the Quebec Government nursery at Berthierville supplied 2,000,000 trees to private land-owners, mostly farmers and pulp companies. The capacity of this nursery is to be increased to 5,000,000 trees per annum.

REPORTS AND FIELD WORK

The report on the *Forest Resources of British Columbia*, by Dr. Whitford and Mr. Craig, is now in the hands of the binder, and will be ready for distribution at an early date. Like all other publications, it has been much delayed by the labour shortage caused by the war.

The report on the *Forest Resources of Saskatchewan* has been delayed by the illness of the author, Mr. J. C. Blumer. Though Mr. Blumer has not been restored to complete health, he is making such progress that we hope to receive the final instalments of manuscript at an early date.

Survey of Ontario Forests

The survey of the forest resources of Ontario has been suspended, owing to the transfer of Mr. Craig to the Ministry of Munitions, to take charge of the inspection of aeroplane spruce lumber in British Columbia. Mr. Craig will return to the Commission at an early date, and will take up the collection and correlation of data respecting the forests of Ontario.

FOREST RESEARCH

As this question is to be discussed by Dr. Howe, my reference to this investigation will be brief. Our research work in co-operation with the Laurentide and Riordon companies, and with the Dominion Entomological Branch, has been continued under the direction of Dr. C. D. Howe.

St. Maurice
Valley

Dr. Howe is making a careful study of the reproduction and growth of the pulpwood species in the St. Maurice valley, Quebec. As he finds that present methods of cutting in Eastern Canada are destructive and that there is no adequate provision for the future, he is endeavouring to ascertain what modifications of cutting methods are necessary to secure adequate reproduction and growth. Unless checked, the increasing predominance of the hardwood in the mixed forests will, eventually, eliminate the spruce and balsam as commercial species. Apparently, logging the hardwoods as well as the conifers is the only solution of the problem.

Dr. Howe's investigations show that, under the cover of hardwoods, the average 4-inch balsam in the St. Maurice valley is 55 years old, the average 8-inch tree is 70 years old, and it was 80 years old at 10 inches in diameter, breast high. At 4 inches in diameter, the average red spruce was found to be 80 years old; at 8 inches, 120 years old, and at 12 inches, 165 years old.

Lessons from
Growth Studies

The crucial point is Dr. Howe's statement that our growth studies, so far as they have been made, indicate that, with the exception of the white birch-balsam type, the trees of the smaller diameter classes grow so slowly that they cannot be depended upon to reach commercial size during a period within which the lumberman can afford to hold his limits. More data must, of course, be obtained before we can say that this conclusion has been carried to a demonstration.

It is not too much to say that this investigation of our pulpwood resources—which we trust will determine the measures necessary to ensure their perpetuation—is one of the most important questions now in progress by the Commission or any other governmental organisation, and we can congratulate ourselves upon being the pioneers in this matter, inasmuch as we initiated it early in 1917.

Work of
Commission
Endorsed

The value of our investigations has been recognized by the Pulp and Paper Association, as well as by financial contributions from the Laurentide and Riordon companies. The Abitibi Power and Pulp Co. has also discussed the possibility of a similar co-operative arrangement respecting inves-

tigation of conditions on its limits, and it is not improbable that this work will also be undertaken. As the tree species on the Abitibi Company's limits differ materially from those on the Laurentide and Riordon areas, such investigation would yield results of much value with reference to that type of forest.*

That means that we shall be able to extend our investigations into that portion of Ontario lying to the north of the height-of-land.

AEROPLANE LUMBER PRODUCTION

Prior to the entry of the United States into the war, large amounts of Sitka spruce for aeroplane manufacture were purchased from United States brokers, nearly all of which was obtained from the forests of Washington and Oregon. In 1917, the requirements of the aeroplane factories of the United States reduced the spruce available for export to an amount that jeopardized the air programme of the Allies, and the Imperial Munitions Board in Canada was requested to secure 24,000,000 feet of aeroplane lumber.

Supplies of Sitka Spruce

In connection with our report on the *Forest Resources of British Columbia*, we had procured data which showed that there was, in that province, 14,165,345,000 board feet of Sitka spruce, of which approximately 34 per cent was in the Queen Charlotte islands and 31 per cent on the Northern Mainland coast. Most of this information was based upon confidential data but, by loaning our Forest Engineer, Mr. R. W. Craig, to the Munitions Board, these data were made available without breach of confidence.†

Owing to the rigid specifications, particularly as regards straight-grained wood, only a small percentage of the lumber which could be used for ordinary purposes was suitable for aircraft. In addition, practically all the available timber had been alienated, the owners were not prepared to operate their limits and the saw-mill capacity in northern British Columbia—the area which contained 65 per cent of the Sitka spruce—was inadequate.

*Since the above was written, the following telegram has been received from the Abitibi Pulp and Paper Company:

"It is our intention to begin a reforestry programme this year along the lines discussed with you here and desire co-operation of your department."

†Under date March 20, 1919, Brig. Gen. W. E. Edwards, Director of Inspection, Imperial Ministry of Munitions, wrote that, owing to the termination of the war, Mr. Craig would shortly be able to return to the Commission. Gen. Edwards added:

"I desire to express my obligation to your Commission for the loan of Mr. Craig's services. He has filled a difficult position, in which his expert knowledge has been invaluable, with great credit".

Cutting rights were granted by order in council, mills that had been closed were re-opened, new mills were erected, and tugs, gasolene launches, scows and barges were chartered to transport the lumber.

Increase in Production The production of spruce increased from 116,000 board feet in January, 1918, to 6,850,000 feet in December; the production of Douglas fir increased from 209,000 feet in January to 1,382,000 feet in December. Total production in 1918: Spruce, 26,124,000 feet; fir, 9,224,000 feet.

Owing to the shortage of spruce, Douglas fir was used for wing-beam stock. It was selected from commercial stock at the mills, the recovery averaging only two per cent.

Best Timber from the Old Trees The supply of Sitka spruce for aeroplane manufacture is so limited that it is estimated that cutting, on a war basis, for another year, would have practically exhausted all the wood that is procurable at a reasonable expenditure of money and effort. Obviously, steps should be taken to conserve the remaining supplies of this material. Cutting it for pulp or commercial lumber should be prohibited. Only the large trees contain the clear, fine-grained lumber required. Most of the aeroplane material was obtained from trees 500 to 800 years old, and such trees cannot be replaced for centuries, if ever.

LANDS

Our work in connection with the Committee on Lands has included: (1) The continuation of the illustration work in Dundas county, and (2) general publicity work.

ILLUSTRATION COUNTY WORK

During 1918, the work on the 16 farms in Dundas county, where better farming methods are being practised, included the following:

1. System and methods of farming, embracing planning, crop rotation, seed and variety selection, tests of different thicknesses of clover seeding, tillage, live stock and manure.
2. Labour, machinery and equipment.
3. Business methods—selling, buying, co-operation.
4. Educational work—schools, clubs, school fairs.

Going to the Farmer At our First Annual Meeting the late Mr. C. C. James said that the solution of the problem of better agriculture was not the taking of the farmer to the experimental farm but the taking of the experimental farm to the farmer. The latter was the policy adopted by us in initiating illustration

farms in each province. Later, we transferred these farms to the Dominion Department of Agriculture, that they might be extended and carried on on a much larger scale than our limited financial resources would permit.

Results already Apparent In Dundas county—which was selected as being a typical area, and easily accessible from Ottawa—we have 16 illustration farms in the four townships which constitute the county. We can now see the results of work done on our advice, such as the effect of adding lime to the land prior to growing clover, results from thick seeding and from thin seeding of clover seed, from the use of certain varieties of seed, particularly of barley, oats, potatoes and corn. For instance, we demonstrated that seeding with potatoes grown in Northern Ontario or New Brunswick increased the yield by from 15 to 100 per cent as compared with potatoes grown from southern Ontario seed.

Our Agriculturist, Mr. F. C. Nunnick, has held numerous meetings on our illustration farms in Dundas county, all of which have been well attended. The large numbers of farmers at these meetings, and the interest shown by the questions and discussions, demonstrate, if demonstration were needed, the great value of our work in this area.

Unfortunately, the excessively wet weather experienced in Eastern Ontario last autumn prevented the harvesting of many fields of corn and potatoes, the crops rotting in the ground.

Farmer's Account Book Advice respecting greater use of agricultural machinery and of labour-saving devices has resulted in much greater use of these highly efficient aids to agriculture. During the year a Farmer's Account Book was published. It is exceedingly simple and has been in great demand, particularly in Manitoba, Saskatchewan and Alberta. Other farmers' account books have been published from time to time, but have failed because they were too complicated to secure adoption by the average farmer.

Our Agriculturist has given addresses at numerous points throughout Canada. At the fair at Winchester, Dundas county, the Commission had a tent containing an educational exhibit of crops grown on the illustration farms and an automatic projector showing results obtained by improved agricultural practice.

WATERS AND WATER-POWERS

During the year the shortage of electric energy for power purposes in southwestern Ontario continued to affect production. It curtailed natural growth; a number of new enterprises which desired to obtain power were unable to do so, and municipalities receiving energy from the Niagara system of the Hydro-Electric Power Commission were required to reduce their consumption by from 15 to 30 per cent of their maximum demands in December, 1917. Though the cessation of the manufacture of munitions will release some 30,000 to 40,000 h.p., this power will be absorbed by the municipalities and by power-users whose demands have been curtailed.

All the water at Niagara Falls allotted to Canada and the United States under the Boundary Waters Treaty—56,000 cub. ft. per sec.—has now been apportioned to the various development companies. Certain interests are now urging that the treaty be amended to permit the diversion of a larger quantity of water, one proposal being that each country be permitted to divert 60,000 cubic feet, or 120,000 cubic feet in all.

SENATOR EDWARDS: How much power would that be altogether?

Mr. WHITE: It depends very much upon the head under which it is utilized: at the present time, 56,000 second-feet is developing about 650,000 horse-power; 120,000 cubic feet per second would yield about 1,400,000 horse-power, if only the head at the falls were utilized. If it were developed on the same plan as the Chippawa, and operated under a head of 305 feet, the proposed total diversion of 120,000 second-feet would yield approximately 3,600,000 h.p. Of course, these are calculations that I am making off-hand. However, it is not necessary to divert any more water to double the power output at Niagara Falls, because, if adequate power is not obtained by means of the present diversion, it can practically be doubled by utilizing the water in the same way as the Ontario Hydro-Electric in their Chippawa-Queenston development, namely, by using the descent in the rapids above and below the falls as well as the fall in the cataract itself.

The Chippawa-Queenston development of the Hydro-Electric Extension will consist of 6 units of 50,000 h.p. each, or 300,000 h.p. in all, operating under a net effective head of 305 feet. In other words, the output of the Chippawa plant will be equivalent to 80 per cent of the present output of all the plants on the United States side of Niagara Falls. It will use 10,000 cubic feet per second, conveyed through $4\frac{1}{2}$ miles of

canalized river and $8\frac{1}{2}$ miles of excavated canal. The estimated cost is \$25,000,000, and it is hoped that it will be completed in 1921.

On the United States side of the river the Hydraulic Power and Manufacturing Co., Niagara Falls Power Co., and the Cliff Distributing Co. have been consolidated. The consolidated company has a present capacity of 370,000 h.p., and an extension, to be completed this year, will contain three units of 33,000 h.p. each, an additional capacity of 100,000 h.p.

**Big Eddy
Conservation
Dam**

The most important water conservation work now under construction in Ontario is the International Nickel Co.'s Big Eddy conservation dam on the Spanish river, in Algoma district. This dam will raise the level of the river 100 feet, and will create a lake with an area of 15 square miles. Combined with the storage in the upper third of the Spanish River watershed, it will increase the minimum flow to over 1,800 cubic feet per second, or almost three times the natural low-water flow, namely, 675 cubic feet per second. It will also create a power site, where 15,000 h.p. can be continuously developed.

The engineer who designed this work, Mr. Henry Holgate, states that:

"When this work is complete, the waters of the Spanish river above the township of Hyman will be conserved to their full extent, and this will be one of the most complete systems of water conservation in Canada.

"Conserving water, and regulating flow on our streams, is one of the most important subjects we have before us, and merits the co-operation and assistance of the Government, as it should be a cardinal principle in power development that the full efficiency of the water in the watershed be made use of, and this cannot be done unless carefully considered systems of storage are provided, so as to equalize the flow as nearly as possible throughout all seasons of the year."

ST. LAWRENCE RIVER

**Private
Development in
the St. Lawrence**

Last year, the St. Lawrence River Power Co., a subsidiary of the Aluminum Company of America, constructed extensive works in the bed of the St. Lawrence river, although such action was in defiance of the terms of the Ashburton Treaty. This action was taken under permit from the United States War Department, but without obtaining the necessary consent from the Government of Canada. Subsequently, the company applied to the International Joint Commission for authority to erect—as an essential part of these structures—a submerged weir in the South Sault channel of the St. Lawrence, a short distance below the works above referred to, and asked for immediate consideration of the application as a 'war measure.'

Anchor Ice
Reduces Output

The St. Lawrence Power Co. contended that, during the winter of 1917-18, ice difficulties in the canal leading to its plant at Massena, N.Y., had reduced the output of aluminium by 7,000,000 lbs.; that there was urgent need of this metal for war purposes, and that the United States Government was pressing them to increase their production. At the same time, the cross-examination elicited the information that the construction of this dam would increase the available power at their Massena plant from its present maximum of 73,000 h.p. to 200,000 h.p. As the company estimated the cost of the dam and appurtenant works at only \$350,000, this application, if granted, would be an enormously valuable concession.

Hon. Hugh Guthrie,* Solicitor General, opposed the application on behalf of Canada. He demonstrated that, under the terms of Article VII of the Ashburton Treaty, which provides that all channels on both sides of Croil, Long Sault, and Barnhart islands shall be kept "equally free and open," the International Joint Commission had no jurisdiction unless and until the consent of the Government of Canada had been obtained. The Commission of Conservation, Canadian shipping interests, and other organizations urged most strongly that no proprietary rights whatsoever be granted to the applicant company, but that all works placed in the St. Lawrence be constructed by Canada and the United States jointly. This action was in conformity with the policy adopted by the Commission of Conservation from its inception, namely, steady opposition to the granting of control of the St. Lawrence to private interests.

Eventually, the International Joint Commission gave decision,† stating that, although they were uncertain respecting the question of their jurisdiction as affected by the Ashburton Treaty, they were granting the right to erect and maintain the dam for the duration of the war or for five years, whichever term should be longer.

For all practical purposes, the Aluminum Company of America was the applicant for this highly valuable privilege, and, therefore, a brief reference to this corporation may be of interest. This company‡ absolutely controls the manufacture of all aluminium** in North

*Hon. Mr. Guthrie's address is such a complete and convincing statement on behalf of Canada's rights and claims that it has been printed in Appendix III. See p. 65.

†The Decision is printed as Appendix IV, p. 81.

‡The *Mineral Industry during 1917*, pp. 12-13, states that, commencing with a capitalization of \$1,000,000 in 1889, it now has an authorized capitalization of \$20,000,000, on which it paid a dividend of 10 per cent in 1916; that "the company has invested about \$70,000,000 of undivided profits in its business; its present investment in plant is about \$80,000,000. The market value of its \$20,000,000 stock is probably \$150,000,000."

**For further data respecting aluminium, see Appendix I, p. 51.

America. According to the statement of its president at Montreal in August last, the company's plants have the following capacities:—

Niagara Falls, N.Y.....	35,000,000 lbs.
Maryville, Tenn.....	25,000,000 "
Badin, N.C.....	*20,000,000 "
Massena, N.Y.....	58,000,000 "
Total capacity of United States plants.....	†138,000,000 "
Shawinigan Falls, Que.....	‡20,000,000 "
Total capacity, Canada and United States..	158,000,000 "

A table published in the New York *Electrical World* states that, in April, 1914, there were 54 transmission systems in the world operating at and above 70,000 volts. Of the 27 systems in the United States, only 5 were using aluminium conductors, as compared with 22 using copper. In Canada, 4 systems were using aluminium and 1 using copper. Our report on *Electric Generation in Canada* shows that the aluminium transmission lines of 10,000 volts and over, in Canada, aggregate 13,000 wire-miles, as compared with 8,000 wire-miles of copper.

During 1918, the New York and Ontario Power Co. applied to the International Joint Commission for authority to erect a dam in the Little channel of the St. Lawrence river, near Waddington, N.Y., and to make improvements which would increase the present flow through said channel. This application is still pending.

These and numerous other problems, such as the increased diversion of water at Chicago, national saving of fuel by restrictions and economies, saving of power and light in factories, the elimination of uneconomical plants and processes, standardization, the growth of co-ordination of power production have been under consideration during the past year and will be covered by the address of our Consulting Engineer, Mr. Arthur V. White.

The subject of water-power development is receiving much attention at the present time, particularly in the United States, where 76 per cent of the total power is generated by steam prime movers. Steam also generates 72.5 per cent of the power in electric generating stations. Data for Canada respecting *total* power generated are not available, but our

**Mineral Industry*, p. 12, states that the plant at Badin "was largely increased in June, 1917 and has run at full capacity ever since. Its capacity has been stated to be 65,000 k.w., capable of furnishing 23,000 [metric] tons [50,600,000 lbs.] of metal annually."

†*Mineral Industry*, p. 13, estimates the production in the United States in 1917 at 200,000,000 lbs.

‡According to *Mineral Industry*, p. 14, the Canadian exports of aluminium in ingots and bars were "22,324,000 lbs., valued at \$7,620,953, or 34.1 cts. per lb. The production was greater than this by.... about 3,500,000 lbs." making the production at Shawinigan about 26,000,000 lbs. which is equal to 11,800 metric tons.

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June, 1917
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recent investigations show that, in the Dominion, only 13.7 per cent of the power in *central electric stations* is generated by steam. That steam has been able to hold its own in the United States, in spite of the high efficiency of water-power, is largely due to the extraordinary success of steam turbines.

On the other hand, owing to war conditions, the price of labour has increased enormously. As pointed out by Mr. Julian C. Smith, Vice President and Chief Engineer, Shawinigan Water and Power Co., "the effect on the cost of power from existing steam plants, as compared with existing water-powers, has been to practically double the cost of power from steam plants and to only slightly change the cost of power from the water-power plant previously built."*

Mr. Smith also states that the capital cost of a water-power plant is twice that of a steam plant and that, if this cost is high because of high labour costs, the water-power plant is "handicapped forever". He concludes that, for many years, steam plants will be of primary importance and water-power plants of secondary importance, but excludes from this dictum the great powers of Niagara and the St. Lawrence which have great inherent and special advantages.

Messrs. Gilbert and Pogue, Division of Mineral Technology, United States National Museum, point out that "when a ton of material passes through a manufacturing plant, it means, with due qualifications, that the railroads have hauled a ton of raw material from far and wide and will move a similar weight of products away for distribution."† They urge that, during stress of industrial expansion, the freight-hauled coal, to be used for the generation of power, may create an impossible situation. If, however, electric energy be transmitted to points where energy alone is required, transportation would be relieved of a burden of coal haulage.

Whether a steam-electric plant be already established on a steam-power basis, or whether it be desired to expand a service or to establish a new operation, the first cost is low and the chief item of operative expenditure is for fuel, which is unavoidable, but is spread over the years of operation. The legitimate capitalization, therefore, is the cost of erection and equipment of a steam-power plant.

In a hydro-electric development, however, conditions are reversed; the great burden falls on the initial cost of development. The interest upon the capital invested in the plant is much the most important item of gross operating expenses. An analysis‡ by Mr. Gano

**The Canadian Engineer*, Dec. 26, 1918, p. 551.

†*Power: Its Significance and Needs*. Bull. 102, Part 5, Smithsonian Institution, p. 10.

‡*Proceedings, American Institute of Electrical Engineers*, May, 1916, p. 585.

Dunn of the gross operating expenses of a typical steam-electric station and hydro-electric station of 20,000 h.p. each, gave the following: In the steam station, coal absorbed 48.9 per cent of the gross operating expenses and bond interest 19.0 per cent, whereas, in the hydro-electric station, bond interest constituted 77.4 per cent of the gross.

The foregoing does not appear to present an unassailable case in favour of hydro-electric development in the United States, except where an advantageous position with reference to markets and low unit cost present economic advantage. The coal-less provinces of Ontario and Quebec, however, do not present the same basic conditions, and the substitution of hydro-electric energy for bituminous coal imported from the United States for the generation of power would justify an expenditure possibly not justifiable upon purely economic grounds.

Central Electric Plants In many instances, the centralization of electric plants presents economic advantages and economies.

In Great Britain the Ministry of Reconstruction has reported on a plan of centralizing the production of electric power in Great Britain. There are some 600 private and municipal central plants for power production. The report emphasizes the wastefulness of a "system whereby a man at Hampstead cooks his breakfast by electricity from one station, travels to his office by that from a second, lights his office by that from a third, and takes lunch at a restaurant supplied by a fourth."

While it is doubtful whether the foregoing could be paralleled in Canada, there are localities where centralization of electric plants would result in substantial economies.

MINES

In July last, Mr. W. J. Dick, our Mining Engineer, resigned, to accept a more lucrative position in Winnipeg. Pending the appointment of a successor to Mr. Dick, your Assistant to Chairman has had to carry on this branch of our work as best he could. In addition, it is quite evident that we cannot get a competent mining engineer for the salary we were paying Mr. Dick.

With the exception of gold mining, the mining industry in Canada has been stimulated by the war. The figures of mineral production for the last seven years are as follows:—

1911.....	\$103,220,994	1915.....	\$137,109,171
1912.....	135,048,296	1916.....	177,201,534
1913.....	145,634,812	1917.....	189,646,821
1914.....	128,863,075	1918.....	211,301,897*

*Since the Tenth Annual Meeting, Mr. John McLeish, Chief, Division of Mineral Resources and Statistics, Dept. of Mines, has courteously supplied corrected statistics. The data respecting production have, therefore, been brought up to date.

It should be borne in mind that these great advances in values during the last three years do not represent an equal increase in tonnages, inasmuch as nearly every metal, except gold, has greatly increased in price.

Production of Coal

The production of coal increased in all the provinces except Nova Scotia. The greatest increase was in the production of Alberta to meet the deficiency caused by the war and the war measures of the United States Fuel Administration. The amount of United States bituminous coal available was much less than usual. In addition, shipments of anthracite to Canada were reduced to 77 per cent of the amount actually imported in 1917, although that amount had proved to be inadequate during the excessively cold winter of 1917-18. For Western Canada, the United States Fuel Administration gave instructions that anthracite shipments were to be reduced to 65 per cent of the tonnage usually shipped to Winnipeg and to 50 per cent of the amount normally shipped to the remainder of Manitoba; no anthracite being shipped to points west of Manitoba. The deficiency thus caused by these measures was met by the largely increased shipments of Alberta coal.

The total production of marketable coal in 1918 was 14,977,926 short tons, valued at \$55,192,896—the largest tonnage except in 1913. The production included 115,405 tons of semi-anthracite, 11,636,190 tons of bituminous, and 3,226,331 tons of lignite.

Production in Alberta increased to 5,972,816 tons, as compared with 4,736,368 tons in 1917, and 4,014,755 tons in 1913—an increase of nearly $1\frac{1}{4}$ million tons as compared with 1917, and of nearly 2 million tons as compared with 1913.

During the winter of 1917-18 statements were made in the press that it was possible to largely increase the production of coal in Nova Scotia. This optimistic view was not shared by us, and, in February, Mr. Dick was instructed to report on the probable shortage. Mr. Dick, basing his report on confidential information received from the principal mining companies, estimated that Nova Scotia would produce only 5,259,000 long tons (5,890,000 short tons), as compared with 7,980,073 short tons in the 'banner' year, 1913, a decrease of two million tons, or nearly 25 per cent. This estimate was communicated to the Dominion Government and to the Fuel Controller, Mr. C. A. Magrath. The actual production was 5,195,144 long tons (5,818,562 short tons)—practically as stated by Mr. Dick.

Mr. Hiram Donkin, Inspector of Mines for Nova Scotia, states that the falling off in the production of coal in Nova Scotia was largely due to the decrease in the number of men employed at the coal face;

59875-3½

109,171
201,534
546,821
301,897*

Division of
Statistics
corrected
up to date.

many men of this class volunteered for overseas service, and their places were filled by men whose rate of production was somewhat less.

Nickel Refining in Ontario The tonnage of nickel produced in 1918 was more than double that produced in 1914. In 1905 the yield was 18,876,315 lbs.; in 1910 it was 37,271,033 lbs.; in 1914 it was 45,517,937 lbs., and in 1918 it was 92,076,034 lbs., valued at \$36,830,414. Three-quarters of the world's production of nickel is mined in Ontario and, with an era of lower prices, the proportion is likely to increase rather than decrease. The nickel refining plant of the International Nickel Co., at Port Colborne, Ont., was put into operation in July, 1918.

Copper Production Largely Increased The production of copper was much stimulated by the enormous demand for war purposes, the greater portion of this metal being obtained from the large low-grade ores of British Columbia and the nickel-copper mines of Sudbury, Ont. The production in Ontario amounted to 23,524 tons (47,047,801 lbs.), valued at \$11,586,932. The International Nickel Co. and the Mond Nickel Co., combined, produced 23,472 tons, or 99·8 per cent of the Ontario output. British Columbia produced 31,429 tons (62,858,628 lbs.), valued at \$15,480,823. In the latter part of 1916, electrolytic refineries for copper and for zinc were put into operation by the Consolidated Mining and Smelting Co. at Trail, B.C.

Less Gold Produced The total production of gold in 1918 amounted to 710,526 ozs., valued at \$14,687,875, as compared with 738,831 ozs., valued at \$15,272,992 in 1917. The gold production of Ontario was 411,270 ozs., valued at \$8,501,705, \$247,876 less than in 1917, due to the severe handicap under which producers of this metal are operating. The Hollinger, one of the great gold mines of the world, yielded two-thirds of the Ontario production, or \$5,752,370.

Silver also Shows Decline The production of silver in 1918 is estimated at 21,284,607 ozs., valued at \$20,597,540, as against 22,221,274 ozs., valued at \$18,091,895 in 1917, a decrease of 4·2 per cent in quantity, but an increase of 13·8 per cent in value. Ontario produced 17,109,389 ozs., valued at \$16,557,098, or 80·4 per cent of the total silver production of Canada. As all but 0·3 per cent was produced in the Cobalt district, the dominant position of this area is apparent.

**Lead and Zinc
Fool War Effect**

In 1900, during the development in East Kootenay, lead production in Canada reached its maximum, 63,169,821 lbs. It declined to 18,139,283 lbs. in 1903, increased to 56,864,915 lbs. in 1905, and fell to 23,784,969 lbs. in 1911. Owing to demands for war purposes, production in 1915 increased to 46,316,450 lbs. In 1918 it was 43,846,260 lbs., valued at \$4,055,779.

The total production of zinc during 1918 was 16,832 tons (33,663,690 lbs.), valued at \$2,746,620, as compared with 14,834 tons, valued at \$2,640,817, in 1917, and 4,551 tons (9,101,460 lbs.), valued at \$474,459, in 1914.

The production of steel ingots and direct steel castings during 1918, was 1,893,000 short tons, as compared with 1,745,734 tons in 1917, and 823,641 tons in 1914.

**Advances in Use
of Magnesite**

During 1918, magnesite from the Grenville district, Que., became available for use for furnace linings, thus replacing the mineral heretofore imported from Austria and Greece. It had been assumed that, owing to the high lime content of the Grenville mineral, it could not be used, but the exigencies of war conditions induced experimental work, which demonstrated that, when properly treated, it makes a rammed or burnt-in lining comparable with the best Austrian. The total shipments of magnesite in 1918 aggregated 39,365 tons, valued at \$1,016,765, as compared with 58,090 tons, valued at \$728,275, in 1917, and 358 tons, valued at \$2,240, in 1914.

**Manufacture of
Ferro-Alloys**

One of the most important metallurgical advances is the development of the manufacture of the ferro-alloys, particularly ferro-silicon. The Electro Metals, Ltd., of Welland, Ont., is the largest electric ferro-alloy industry in the British Empire. This plant has a capacity of 48,000 tons of 50 per cent ferro-silicon, and of 25,000 tons per annum of carbon-electrodes. In addition to its use in steel manufacture, ferro-silicon, with 85 per cent silicon content, was in demand for use in the manufacture of balloon gas.

**Petroleum and
its Products**

The war has demonstrated the enormous value of petroleum and its products, particularly gasoline. In the pre-war period, large reserve stocks of petroleum were carried in the United States, but the enormously increased demand, coupled with declining production, reduced the amount on hand January 1, 1918, to about 153,000,000 bbls., although a storage of about 50,000,000 bbls. is required to fill the pipe lines and keep the industry in operation. At the same time, if consumption of petroleum in the United States were to

continue to increase at the same rate as during 1902-16, the reserves would be exhausted about 1932. Obviously, these reserves will not be exhausted, because increased prices, growing imports and other causes will prolong the life of the wells.

Gilbert and Pogue state* that from 90 to 30 per cent of the oil is left underground and that, deducting losses by fire, seepage and evaporation, probably less than 25 per cent of the petroleum underground reaches the pipe-line. If we subtract from this proportion the losses involved in improper and wasteful methods of utilization, the recovery factor becomes perhaps as low as 10 per cent.

Of the world's output of petroleum, 66,000,000 tons, the United States contributes 66 per cent, Russia about 13 per cent, Mexico about 11 per cent and the entire British Empire less than 3 per cent (2.7).

The production of Canada is 25,100 tons, or .04 of 1 per cent, of the world's production of this raw material which is indispensable to the processes of modern manufacture and transportation.

"To-day it enters into our daily life under the guise of at least 250 different and marketable commodities. It lights our lamps and stoves; it cleans our clothes; it prepares our varnishes; it acts as a substitute for turpentine in the printing, dyeing and painting industries; it invades our tables in the form of artificial butters, confectionery and a number of other edibles; it supplies us with our wax, our candles, our vaseline, our chewing gum, and a vast array of ointments, salves and drugs; it furnishes the dressing-table with perfumes and the smoking-room with matches; it imparts the final lustre to collars and shirts, and the textile trades use enormous quantities of it for finishing soft goods; it medicates our bodies and gives to preserved fruits their peculiarly toothsome appearance; it blends with animal and vegetable oils in a range of combinations almost infinite; its residue can be burned as coke or used in the manufacture of electric arc-lights or employed in road-making as a rival to asphalt; it lubricates our machinery and drives our motor-cars, our ships, our aeroplanes, our locomotives, our ploughs and tractors. By means of it every form of transportation on land, in the air, on the sea and below the sea, has been immeasurably extended and in many instances revolutionized. There must be at least a hundred trades that now use oil for heat and power purposes where ten or fifteen years ago they used nothing but coal."†

At the London Oil Congress in 1912, it was shown that the *Mauretania*, for the round trip from Liverpool to New York, by changing from coal to oil would save 5,000 tons of fuel, reduce the stokehold force from 300 to 30 and would make available for cargo

**Petroleum—A Resource Interpretation*, Bulletin 102, Part 6, p. 41, Smithsonian Institution, 1918.

†*Ibid.*, p. 41.

and passengers a space of about 100,000 cubic feet, representing an earning value of \$50,000 on each round trip.

Although we have no oil-fields comparable with the Pennsylvania, Texas, Oklahoma and other fields in the United States, the chances of discovering oil in Alberta may properly be described as fair. The production of the Petrolia oil-field, in southwestern Ontario, in 1918, was 288,692 bbls., as compared with 528,959 bbls. in 1908.

**Economic
Utilization
of Coal**

Since its organization in 1910 the Commission has given special attention to the more efficient utilization of coal, the objects aimed at being the use of (1) lignite, either as mined or with the expenditure of the minimum of cost and effort in preparing it for use; (2) the more efficient utilization of coking coal in plants near large markets, producing coke and gas as primary products, and tar, ammonium sulphate, etc., as secondary products; (3) manufacture of carbo-coal; (4) pulverized fuel; (5) carbonized lignite briquettes.

Pulverized Coal

In Great Britain, the war has emphasized the enormous value of certain coals. In the Durham field, certain seams contain a coal peculiarly adapted to the manufacture of a fine hard coke, low in ash and sulphur. The Carbonization Committee of Great Britain has recommended that export of this particular quality of coal should be forbidden; that, if there is a sufficiently large reserve of coking coal to meet the demand of the British iron and steel industry, it should only be exported as metallurgical coke that the valuable by-products may be retained for use in the dye and many other valuable domestic industries. Practical difficulties in connection with mining will almost certainly prevent carrying the recommendations into effect, but it is noteworthy as indicating the great value of such coals as a national asset.

**Economies in
Furnace
Operation**

Due to the shortage of fuel, attention has been directed to the possibilities of economies in furnace operation. In large industrial establishments in the United States, it has not been unusual for expert heating engineers to effect a saving of 20 to 30 per cent of the fuel account. About 24,500,000 tons of bituminous and lignite coal is consumed in Canada each year. If our consumption were reduced by only 10 per cent, it would represent an annual saving of at least \$7,500,000, much of which is expended for coal imported from the United States.

The Alliance Power Co. state that, by burning lignite slack, they have succeeded in reducing the coal bill in the Edmonton, Alta., power house from \$165,000 a year, to \$75,000; also, that, if an automatic stoker were devised which would "respond and evaporate the necessary water in the boilers to handle the overload at peak", much better results could be obtained.

Uniform
Mining Act
Suggested

Mr. H. A. Mackie, M.P., Edmonton, is urging that a Canadian Coal Mining Act be passed by the Dominion, contingent upon the antecedent consent of all provinces, the operation of the Act being left to the provinces.

Mr. Mackie has requested the Department of Labour to call a conference of the Chief Inspectors of Mines of the various provinces. Whether the provinces would consent or not, there can be no doubt that, as pointed out by Mr. John T. Stirling, Chief Inspector of Mines for Alberta, laws should be identical in, say, British Columbia, Saskatchewan, and Alberta, with provision that the operation of all coal mines in these provinces be under the supervision of persons holding certificates of competency, granted by the authorities of either province. Similarly, this situation should obtain with reference to Nova Scotia and New Brunswick.

Mr. Stirling further states that there are nearly 300 mines in operation in Alberta, about 60 per cent of which is operated in such a small way that it is impossible to make them a commercial success. All the coal that is easily accessible, chiefly along the river banks, is mined by driving in a gangway for a few hundred feet from the outcrop, and, owing to the operator's inability, financially, to put in proper supports, these gangways are allowed to cave in after two or three years' operation, with the result that the larger bodies of coal lying beyond these worked areas will require to be obtained in years to come by expensive shaft sinking.

In addition to this, the danger of driving into old workings which are flooded with water is constantly increasing, so that the chances of catastrophes are also very much increased.

Reduction in
Anthracite Prices
Unlikely

The fact that the price of anthracite has steadily increased during the past quarter of a century, and the well established fact that, if consumption continued at the present rate, the anthracite of the United States would be exhausted in less than a century, demonstrate that the theory of lower prices after the war is utterly fallacious. Even prior to the war, the production of anthracite was decreasing at the rate of approximately one per cent per annum. The problem in Canada, therefore, is: What can be done in the way of producing a fuel that approximates to anthracite or toward the utilization of lignite under more advantageous conditions?

The Research Council has suggested that briquetting of carbonized lignite furnishes the solution, and the sum of \$400,000 has been appropriated for the erection of an experimental plant. Construction of this plant has not yet been commenced.

Development of Carbocoal

transportation

Pulverized Coal Successful

and several United States railways have successfully operated locomotives with this class of fuel.

Copper Cliff, Ont.,

reduced 30 per cent.

Substitute for Anthracite Necessary

earlier reports, and need not be recapitulated.

The steadily increasing price and the decrease in the reserves of anthracite demonstrate that, in Ontario and Quebec, we must turn to some form of coke that possesses most of the characteristics of this valuable fuel, such, for instance, as carbocoal or retort coke.

The greatest obstacle to the introduction of retort coke is the fact that, hitherto, practically all coke, except gashouse coke, has been produced for metallurgical purposes and, for obvious reasons, such coke could be most economically produced at or near the mine. The fact that central coking plants, in the immediate vicinity of large cities, can market not only coke but the gas, tar and all other products, demonstrates their great economic advantage. In addition, the fuel produced by a retort coke plant would be better adapted for domestic heating, for raising steam and for similar purposes, than metallurgical coke would.

For large individual consumers, locomotives and certain other uses, pulverized fuel promises to revolutionize present practice. It is almost axiomatic that the less labour and cost expended on the preparation of coal fuel, the better, and, other things being equal, the process that approaches most closely to this dictum is the most efficient and the most economic.

In Great Britain, much attention has been devoted to carbocoal, the process yielding a fuel that is denser, dustless, clean, uniform in size and quality and stands without disintegration; its density is greater than that of coke and more nearly approaches that of anthracite; the yield of tar and ammonium sulphate is greater than in the by-product coking process.

Pulverized coal, for certain purposes, has achieved remarkable success, particularly in cement plants, copper smelting and other metallurgical processes, and several United States railways have successfully operated locomotives with this class of fuel. With the exception of the Calgary plant, which uses natural gas, all plants of the Cement Company of Canada are using pulverized coal. It has recently been adopted by the British Columbia sugar refinery, and the International Nickel Co., Copper Cliff, has installed it. Experimental runs in the blast furnaces at Copper Cliff, Ont., showed that not only could pulverized coal replace the more costly coke, but the tonnage of fuel consumed was reduced 30 per cent.

The striking economic advantage of central coking plants, producing retort coke for fuel, gas, coal tar, ammonium sulphate, etc., has been set forth in earlier reports, and need not be recapitulated.

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A pamphlet on *Pulverized Fuel*, by Mr. W. J. Dick, is now in the press and will be issued at an early date. In August last, your Assistant to Chairman addressed the Professional Meeting of the Engineering Institute of Canada at Saskatoon on *Fuels of Western Canada and their more Efficient Utilization* and, later, expanded it for publication.

FUEL SHORTAGE

Since our organization nine years ago, we have given special attention to fuel problems, as we recognized that, sooner or later, a combination of circumstances would cause a shortage of fuel.

Commission Gives Warning

In February, 1917, we issued a news letter, warning consumers to lay in their supplies of coal immediately, in view of the probability, almost a certainty, that there would be a shortage. It was widely reproduced throughout Canada and the fact that, during the next four months, the anthracite imports were much above normal indicates that it had a very material effect.

Canada's Supply Reduced

Our survey of the underlying conditions had convinced us that, unless conditions were unusually favourable, the mines of the United States would not produce sufficient anthracite for our needs in Canada. The great bulk of the anthracite is consumed in the Northeastern and North Central states and in Canada. Owing to the the enormous development of industries connected with the war, there had been a great influx of population into the Northeastern and Atlantic states north of the Potomac, the addition to the population of Massachusetts, New Hampshire, New York, Pennsylvania and Maryland, since 1911, being estimated at 5,000,000, or 15 per cent. The tremendous congestion of freight in this industrial area, the removal of millions of men from the producing to the non-producing class, and the transference of increasingly large numbers of men to ship-building, munitions, and other highly-paid war industries, and other factors could have only one effect, namely, an insufficient supply of anthracite in Canada.

In March, 1918, our conclusions were strikingly verified by the announcement of the United States Fuel Administrator that we would receive only 77 per cent of the anthracite imported by us in 1917-18, which amount had been found insufficient. Commencing in December, 1917, we had urged a greatly increased cutting of wood fuel, and the increased production materially assisted in tiding over the shortage of anthracite last autumn. Had the war continued till the spring of this year (1919) and had we even had a normal winter, conditions in many parts of Canada would have been serious.

About midsummer of 1917 conditions in the coal-mining industry in the United States demonstrated that drastic action was necessary. On July 12, 1917, Mr. C. A. Magrath was appointed Fuel Controller, with full powers over the mining, transportation, distribution, etc., of coal. During the winter of 1917-18, the shortage of coal became acute; 'heatless Mondays' were ordered in Canada and the United States to save fuel, the situation having been much aggravated by the almost unprecedented cold weather.

During the height of the influenza epidemic the production of anthracite fell off from 2,000,000 tons per week to 1,500,000, or 25 per cent less than during the same week in 1917. Fortunately, the unprecedentedly mild weather and the termination of the war have averted what would otherwise have been a serious situation.

Having happily escaped a fuel famine this winter, we should endeavour to formulate a sane and wise policy respecting the development of our great water-powers, particularly Niagara and the St. Lawrence, and the more efficient utilization of our bituminous, semi-bituminous and lignite coals, that future fuel shortages will not find us unprepared.

SENATOR EDWARDS: Do you mean for heating or for power purposes?

MR. WHITE: Both; in order that we may obtain more efficient results from these coals than can be obtained under existing circumstances, particularly when they are consumed raw. Electric energy generated from our water-powers, should be utilized for power purposes, that our imports of bituminous coal from the United States may be reduced. It cannot be too strongly emphasized that future fuel shortages are not a possibility but are practically a certainty, and they will recur whenever there is a sufficient combination of adverse conditions. In addition, an educative campaign should be carried on urging the adoption of economic methods of firing, the replacement of ineffective boilers and similar measures that will reduce the coal bill.

FIRE PREVENTION

Since our last meeting, our report on *Fire Waste in Canada*, by Mr. J. Grove Smith, has been issued. It is the first report on the subject ever issued in Canada and has aroused public interest in a remarkable manner. That this interest might be crystallized into definite action, the Commission has, during the past year, carried on a campaign of publicity through the newspapers and by means of public addresses. Municipal authorities have been advised respecting the adequacy of their water-works systems for fire protection pur-

poses and equipment of fire departments, such advice necessitating making complete surveys of several municipalities.

Fire Prevention Leagues Established Mainly as the result of our efforts, fire prevention leagues have been organized in Ontario and British Columbia. In addition, an advisory committee has been appointed by the Dominion Superintendent of Insurance to inaugurate education of the public and to advise the government respecting fire prevention legislation, movements have been started to have fire marshal acts enacted in the provinces of Quebec, Nova Scotia and New Brunswick, the fire insurance companies operating in Canada are attempting to revise the present insurance agency system in the interests of fire prevention, local authorities are increasingly adopting the recommendation of the Commission with respect to the periodical inspection of buildings, and there is every reason to believe that, eventually, the entire programme outlined by the Commission in its report will receive legislative endorsement.

Excessive Fire Losses The record of fire losses in Canada for 1918 emphasizes the necessity of drastic steps being taken to bring about a change in the public attitude towards fire waste. During the year the total value of property destroyed by fire amounted to no less than \$33,600,000, and exceeded by over 35 per cent the loss of the previous year. If the amount of money spent on fire protection and insurance be added to the direct fire loss the total reaches over \$65,000,000. In other words, if the loss continued at the same rate for nine years, it would aggregate an amount that would equal the entire subscription to the last Victory Loan. The record of fire losses for 1918, classified according to the amount of loss involved in each fire, is given herewith.

	Fires over \$100,000		Fires from \$10,000 to \$100,000		Fires less than \$10,000	
	No.	Loss	No.	Loss	No.	Loss
January.....	8	\$ 1,057,000	34	\$ 873,000	1,499	\$ 535,000
February.....	7	1,467,000	15	319,000	1,423	602,000
March.....	3	575,000	15	668,000	1,264	537,000
April.....	5	1,500,000	21	1,120,000	1,802	723,000
May.....	10	1,652,000	19	906,000	1,528	1,177,000
June.....	6	1,277,000	15	833,000	1,723	1,006,000
July.....	7	960,000	19	841,000	1,246	1,395,000
August.....	3	812,000	22	1,183,000	1,638	971,000
September.....	1	250,000	15	419,000	1,107	667,000
October.....	5	3,650,000	9	646,000	984	1,121,000
November.....	2	300,000	14	402,000	1,518	965,000
December.....	5	1,150,000	16	376,000	1,347	688,000
Total.....	62	\$14,650,000	214	\$ 8,586,000	17,079	\$ 10,387,000

For many years the people of Canada have felt that the tax for fire insurance is unduly high, but, instead of blaming themselves for creating and maintaining conditions that cause excessive fire waste, have, in large part, devoted their attention to the insurance companies. While not contending that the insurance companies are altruists, it should be borne in mind that they are simply playing the part of distributors. They collect a certain amount of money from the insured, deduct certain amounts for commissions to insurance brokers, for office and other expenses of management, for dividends to their stockholders, and pay out the remainder to policyholders who have sustained fire losses. Obviously, if fire losses increase, rates must be raised to meet such losses. On the other hand, if there were no fire losses, the insurance companies would have to go out of business.

The fire loss in Canada is increasing at an alarming rate, the total for 1918 being \$33,623,000, as compared with \$24,800,000 in 1917, \$25,600,000 in 1916 and \$19,022,000 in 1915. In 1918, there were 276 fires, causing a loss of \$10,000 or over, as compared with 238 in 1917, 218 in 1916 and 237 in 1915. The largest monthly total was that of October—\$5,119,145—which included the explosion in the munitions plant at Trenton, Ont., resulting in a loss of \$3,000,000.

Mr. J. Grove Smith's investigations demonstrate that a few fires cause two-thirds of our fire loss. In 1918, we had 17,355 fires in Canada, entailing a loss of \$33,623,000, but \$23,236,000, or 69 per cent, of that loss was caused by 276 fires. Again, only 62 fires were responsible for a loss of \$14,650,000, or 44 per cent of the total loss.

Much eloquence has been devoted to the advocacy of an educative campaign to instruct the children of Canada respecting greater precautions against fire, the basic idea being that many fires would thereby be prevented. While recognizing the great value of such education, it must be borne in mind that, even if the 12,000 dwelling fires which occur every year were prevented, it would only reduce our fire loss by 5 per cent, whereas, *if the less than 300 fires which annually damage large mercantile establishments and manufacturing plants could be prevented, two-thirds of our fire waste could be avoided.*

Mr. Smith recommends that the following legislation be enacted:

(1) Requiring a signed application (on a standard form) for all insurance, the statements in such application to form a condition of the insurance contract and a continuing warranty during the currency of the policy.

(2) Requiring the registration and licensing of all agents and brokers placing insurance with companies operating under Dominion

**Large Fires
Responsible**

**Small Percentage
of Loss due to
Dwelling Fires**

Less than 100	535,000
Loss	602,000
	537,000
	723,000
	1,177,000
	1,006,000
	1,395,000
	971,000
	667,000
	1,121,000
	965,000
	688,000
	3,387,000

license, license to be issued by the Superintendent of Insurance after examination of the character and qualifications of the said agents and brokers.

(3) Requiring the proper inspection by insurance agents of all property whereon the total insurance exceeds \$5,000, and making compulsory the notification of defective or dangerous conditions in buildings to the Provincial Fire Marshal's department.

(4) Empowering Provincial Fire Marshals to prevent the issuance of insurance and to cancel all existing insurance upon property reported as being in a dangerous condition until such conditions have been remedied.

(5) Requiring the installation and proper maintenance of automatic sprinkler systems in all buildings (fireproof buildings excepted) which, together with their contents, have an insured value exceeding \$100,000.

To carry these recommendations into effect, legislation by both the Dominion and the various Provincial Legislatures must be had, though much can be accomplished by amendments to the present Regulations of the Dominion and Provincial Insurance Branches.

CONSERVATION OF GAME AND WILD LIFE

During the year, we have co-operated with the Advisory Board on Wild Life Protection. Your Assistant to Chairman is Chairman of the Board and represents the Commission thereon.

Migratory Bird Convention Act

The Regulations under the Migratory Birds Convention Act are now operative, and, with few exceptions, the provinces have amended their legislation to conform with the terms of the treaty and are administering these laws, the Dominion taking action only when requested to do so by a province.

The Regulations under the new Northwest Game Act are now in effect. They provide increased protection for the game and fur-bearers of our northern regions which constitute so important an economic asset. The licensing of the fur trade will give a control that will ensure its adequate conservation. The musk-ox, wapiti and wood bison are now permanently protected.

Point Pelee a National Park

Point Pelee, Ont., the most southerly portion of Canada, has been established as a National park, for the protection of the birds which concentrate there during migration or breed there. It is hoped that Bonaventure island, Percé rock and the Bird rocks in the gulf of St. Lawrence will be segregated as bird sanctuaries.*

*Since the above was written the Quebec Legislature has, on the recommendation of Hon. Mr. Mercier, Minister of Colonization, Mines and Fisheries, passed an Act, establishing bird sanctuaries on these islands.

The Advisory Board took a strong stand against any unwarranted relaxation of our game laws for the purpose of increasing the food supply. New Brunswick has now prohibited the sale of game, making, in all, three provinces that have adopted this policy so essential to game protection. Efforts are also being made to check the excessive slaughter of moose in the Yukon for the market.

Killing Deer to Increase Meat Supply To increase the meat supply, the province of Ontario killed a number of deer in Algonquin Park. In all, 650 deer were killed and yielded 66,221 lbs. of meat, or one-half ounce of meat for each inhabitant of the province of Ontario.

The wapiti is protected everywhere except in Saskatchewan. A letter from the Premier, Hon. Mr. Martin, addressed to the Advisory Board, indicates that the game laws of that province will be amended during the current session to give this magnificent animal protection there also.*

The North American Reindeer Co. proposes to import reindeer from Alaska, and has applied for a grazing lease of a large area in Manitoba and the Northwest Territories northwest of Churchill. If the experiment be successful, this herd will supply animals for transportation and will add to the meat supply.

Conference on Wild Life Protection Our Committee on Fish, Game and Fur-bearing Animals and the Advisory Board on Wild Life Protection, jointly, have called a conference of game officials of the Dominion and Provincial Governments and of others interested in the conservation of game, fur-bearing animals and wild life generally. This conference will be held here to-morrow and the day following and valuable results are anticipated.

It is expected that the report on our *Wild Life Resources and their Conservation*, which is being prepared by Dr. C. Gordon Hewitt, who has continued to act as special adviser to the Commission in the protection of game and wild life, will be completed shortly and will be published during the year.

COMMITTEE ON PRESS AND CO-OPERATING ORGANIZATIONS

That conservation is receiving so much attention in Canada is largely due to the work of the Commission of Conservation. The Commission initiated the work of publicity respecting conservation of natural resources and to this body, a large measure of resultant public interest is undoubtedly due.

*Since the foregoing was written, the Province of Saskatchewan has also passed legislation protecting the wapiti, commonly called the elk.

**Interests of
School Children**

Through the medium of *Conservation* and *Conservation of Life* the public is kept in touch with what is of interest in the conservation and protection of Canada's public domain.

Canada's resources and their development receive far too little attention in our schools. *Conservation* is distributed monthly to 2,600 school teachers, and, through them, many thousands of Canada's younger generation have the enormous importance of the efficient utilization of Canada's natural resources impressed upon them.

The Commission has supplied to the Khaki University in London numerous copies of its reports. These publications are being used as text books in the continuation courses. Their study by the soldiers overseas will prove of great value to the men, personally, and also, through the creating of added interest in their country, be a distinct advantage to Canada.

**Canadian Press
Supports
Conservation**

The newspapers of Canada have stood loyally back of *Conservation* and have given largely of their space to reprinting its material. They have also very generously made editorial reference to Canada's natural resources and their protection. Especially has this been the case recently regarding the proper planning and preparation of land for soldiers homesteading. The newspapers and periodicals of Quebec have given unlimited space in the campaign for securing the passing of a Town Planning Act by the Quebec Legislative Assembly.

Our editor was present at the annual meeting of the Canadian Press Association, when the opportunity was taken advantage of to impress upon the visiting editors the work of the Commission and its value to Canada.

Conservation and *Conservation of Life* have been issued regularly as also special newspaper bulletins as occasion required.

**Reports
Published**

The Annual Report was issued in English and French. A departure was made this year from the usual custom, in that the larger portion of the edition was bound in paper covers. This has effected a considerable saving, as the cost of cloth binding has very materially increased.

Fire Waste in Canada, by J. Grove Smith, our Fire Prevention Engineer, was published, and has had a very heavy demand. This report has been widely commented upon, and has aroused much interest in fire prevention.

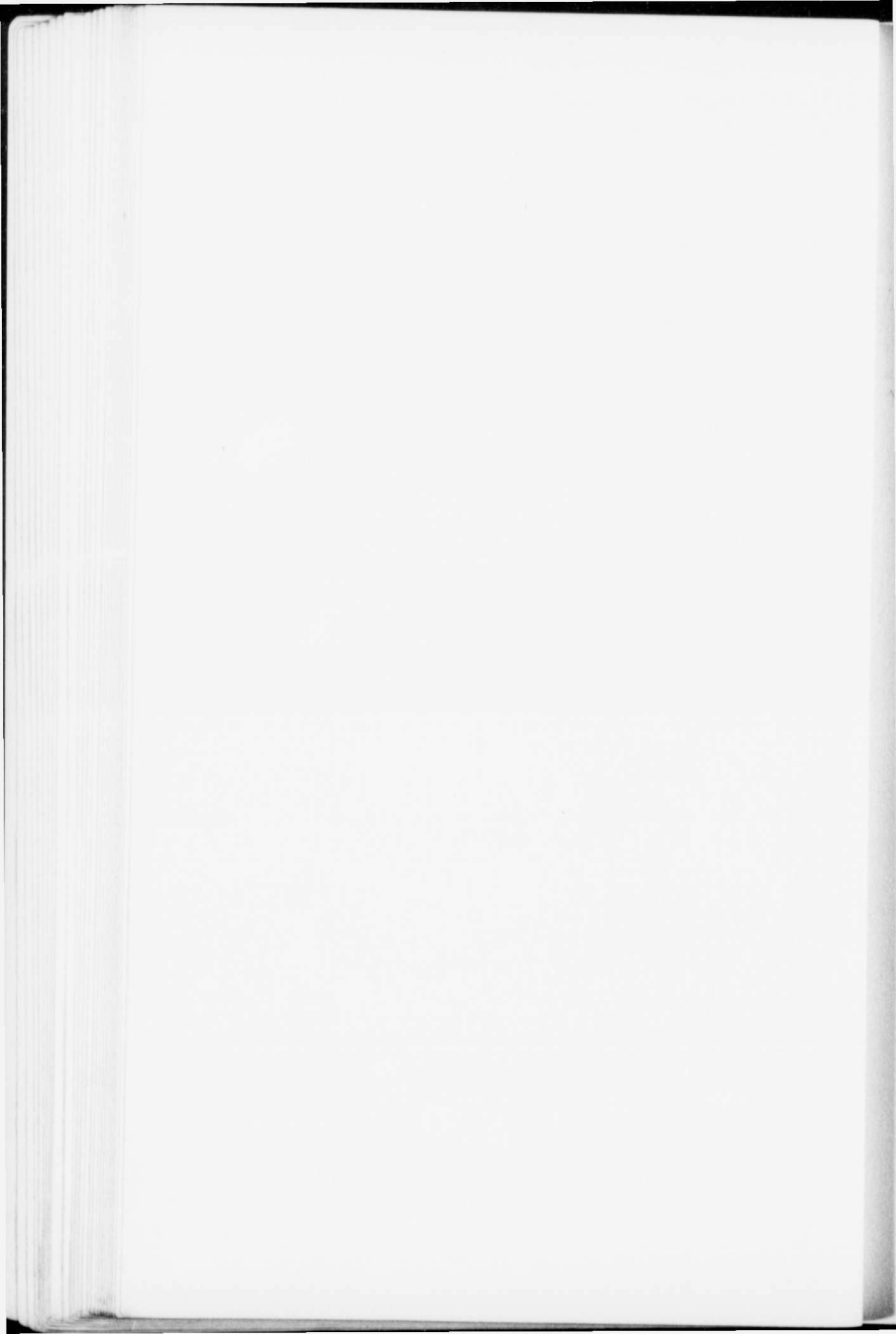
Forest Resources of British Columbia, by Dr. H. N. Whitford and Roland D. Craig, has just been issued, as has also *Electric Generation and Distribution in Canada*, by Leo. G. Denis.

A *Farmer's Account Book*, prepared by F. C. Nunnick, containing a simple method of book-keeping for farm use, has been printed. The number of requests from active farmers has exhausted the first edition, and a further edition is being prepared.

The following pamphlets have also been issued: *Wood Fuel to Relieve the Coal Shortage in Eastern Canada*, by Clyde Leavitt; *Fuels of Western Canada*, by James White; *Handbook for Farmers*, by F. C. Nunnick and E. P. Bradt; *Utilization of Fish Waste in Canada*, by J. B. Feilding; *Fishways in the Inland Waters of British Columbia*, by A. V. White; *Conservation of Man-power in Canada*, by Dr. P. H. Bryce; *Garbage as Feed for Hogs*, by F. C. Nunnick; *Powdered Fuel*, by W. J. Dick, and *Goitre*, by Dr. F. J. Shepherd.

There is in press a report on *Water-Powers of British Columbia*, by A. V. White, and in course of preparation *Forests of Saskatchewan*, by J. C. Blumer, *Urban Planning and Development*, by Thomas Adams, and *Wild Life in Canada and its Conservation*, by Dr. C. Gordon Hewitt.

In June last, by order in council, the printing of the Commission was brought under the Department of Printing and Stationery, and the cost of its execution by the Printing Bureau will be charged to the Commission. Previously, all the Commission work has been executed by private printing plants, after competitive tenders had been secured. This plan was found to be economic and efficient, the work being executed at a minimum cost and good service being secured.



APPENDIX I

Aluminium, with Special Reference to Use for Electrical Energy Transmission

The aluminium industry began in a very modest manner in the early 'eighties' of the last century. Several factories were operated on the St. Claire Deville method, of which the one at Salindres, France, produced 2½ tons of aluminium annually. The production increased only slowly to begin with, as will appear from the appended table* showing the world's production in metric tons†:—

1880.....	2.4	1907.....	19,800
1885.....	13	1908.....	18,600
1890.....	175	1909.....	31,200
1895.....	1,426	1910.....	43,800
1900.....	5,000	1911.....	45,000
1901.....	6,900	1912.....	61,100
1902.....	8,350	1913.....	78,790
1903.....	8,200	1914.....	84,857
1904.....	9,300	1915.....	86,394
1905.....	11,500	1916.....	112,626
1906.....	14,500	1917.....	173,500

In a review‡ of the international aluminium industry, published in 1917, it was stated that the demand for aluminium had increased greatly during the last few years. While the German, Swiss, French, and British works have had difficulty in extending greatly under war conditions, the aluminium industry in the United States has made enormous progress. The world's production of aluminium during 1917 is estimated at 173,500 metric tons, and, if the extensions and new constructions now in process of execution are taken into consideration, the capacity will increase to 200,000 tons in the near future. Such a large production would prevent excessive prices of aluminium, but it is questioned whether sufficient supply of alumina, bauxite, cryolite, etc., will be on hand in time to produce 200,000 tons.

*Statistics for 1880-1902 from *Engineering*, Aug. 16, 1918, p. 163; for 1903-12, from *Metallgesellschaft*, 1903-1912, p. 16; for 1912-17, from *Mineral Industry during 1917*, p. 10.

†The metric ton is 2,204 lbs. but, as these statistics are only close approximations or estimates, it is assumed to be 2,200 lbs.

‡*Electrical Review*, London, March 30, 1917.

Occurrence Figures relating to the occurrence of aluminium show that it is the third in the list of elements of the body of the earth (7.90 per cent, according to F. W. Clarke) and as No. 1 of all the metals iron comes next with 4.43 per cent).

Bauxite is the only available ore of aluminium. Its consumption has been steadily increasing since the outbreak of war, not only as a source of this valuable metal, but for abrasives, brick for metallurgical furnaces, etc.

Statistics of production in the United States, France, United Kingdom, Italy and India, during 1913-17, are given on p. 53.

"Bauxite has been discovered in considerable quantities in British Guiana . . . Development work has now reached a stage where a steady output is assured . . . The British Government is now taking a firm stand with regard to the exploitation of these deposits and is determined that the first call shall be reserved for the British Empire."* In December, 1917, it was announced that no further applications for bauxite lands would be granted till after the war. The Government also ordered that a portion of the bauxite won by holders licensed before this regulation came into force must be placed at its disposal at a certain price and, also, reserved the right to limit or to prohibit the export to countries other than British. Following the promulgation of these regulations, a large export to a foreign country of British Guiana bauxite, won by a company in which foreign interests are partly represented, was held up.†

In view of the possibility that additional plants for the manufacture of aluminium may be established in Canada, the foregoing statement respecting British Guiana bauxite is of interest.

No commercial ores of aluminium have, as yet, been found in Canada. Aluminium is, however, made in the Northern Aluminum Co.'s extensive works at Shawinigan Falls, Que., from bauxite ores imported from France, the United States, and also, formerly, from Germany. The company also operates a wire mill for the manufacture of aluminium wire and cables.

* *The Mineral Industry During 1917*, p. 28.

†While this was probably correct when printed, the Aluminum Company of America is mining bauxite on its properties in British Guiana. Ocean-going vessels ascend the river to the mines, and transport the ore to New Orleans; thence, it is shipped by rail to East St. Louis.

According to *The Mineral Industry During 1917*, the world's production of bauxite for 1913 to 1917 was as follows:—

	1913	1914	1915	1916	1917
	Long tons	Long tons	Long tons	Long tons	Long tons
France.....	304,314	(a)	(a)	(a)	(a)
United States.....	210,241	219,318	297,041	425,100	568,690
Great Britain.....	8,282	8,286	11,723	10,329	14,724
Italy.....	6,841	3,844	5,807	8,739	(a)
India.....	1,184	514	876	750	(a)

(a) Statistics not available.

Some notes on the manufacture of aluminium, as carried out by the British Aluminium Company in 1911, are of interest. The allocation of cost* is given as follows:

	Per lb.
Energy.....	1·12 c.
Carbon.....	1·45
Alumina.....	6·25
General expenses and profits.....	6·25
	15·07

The following table, which only claims to be approximate, and which refers to the conditions prevailing before the war, is another estimate as to the cost of production.

	Francs per kilogramme	Cents per lb.
35 k.w.h. at 0·7 centimes.....	0·25	2·19
2 kg. of aluminate at 0·25.....	0·50	4·38
0·8 kg. electrodes at 0·35.....	0·28	2·45
0·12 kg. cryolite at 0·40.....	0·05	0·44
0·05 kg. fluoride at 0·50.....	0·03	0·26
0·25 working hours at 0·60.....	0·15	1·31
Sundries.....	0·15	1·31
	1·35†	12·34

* See p. 59 for New York prices of aluminium, 1913-17.

† *Engineering*, August 30, 1918. The total as given in the original article is as above, but the items of cost, as stated, total 1·41 francs, which is equivalent to 12·89 cents.

"With regard to the consumption of electric energy in the production of aluminium, Faraday's law requires 2,969 ampere-hours per kilogramme [1.347 amp.-hours per pound] of aluminium, and this result is very nearly (95 per cent to 90 per cent) reached in actual production".* In practice, "in order to produce 1 kg. of aluminium as little as †24 k.w.h. [11 k.w.h. per pound] has been employed, but 33 k.w.h. to ‡35 k.w.h. per kilogramme [15 k.w.h. per pound] is considered a satisfactory result".

The Norwegian Høyang Falls Company is erecting an aluminium factory in the Sognefjord of 20,000 h.p. for an annual production of 4,000 tons; their calculations are based on a cost of production of 1 kroner per kilogramme (11.7 cents per pound) of aluminium, a normal selling price of 1.45 kroner (17 cents per pound) being reckoned upon, which should provide a dividend on the share capital of some 15 per cent, the various items in the way of expenses, etc., having been provided for. The share capital is 15,000,000 kroner (about \$3,900,000).

The transportation of raw materials very materially affects the cost of production of aluminium. For instance, the factories in Salindres, France, which have an annual production of some 12,000 tons of oxide of aluminium, require 30,000 tons of bauxite, 6,500 tons of lime and 50,000 tons of coal.

Mr. J. T. Pattison, sometime in charge of the chemical laboratory of the Aluminium Corporation, Ltd., Wallsend-on-Tyne, states in his *The Manufacture of Aluminium*, p. 12, that the Aluminium Company's furnaces yield 1.75 pounds of aluminium per horse-power day.

Although it is impossible, at the present moment, to forecast the effect of the war upon many industries, it is clear that the shortage of copper has greatly extended the use of aluminium, and that not merely temporarily. The production has, in consequence, increased, and a number of important aluminium works have been, and are being, started in different countries.

The annual production, in metric tons, of aluminium was distributed amongst the different countries as under:

**Engineering*, p. 219, August 30, 1918.

† This would be equivalent to about 600 lb. of aluminium per horse-power year.

‡ 33 k.w.h. per kg. is equivalent to 436 lbs. of aluminium per horse-power year, or 35 k.w.h. per kg. is equivalent to 411 lbs. Mr. A. V. Davis, President of the Aluminium Company of America, has stated that one horse-power year will produce 450 lbs., demonstrating that, in their practice, a slightly higher efficiency has been obtained.

	Canada	United States	Great Britain	France	Norway	Italy	Switzerland	Austria-Hungary	Total
1903		3,400 ¹	700	1,600			2,500 ²		8,200
1904		3,900 ¹	700	1,700			3,000 ²		9,300
1905		4,500 ¹	1,000	3,000			3,000 ²		11,500
1906		6,000 ¹	1,000	4,000			3,500 ²		14,500
1907		8,000 ¹	1,800	6,000			4,000 ²		19,800
1908		6,000 ¹	2,000	6,000		600	4,000 ²		18,600
1909	2,800 ³	13,200	2,800	6,000	600	800	5,000 ²		31,200
1910	3,500 ³	16,100	5,000	9,500	900	800	8,000 ²		43,800
1911	2,300 ³	18,000	5,000	10,000	900	800	8,000 ²		45,000
1912	8,300 ³	18,000	7,500	13,000	1,500	800	12,000		61,100
1913	5,916	29,500	10,000	15,000	2,500	874	10,000	5,000	78,790
1914	6,820	40,600	8,000	12,000	2,500	937	10,000	4,000	84,857
1915	8,490	45,000	6,000	7,500	3,500	904	12,500	2,500	86,394
1916	8,500	63,000	4,000	20,000	16,000	1,126	15,000	5,000	112,626
1917	11,800	90,700	6,000	20,000	18,000	7,000	15,000	5,000	173,500

Note—Statistics for 1903–12 from *Metallgesellschaft 1903-1912*, p. 16; for 1913–17, from *Mineral Industry during 1917*, p. 10.

¹ Includes Canada.

² Includes Austria-Hungary and Germany.

³ Exports.

The proportion of the world's production of aluminium in 1913 and 1917, respectively, was: Canada, 7.5 and 6.8 per cent; United States, 37.5 and 52.3 per cent; Great Britain, 12.7 and 3.4 per cent; Switzerland, 12.7 and 8.7 per cent; Austria-Hungary, 6.4 and 2.9 per cent; France 19.0 and 11.5 per cent; Norway 3.2 and 10.4 per cent; Italy, 1.0 and 4.0 per cent. In 1917, the aluminium producing companies of the world had the following output:

	Metric tons	Pounds
Aluminum Co. of America	90,700	200,000,000
Northern Aluminum Co. of Canada	11,800	26,000,000
L'Aluminium Française (France and Norway)	30,000	66,000,000
British Aluminium Co. (Great Britain and Norway)	11,800	24,200,000
Aluminium Industrie Aktiengesellschaft (Switzerland and Austria)	20,000	44,000,000
L'Aluminio Italiano (Italy)	7,000	15,400,000
Høyang Falden Aluminium (Norway)	3,000	6,600,000
	173,500	382,200,000

Canada—The *Mineral Industry During 1917* states that the "Northern Aluminum Co., a subsidiary of the Aluminum Company of America, with extensive works at Shawinigan Falls, Que., is the

only producer. It is said to use 42,000 kilowatts (56,000 h.p.). Its output is not officially published, but, with the above cited power, it should be about 14,000 metric tons per year. Statistics published by the Canadian Government show the importation of bauxite and alumina, together, as 87,154 short tons in 1917. The exports of aluminium in ingots and bars are given as 22,324,600 lb., valued at \$7,620,953, or 34.1 cts. per lb. The production was greater than this by the amount produced which was consumed in Canada: estimating this as about 3,500,000 lb., we have placed the 1917 production at 26,000,000 lb., which is equal to 14,300* metric tons. This agrees with the 14,000 tons mentioned above as corresponding to the power stated by Mr. H. E. Randall to be used at the Shawinigan plant. The output of the Canadian plant is used chiefly for export to Europe, Japan, etc. Its exports to the United States in 1917 were 1,879,859 lb."

Although all the raw material has to be imported for the production of aluminium in Canada, the industry is of some importance, owing to the cheap hydro-electric power facilities offered by this country, while a large portion of the United States production is obtained with hydro-electric energy exported from Canada. The following table shows the expansion of the industry in Canada since 1905:

ANNUAL IMPORTS OF 'ALUMINA' AND EXPORTS OF ALUMINIUM

Calendar year	Imports of alumina		Exports of aluminium		
			Ingots, bars, etc		Manu- factures
	Pounds	Value	Pounds	Value	Value
1905.....	5,360,800	\$ 138,765	2,535,386	\$ 508,219	\$ 1,588
1906.....	8,975,400	239,136	4,521,486	899,113	2,244
1907.....	12,705,300	268,502	5,478,203	1,109,353	1,499
1908.....	1,485,500	29,752	1,713,800	399,785	1,727
1909.....	11,794,100	234,544	6,134,500	918,195	3,453
1910.....	19,464,400	403,283	7,722,400	1,160,242	3,741
1911.....	18,607,200	372,009	4,990,100	747,587	1,555
1912.....	22,400,500	448,061	18,285,700	2,002,363	10,898
1913.....	30,704,200	614,713	13,015,000	1,762,214	8,203
1914.....	28,557,000	571,419	14,510,800	2,364,907	5,571
1915.....	35,016,200	892,634	18,680,800	3,333,726	620,562
1916.....	53,819,000	1,114,061	18,425,300	5,201,066	26,780
1917.....	174,307,800	1,866,240	22,324,600	7,620,953	17,165
1918.....	186,442,200	2,071,060	21,616,500	7,223,570	197,673

United States—There are aluminium plants at Niagara Falls, N.Y., Massena, N.Y., Maryville, Tenn., and Badin, N.C., all owned by the Aluminium Company of America, which monopolizes the

*An obvious error; 26,000,000 lbs. is equal to 11,800 metric tons.

manufacture of aluminium in Canada and the United States. The capacity of the Badin plant, since its enlargement "has been stated to be 65,000 k.w., capable of furnishing 23,000 (metric) tons of metal annually." In Tennessee, the Aluminum Co., through a subsidiary company, has developed a water-power plant on the Little Tennessee river. This is the first of a system of seven plants, which, "when completed and put into action, will just about double the aluminium-producing capacity of North America." Seven dams will store water sufficient to produce a constant 450,000 h.p. The investment in this development may be estimated at \$40,000,000.

The Boston News Bureau states that, commencing with \$1,000,000 authorized capital in 1889, the Aluminum Co. of America increased its capitalization to \$3,800,000 in 1905 and to \$20,000,000 in 1909. In 1916, it paid a dividend of 10 per cent. "As a matter of fact, the company has invested about \$70,000,000 of undivided profits in its business; its present investment in plant is over \$80,000,000. The market value of its \$20,000,000 stock is probably \$150,000,000."*

Great Britain—The British Aluminium Co. has two plants in Great Britain and two subsidiary reduction plants in Norway. When war broke out, it suspended work on the development of a water-power and a reduction plant in Switzerland. Extensions of its British plants are under construction and plans are on foot to increase its Norwegian plants. Profits in 1917 were £347,474 (\$1,737,000) out of which 6 per cent dividend was paid on the preferred shares and 10 per cent on the common.

The Aluminium Corporation has one plant in Great Britain.

The price of aluminium in Great Britain in 1917 was fixed at 48.8 cents per lb.

France—There are plants with an aggregate capacity of about 100,000 h.p., *viz.*: Société Electrometallurgique Française, with factories at La Praz and at Gardannes; and the Compagnie des Produits Chimiques d'Alais, with factories at Calypso, St. Félix de Maurienne, St. Jean de Maurienne, Auzat and Chedde.

The French Ministry of Munitions fixed the price of aluminium in France for 1917 at 4 francs per kilo (32.7 cts. per lb.), but, on Oct. 1, increased it to 6 francs (50.9 cts.).

Switzerland—The Aluminium Industrie Aktiengesellschaft, Neuhausen, Switzerland, controls factories with an aggregate capacity of 100,000 h.p., *viz.*, one at Neuhausen, Switzerland, one at Rheinfelden, Germany, and one at Lend-Gastein, Austria, also at Crippis-Borgne. Its net profits in 1917 were 19,810,000 frs. A dividend of 20 per cent was paid on the 35,000,000 frs. capital stock, the 8,750,000

*The Mineral Industry During 1917, p. 13.

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MINIUM

Manu- factures
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197,673

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frs. of the capital stock unpaid was paid up and a bonus of 7,000,000 frs. in new shares was divided among the stockholders.

Norway—The capacity of the Norwegian aluminium plants is as follows: Arendal, 5,000 tons; Tyssedal, 6,000 tons; Vigeland, 2,000 tons; Stangfjord, 600 tons; Høyang, 4,000 tons. Total, 17,600 tons. *Mineral Industry* states that "the present Norwegian production is probably 18,000 to 20,000 tons per year," but exact figures are not available.

Italy—Three companies, the Villeneuve et Borgofranco, the Tresilieres du Havre and the Trafilierie et Lamanitoi di Metalli are combined into the L'Aluminio Italiano, with a capital of 20,000,000 lire (\$5,000,000).

The countries which have exported most aluminium are France and Switzerland. Prior to the war, each exported 7,000 tons to 8,000 tons per annum. Germany has been the largest importer of aluminium—16,000 tons in 1912 and 12,500 tons in 1913. It is very difficult to obtain reliable information about the production of aluminium during the war; prices have risen abnormally, and new factories have been started which have secured contracts extending over several years after the conclusion of peace.

Conditions of 1915 were favourable to the United States branch of the aluminium industry. In 1914, the United States produced about 48 per cent of the world's production; in 1915, probably over 50 per cent; and, in 1917, 52.3 per cent. In 1917, Canada produced 6.8 per cent of the world's production. Or, expressing it in another way, Canada and the United States, combined, produced one and one-half times as much aluminium as the rest of the world.

Provided the projected factories are built and operated, the production of aluminium is soon likely to be largely increased. If the alumina factories can increase their output, an annual production of some 200,000 tons of aluminium may then be reckoned upon.

It is estimated that, of this aggregate, 50 per cent is likely to be produced in the United States and Canada, 8 per cent in Great Britain (11 per cent before the war), 13 per cent in France (26½ per cent before the war), 11 per cent in Norway (2¼ per cent before the war), 4½ per cent in Italy (1¼ per cent before the war), and 13 per cent in Switzerland, Germany and Austria-Hungary.

This estimate has recently been made by a "French expert, from which fact it would appear that the French themselves are prepared to lose their lead in the production of what has been called the French metal. The French, however, have not been idle, but propose to meet the increased foreign competition by starting branch factories in different parts of the world. France is therefore likely to maintain its financial position in the world's aluminium industry for

years to come. The French obtained what may be called a privileged position, apart from their bauxite deposits, chiefly through their early developed chemical and electro-chemical aluminium industry, which not only aimed at producing but at finding fresh uses for this new and untried metal.**

Value and Prices

As a result of the requirements for war purposes, up to the date of the armistice, the demand greatly exceeded the supply. The principal use was in the manufacture of a high explosive called 'ammonal', a mixture of ammonium nitrate and powdered aluminium. Large quantities were required for the frame-work of airships, aeroplanes, certain parts of machine guns, the points of rifle bullets, etc. As a result of this demand, the price of aluminium has been affected to a much greater extent than most other metals. The rapid rise in prices occurred in 1915 as shown by the following:

AVERAGE PRICES OF CERTAIN METALS, 1895-1919, AT NEW YORK†

Year	Copper, electrolytic	Lead	Tin	Aluminium	Silver
	Cents per lb.	Cents per lb.	Cents per lb.	Cents per lb.	Cents per oz.
1895.....	10·8 ²	3·2	14·1	58·7	65·3
1896.....	10·9 ²	3·0	13·3	50·8	67·1
1897.....	11·3 ²	3·6	13·7	39·0	59·8
1898.....	12·0 ²	3·8	15·7	30·6	58·3
1899.....	16·7	4·5	25·1	32·7	59·6
1900.....	16·2	4·4	29·9	32·7	61·3
1901.....	16·1	4·3	26·7	33·0	59·0
1902.....	11·6	4·1	26·8	33·0	52·2
1903.....	13·2	4·2	28·1	33·0	53·6
1904.....	12·8	4·3	28·0	35·0	57·2
1905.....	15·6	4·7	31·4	35·0	60·4
1906.....	19·3	5·7	39·8	35·8	66·8
1907.....	20·0	5·3	38·2	45·0	65·3
1908.....	13·2	4·2	29·5	28·7	52·9
1909.....	13·0	4·3	29·7	22·0	51·5
1910.....	12·7	4·4	34·1	22·3	53·5
1911.....	12·4	4·4	42·3	20·1	53·3
1912.....	16·3	4·5	46·1	22·0	60·8
1913.....	15·3	4·4	44·3	23·6	59·8
1914.....	13·6	3·9	34·3	18·6	54·8
1915.....	17·3	4·7	38·6	34·0	49·7
1916.....	27·2	6·9	43·5	60·7	65·7
1917.....	27·2	8·8	61·8	51·6	81·4
1918.....	24·6 ³	7·4	**	33·5 ⁴	96·8
1919 ⁵	16·6	5·2	72·5	33·0 ⁶	109·4

¹ *Engineering and Mining Journal*, Feb. 22, 1919, p. 352.

² Prices 1895 to 1898 are for Lake copper.

³ Average of 11 months, no quotations being made in December.

⁴ The prices quoted for 1919, are current prices for June 4, 1919.

⁵ Official price.

⁶ No average computed.

* *Engineering*, August 30, 1918, p. 219.

† *Engineering and Mining Journal*, quotations in annual review numbers.

In 1854, aluminium sold at £120,000 per ton; in 1856, at £14,400 per ton; 1858-85, at £4,800; in 1886, at £3,400 per ton; at the end of 1890, the price had declined to £720; at the end of 1891, to £240; in 1900, it sold at £86; in 1910, at £62.

The great fall in price followed the decline in the price of sodium from 2,000 francs to 15 francs per kilogramme. Prior to the war, aluminium had dropped to £60 per ton and had become one of the cheaper metals. Comparison of the foregoing with the prices of metals quoted on page 59 shows that, owing to the protective tariff, the price of aluminium in the United States is higher than in Great Britain.

Used in Transmission Lines	Certain properties of aluminium tend to bring it in keen competition with copper for the construction of electric transmission lines; the economic question based on the relative prices of the two metals is the principal determining factor in choosing between the two.
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Aluminium is very light (2.7 against 8.9 for copper); it has a very fair conducting capacity (34 against 57 for copper), and it has relatively satisfactory strength (22 against 44 for copper). To obtain the same total conducting capacity, only half the weight of aluminium is required as compared with copper. Consequently, compared by weight, aluminium may be said to have twice the conducting capacity of copper. As, however, even the half weight of aluminium has a larger volume than the corresponding quantity of copper, the cooling of an open-air aluminium line is more effective than that of a copper line. An aluminium line has also the advantage as regards the stress caused by its own weight, but it is at a disadvantage as regards wind pressure and accumulation of snow.

One of the reasons why aluminium has not been more extensively used on transmission lines in the United States, is given in the following editorial in the *Electrical World**:

"As is well known to our readers, the American price for aluminium is deliberately set by the powers that rule it at a figure which just fails to encourage the very large use of the metal in preference to copper. Under ordinary conditions an aluminium conductor at American prices is just a few per cent cheaper than the equivalent copper conductor, so little cheaper, in fact, that the extra cost of supports and stringing the aluminium equals the saving. In Europe and in Canada the ordinary quotations of aluminium are about the same, pound for pound, as copper at the base price, and for hard-drawn wire the saving in the use of aluminium figures out at from 35 to 40 per cent. This difference in condition is established by a virtual monopoly of aluminium in this country, with the usual effect

* *Electrical World*, New York, July 6, 1912.

on the duty, which has been kept just high enough to block importations. As a result of this, the transmission line outside of the United States is more than likely to be constructed of aluminium, while, inside our tariff wall, copper has to be the chief reliance.

"One of the interesting minor advantages of aluminium for the very high voltages as found on some of the Canadian lines is that, owing to its larger cross-section for the same conductivity, the tendency to coronal loss is somewhat reduced."

Another article in the same issue states:

"For the last eight or ten months the average market quotations in the United States for the two metals have been: aluminium 21 cents per pound, and copper 13 cents per pound. The expenses for drawing into wire are, of course, larger per pound for aluminium than for copper, and the average normal cost of hard-drawn wire may be taken as 27 cents per pound for the former and 15 cents per pound for the latter." On the basis of these prices, the weight of aluminium for the same line capacity being one-half that of copper, "it will be found by simple arithmetic that any bare aluminium conductor will cost 10 per cent less than the equivalent copper conductor. Although several aluminium lines have been erected in the United States, it is found, in general, that the comparatively small saving is largely offset by the increased height and cost of the towers for the aluminium line, and consequently there is little inducement for the American engineer to adopt the new metal. Matters are somewhat different, however, in Europe and Canada.

"The United States, European, and Canadian quotations for copper are practically identical, and may be taken at present at 12.5 cents per pound. The European and Canadian quotation for aluminium, however, is only 13 cents per pound as against 21 cents in the United States. In these countries, therefore, the prices for hard-drawn wire are approximately 19 cents and 15 cents per pound for aluminium and copper respectively, with the result that the substitution of aluminium for copper effects a saving of over 36 per cent."

In 1913, during tariff hearings before the Committee on Ways and Means, U. S. House of Representatives, Mr. J. P. Bartlett asked that aluminium be placed on the free list. In his brief, the aluminium industry was declared to be practically in the hands of one concern, the Aluminium Company of America, which controls substantially all the sources of aluminium in the United States. The company was also charged with oppressive commercial methods and practices, as evidenced by the suit filed against it by the Federal Government and the decree entered. He offered the following statement in reference to the Aluminium Company of America's capitalization and profits:—

"That company, starting with a capital of \$20,000, increased it to \$1,000,000, of which, according to said petition, an additional \$10,000 was paid for in cash, \$250,000 was to be paid as called for,

and \$720,000 was the estimated value of certain patents, and that its estimated assets were \$27,000,000, representing (with a possible exception of \$1,000,000) earnings and including a stock dividend of 500 per cent, or \$16,000,000, declared Dec. 15, 1909, besides cash dividends often declared, those in 1910 admittedly being 17 per cent on said \$27,000,000."

He further stated that "the company, through its subsidiaries, is . . . also the largest consumer of aluminium, discriminating in favour of its own users against outside purchasers; large bauxite deposits, the chief raw material in aluminium production, exist abroad and large manufacturers of aluminium in bulk are also situated there. By placing aluminium on the free list, a large stimulus will be given to the manufacture of aluminium products at home."

The Aluminum Company of America filed a somewhat extended statement in defence of its operations and the duty of 7 cents per pound. They said:—

"The mineral bauxite is found in Arkansas, Georgia, Alabama, and Tennessee. It requires 6 tons each of bauxite, coal, and limestone to make 2 tons of alumina, from which 1 ton of aluminium is made. Alumina is made at East St. Louis, Ill., the point of minimum freight haul for the raw materials. Carbon made from petroleum coke is another important raw material employed. Next to labour, electrical energy is the chief requirement in making aluminium, and the company has large electric smelting plants on the Niagara and St. Lawrence rivers, and is commencing another plant on the Little Tennessee river.

"The reduction process is slow and complicated and requires a large investment. While bauxite is plentiful and has a market value of \$5 per ton, aluminum, in the form of ingot, sheet, or wire, has a market value of \$400 per ton, owing to labour requirements and the large investment, which amounts to \$1,500 per ton of product turned out annually. Even the interest amounts to 4½ cents per pound. Petroleum coke is worth about \$5 per ton, but the finished carbons cost about \$50 per ton. The smelting process is continuous, requiring three daily shifts. Domestic labour is considerably more expensive than the labour obtainable abroad. Freight hauls on raw materials are also much longer in this country than abroad.

"Outside of the United States there are fourteen companies manufacturing aluminium, with a capacity of over 100,000,000 lb. per annum, although the foreign consumption in 1911 was but 55 per cent of capacity. Importations to this country (United States) have been as follows, in round figures: 1909, 5,140,000 lb.; 1910, 12,340,000 lb.; 1911, 7,690,000 lb.; 1912, at rate of 18,750,000 lb. There have been no exports of aluminium produced at home, but there have been some exports of partly or completely fabricated products made from imported ingots."

The company asked that the present duty be retained. It also stated that it is not a merger or combination, but has built up up its own property and business.

War prices seem to have further discouraged the use of aluminium in the United States for transmission line construction. A comparison

in prices of the two metals, copper and aluminium (see page 59) explains why. Several United States transmission companies even went so far as to replace already existing aluminium lines with copper for economic reasons. The following are notable examples:

Rochester (N.Y.) Railway and Light Co. "Arrangements have been made by the Rochester (N.Y.) Railway and Light Company to substitute No. 0 stranded copper wire for the 428,000-circ. mil. stranded aluminium conductors of a duplicate three-phase transmission line between Mortimer, N.Y., and the city of Rochester." The aluminium transmission line was built in 1907 and designed to transmit 18,000 h.p. This capacity has been reduced by the change in conductors to about 12,000 h.p., which is considered sufficient for future service. With the price of aluminium at 56 cents per pound and copper at 20 cents per pound—the basis on which the substitution was made—a net amount of \$8,400 has been realized from 63,000 pounds of aluminium through the change.*

Northern California Power Co.—"On account of the present abnormally high price of aluminium, and also because it has deemed it advisable to increase the capacity of certain of its transmission lines, the Northern California Power Company, Consolidated, of San Francisco, has taken down some of its aluminium wire and substituted therefor copper wire. The proceeds from the aluminium wire taken down have been sufficient to cover the cost of copper wire of greater capacity together with the labour and other costs involved. The company has made this change from aluminium to copper wire on its high-tension lines between Hamilton City and Nord, a distance of about 9 miles, and between Hamilton City and Chico, a distance of about 13 miles. It is at present engaged in making a similar change from Hamilton City toward Butte City, a distance of about 20 miles, and, as soon as this is finished, it will change the line from Orland northerly, a distance of about 30 miles."†

Montana Power Co.—"Recently advantage has been taken of the high price of aluminium by the Montana Power Company in the reconstruction of transmission lines from its power stations on the Madison river to Butte. Originally three 50,000-volt lines were constructed between these points, two of them using aluminium conductors on wood poles and one No. 0 copper on steel towers. The steel tower copper line has been re-insulated for 100,000 volts and the aluminium lines abandoned. General Manager F. M. Kerr of the Montana Power Company gives the cost of re-insulating the

* *Electrical World*, Dec. 25, 1915.

† *Electrical World*, Feb. 19, 1916.

60 miles of tower line as approximately \$17,000, with a salvage on aluminium from the other two lines at 52 cents a pound f.o.b. Butte railway station, of approximately \$60,000."*

Respecting the proportion of aluminium and copper used in high tension lines,—70,000 volts and over—data compiled from a tabular statement in the *Electrical World*† show that, in 1914, North America had some 7,000 wire-miles of aluminium against some 19,000 wire-miles of copper in use on lines operating above this voltage. In other parts of the world, the table shows no aluminium used on lines of over 70,000 volts. This is partly owing to the fact that there are comparatively few lines outside of America operating under these higher voltages, but aluminium is also extensively used on the shorter lines found there, notably in Norway, Sweden and New Zealand.

Canada probably has in use a greater proportion of aluminium lines than any other country. A recent survey by the Commission of Conservation shows that on all lines in the Dominion, operating at 10,000 volts and over, there are 13,000 wire-miles of aluminium and 8,000 wire-miles of copper.

* *Electrical World*, Feb. 24, 1917.

† *Electrical World*, April 25, 1914.

APPENDIX II

Order in Council, 2nd September, 1918, re Application of St. Lawrence River Power Co.

P. C. 2144—Certified copy of a Report of the Committee of the Privy Council, approved by His Excellency the Governor General on the 2nd September, 1918.

The Committee of the Privy Council have had before them a report, dated 31st August, 1918, from the Right Honourable Sir George E. Foster, Acting Secretary of State for External Affairs, submitting that there has recently been before the International Joint Commission an application of the St. Lawrence River Power Company, a corporation of the state of New York, for the approval of a project to construct certain works in the South Sault channel of the St. Lawrence river, an international navigable boundary water; that, as a result of this proceeding, a situation has arisen that may seriously affect Canadian interests; and that, for the reasons set out in the Memorandum hereto annexed, it is desirable that the whole matter should be made the subject of direct discussion and settlement with the Government of the United States.

The Minister, therefore, recommends that representatives of this Government be delegated and empowered to approach the United States Government, through the appropriate channel, and to enter into negotiations upon the matter with representatives of that Government upon the basis of the annexed memorandum.

The Committee concur in the foregoing recommendation and submit the same for approval.

RODOLPHE BOUDREAU

Clerk of the Privy Council

MEMORANDUM

The St. Lawrence River Power Company, a corporation of the state of New York, has made, under what is conceived to be the authority of the Treaty of January 11, 1909, between the United States and His Majesty the King, an application to the International Joint Commission for the approval of a project to construct a submerged weir in the South Sault channel of the St. Lawrence river. The South Sault channel is an international boundary water, and the Governments of Canada and the United States having appeared by counsel in the proceeding and the hearing thereon, certain questions have arisen that affect not only the treaty relations between Canada and the United States and the powers of the International Joint Commission, but also the prosecution of the European war. For the reasons hereinafter indicated, it appears desirable that the matter should be made immediately the subject of direct consultation and negotiation between the two Governments.

The position, as reported by counsel for the Canadian Government, may be here summarized. In September, 1917, the St. Law-

rence River Power Company applied for and secured permission from the Secretary of War of the United States to undertake certain works in the South Sault channel, namely, to dredge a channel through what is known as Dodge shoal, to construct a moveable ice boom and to extend to Long Sault island, by means of a submerged weir, the jetty or deflecting dyke already existing in the South Sault channel. It was stated that the object in view was, through the effect of these works on the river ice formations, to secure during the winter season an increased development of hydro-electric power in the company's power plant at Massena, New York, which is dependent for its operation upon a diversion of the waters of the St. Lawrence river. The construction of the submerged weir was only permitted by the Secretary of War subject to the approval of the International Joint Commission; the other works, however, were approved, without the knowledge of the Canadian Government and without any reference to the Commission, and have in whole or in part been proceeded with.

Although the immediate completion of all these works has been represented as being highly desirable and even urgently necessary, almost a year was allowed to elapse before the St. Lawrence River Power Company took steps to fulfil the condition imposed by the Secretary of War in respect of the proposed submerged weir; it was not until August 9, 1918, that the company's plans and application for approval thereof were filed at the offices of the International Joint Commission at Washington. Thereafter, on August 12, before any notice of the application had been formally served upon the Canadian Government, counsel for the United States Government presented a motion before the International Joint Commission in the course of a hearing upon another matter, praying that the hearing on the application should proceed at that session, notwithstanding the Commission's rules of procedure, which require notice and publication of the application and provide for a considerable period for the filing of counter statements. In support of his motion, counsel represented on behalf of the United States that the St. Lawrence River Power Company was supplying the electrical power essential to its parent corporation, the Aluminum Company of America, one of the world's chief producers of aluminium; that the proposed works would result in an increased production of aluminium during the coming winter months estimated at six million pounds; and that this increased production was urgently necessary for the purposes of the Government of the United States and the Allies in the prosecution of the war. Counsel, therefore, urged that it should be made possible to hold an immediate hearing on the merits of the application.

Counsel for the Canadian Government, having had no opportunity to secure instructions, opposed the motion, declaring at the same time the readiness of his Government to co-operate in all necessary war measures and urging that the matter was more properly one for direct consultation between the Governments.

After consideration, the International Joint Commission ordered the suspension of the rules and fixed the hearing of the application for August 29 at Montreal.

At the hearing at Montreal counsel for the United States, for the first time, came forward with a definite request that the application should be granted forthwith as an urgent war measure, and presented in support thereof a letter from the Secretary of War of the United States. Counsel for Canada submitted, and argued in support of, a statement presented to the Commission, copy of which is attached hereto. It was contended that, under existing treaties, the Commission was without power to grant the approval sought; and the suggestion was repeated that, in any case, the proper and more expeditious procedure was that of direct negotiation between the two Governments, and the Government of Canada was prepared to enter upon such negotiation immediately.

The International Joint Commission has taken the application under advisement until September 12, when it is possible, though, of course, not certain, that a decision may be announced. It was urged at the hearing that, unless the proposed work was commenced before September 15, there would be a risk that it could not be finished before the winter.

Having regard both for the necessity of securing the most effective prosecution of the war and for the great desirability of a wise regulation of the boundary water system between Canada and the United States, it is believed that the procedure pursued in this matter is not calculated to result in a mutually satisfactory solution. The Government of Canada is strongly convinced that some other and more direct means of settlement should be sought; and in this conviction it submits the following considerations and suggestions:—

1. Article VII of the Webster-Ashburton Treaty of 1842 declares "that the channels of the river St. Lawrence on both sides of Long Sault islands and of Barnhart island * * shall be equally free and open to the ships, vessels and boats of both parties." This declaration, relating as it does specifically to the South Sault channel, clearly prohibits the construction of the proposed submerged weir, which admittedly would prevent all navigation through this channel. So far as the Treaty of January 11, 1909, goes to the question, it is equally conclusive against the project. Article VIII lays down an order of precedence to be observed among the various uses for boundary waters enumerated therein, and declares that "no use shall be permitted which tends materially to conflict with or restrain any other use which is given in preference over it in this order of precedence." In the order of precedence that follows "uses for navigation" are given preference over "uses for power and for irrigation purposes." The construction of the proposed submerged weir is sought purely for power purposes, and, as such, it must be held to be prohibited by Article VIII, since it would not only "tend materially to conflict with or restrain" but it would wholly prevent the use of this channel of the St. Lawrence river for navigation. Clearly, therefore, the International Joint Commission is without power to approve the proposed structure, and it is apparent that the application, if pressed as at present, must fail.

2. It is true that the project in question might have been put forward in such a manner that it could properly have become the

subject of inquiry and recommendation by the International Joint Commission. In the turn which the proceeding actually took, the United States Government became in effect the real party; the case became in substance a United States Government matter. Such a case might properly have been referred to the International Joint Commission for inquiry and report under Article IX of the Treaty of January 11, 1909; for it is under this Article that governmental matters or projects should be submitted to and considered by the Commission. It need only be added here that the Government of Canada was prepared from the beginning to entertain such a course and to assist in every possible way in carrying it out.

3. As already intimated, the Canadian Government is not unmindful of the considerations of urgency advanced in this matter on behalf of the Government of the United States; it is not only ready, but is very anxious to do everything in its power to promote in every sphere of endeavour the most effective and harmonious co-operation in the prosecution of the war, in which the two Governments are associated under common ideals against a common foe.

4. For this great purpose the Canadian Government recognizes that, in view of the near approach of the winter season, it is highly desirable that a speedy conclusion should be reached upon the question of the necessity for the construction of the proposed works in the South Sault channel. To this end the Canadian Government would suggest that the whole matter should be withdrawn from the purview of the International Joint Commission and be made immediately the subject of diplomatic negotiation between the two Governments. This suggestion is advanced in the belief not only that it will, if accepted, conduce to a speedy conclusion of the matter, but that it is more appropriate that all proposed measures of co-operation in respect of the war should be discussed in this manner rather than through the medium of the International Joint Commission. In the view of the Canadian Government it was never contemplated that the machinery of this Commission should be used for the settlement of such unusual executive measures as present themselves to the two Governments in the extraordinary emergency that confronts them to-day; rather the Commission was designed to promote, for permanent and comprehensive application, the establishment of a system of principles under which a great natural highway, common to the two countries, might be wisely and deliberately developed for the common benefit. The circumstances in which the present matter has been brought forward and heard need only be recalled to show how little calculated they are to afford to the Commission the opportunity for careful and fully informed consideration that is so essential to the fulfilment of the Commission's real purpose.

5. If, therefore, the United States Government still considers that the proposed works ought to be constructed as a war measure, the Government of Canada is prepared to enter into immediate discussion upon the matter, and to that end it would propose the following as a basis:—

(a) If the Government of the United States is satisfied that, unless the proposed works are constructed in the South

Sault channel, there must necessarily be a substantial shortage in the supply of aluminium for the purposes of the United States and the Allies in the prosecution of the war, the Government of Canada will assent to the proposed construction as a war measure. In pursuance of this undertaking, the present application of the St. Lawrence River Power Company to the International Joint Commission should be withdrawn.

(b) The terms upon which the proposed works shall be constructed shall be agreed upon at a conference between representatives of the two Governments delegated and empowered for this purpose.

(c) In order that the South Sault channel may be restored to its present status, the terms should include a provision to the effect that the submerged weir, if constructed, shall be removed within twelve months after the conclusion of the European war.

(d) There shall not be diverted from the St. Lawrence river by the St. Lawrence River Power Company a greater quantity of water daily than is at present being so diverted. This paragraph is not to be construed as admitting any right on the part of the St. Lawrence River Power Company, or of any other person or corporation, to divert water from the St. Lawrence river.

(e) The Canadian Government, being advised that it would be possible to develop some seven hundred thousand horse-power from the waters of the St. Lawrence river in the vicinity of the Long Sault rapids, and recognizing that any such development could only proceed under agreement between the two countries, proposes for consideration that the two Governments should take immediate steps jointly to prepare a scheme looking to such power development in the interests of the two countries. In the light of this possibility the Canadian Government is strongly of the opinion that no permanent project by private interest should be permitted at this time that would prevent or interfere with the carrying out of such a joint programme by the two countries.

6. In conclusion, the Government of Canada earnestly trusts that, by means of such a conference between the two Governments as is here proposed, some mutually satisfactory solution of the matter may be reached; for it would look with grave concern upon any casual or hastily considered project that might have serious results upon the navigability of the great highway that constitutes Canada's main artery of communication and commerce. In this connection the Canadian Government would welcome further information concerning the circumstances and authority under which the dredging of Dodge shoal in the South Sault channel, hereinbefore referred to, was undertaken; for, even although it should appear, as alleged, that this change in the river bed will have no effect upon the navigability of the St. Lawrence river, yet, in the view of this Government, it is highly desirable, in the interest of the establishment of sound principles and rules for the development of the common boundary waters, that such projects of private companies should be submitted

in advance to the International Joint Commission. The Canadian Government, which is advised that this dredging has already had the serious effect of lowering by at least five inches the water at the head of the Cornwall canal, reserves for further attention any rights in respect thereof under existing Treaties.

A similar reservation is made in respect of the proposed ice-boom—the construction of which is apparently contemplated without any consultation with the Canadian Government or reference to the International Joint Commission.

OTTAWA, August 31, 1918.

APPENDIX III

Argument of Hon. Hugh Guthrie,* Solicitor General for the Dominion of Canada

Hon. Mr. GUTHRIE: Representing the Government of Canada in this matter, there is not, in my opinion, very much between us upon the facts, and my submission is that, upon the admitted facts, upon the statement of the case which has been put in by the applicant company, there is no power in the International Joint Commission to approve this order; and, if there were such power, I do not think in their discretion they should approve it.

We rely, of course, in that position, in the first place, upon what we consider our absolute treaty rights. The Treaty of 1842, commonly known as the Ashburton Treaty, is still a treaty in full force and effect. It is the treaty which delimits the boundary lines between Canada and the United States. Of its very nature it is a permanent and binding arrangement, and was reached after a long discussion by the two countries. It is an arrangement which was come to upon consideration—valuable consideration. The preamble of the treaty itself recites that it is an arrangement made with such equivalents and compensations as are deemed just and reasonable. Where Canada yields a point in a particular instance, the United States yields a point in another instance. It is founded, therefore, upon equivalents and compensation. A treaty of that nature must be looked on as a very sacred international bargain which cannot lightly be broken, varied or altered.

Now, Article VII of the Treaty is very explicit in regard to the channel of the St. Lawrence at Long Sault island. Those terms which apply to the Long Sault channels read as follows:

"It is further agreed, that the channels in the river St. Lawrence, on both sides of the Long Sault islands, * * * shall be equally free and open to the ships, vessels, and boats of both parties."

There are three requirements of that section with regard to both of those channels. The first is that they shall be equal, that is, the usage of them. Next, they shall be free, and, next, they shall be open. It is interesting to note just a point in regard to the use of that word "equally." There has been some comment on the use of the word. If I understand rightly the contention of my learned friend, Mr. Koonce, when the matter was before this Commission at Atlantic City, he sought to argue that "equally" meant merely that there shall be no discrimination; that the South branch of the Long Sault might be closed so long as it was closed against all parties, because then there would be an equality of non-user which would satisfy the language of the treaty. I am unable to agree with any such view of plain language, and I am satisfied it would be nothing short of a

*Argument of Hon. H. Guthrie on behalf of the Dominion of Canada at the Hearing before the International Joint Commission of the application of the St. Lawrence River Power Company, Montreal, August 29, 1918.

distortion of words to put such a construction upon it. But the word "equally" has a history. In the original draft of the treaty the word "equally" did not appear, and in other sections of the treaty the word "equally" does not appear with regard to the New Brunswick waters.

Mr. MIGNAULT: Can you suggest, Mr. Guthrie, why it was put in?

Mr. GUTHRIE: Yes, I am going to suggest why it was put in. Would you permit me to proceed, because that is the point I am making. The word "equally" did not appear in the first draft. Now, this is a matter, perhaps, of some slight importance. It is an historical point anyway. In *The Works of Daniel Webster*, published by the well known house of Little, Brown & Company, of Boston, in 1856, we get some light upon the question as to how the word "equally" came to be inserted.

Mr. MIGNAULT: Will you give me the reference, please?

Mr. GUTHRIE: The reference is to Volume VI of *The Works of Daniel Webster*, published by Little, Brown & Company, of Boston, in 1856, at page 282. The first reference is to a letter written by Lord Ashburton and addressed to the Honourable Daniel Webster on July 16, 1842. In this letter, Lord Ashburton enters a mild protest or suggestion that, under certain circumstances, the passage of a British vessel through the Long Sault channels might be refused, and he suggests:

"We want a clause in our present treaty to say that, for a short distance, namely from the upper end of Upper Long Sault island to the lower end of Barnhart's island, the several channels of the river shall be used in common by the boatmen of the two countries."

Mr. Webster replied to that letter in a communication dated July 27, 1842. From his letter I read the following, at page 284:

"Besides agreeing upon the line of division through which these controverted portions of the boundary pass, you have suggested also as the proposed settlement proceeds upon the ground of compromise and equivalents, that boats belonging to Her Majesty's subjects may pass the falls of the Long Sault, in the St. Lawrence, on either side of the Long Sault islands, and that the passages between the islands lying at or near the junction of the river St. Clair with the lake of that name shall be severally free and open to the vessels of both countries."

Mr. Webster's interest was in the Detroit river. It happened that, near Detroit, the channel passes through Canadian waters. He saw that, if the clause were [not] made plain and the treatment for both countries made equal, it might afterwards be contended that the important channel at Detroit was wholly in Canadian waters, and that might not accord equal treatment to the ships of the United States. He agreed that the matter shall be straightened out, and, toward the end of his letter, he says:

"It being understood that all the water communications and all the usual portages, along the line from lake Superior to the lake of the Woods, and also Grand portage from the shore of lake Superior to the Pigeon river, as now actually used, shall be free and open to the use of the subjects and citizens of both countries."

At the close of Lord Ashburton's letter of July 29, 1842, he says:

"I should remark, also, that the free use of the navigation of the Long Sault passage on the St. Lawrence must be extended to below Barnhart's island, for the purpose of clearing those rapids."

At page 352 of the same volume, in President Tyler's Message transmitting the Ashburton Treaty to the Senate, it is said:

"So, again, there are several channels or passages, of different degrees of facility and usefulness, between several islands in the river St. Clair, at or near its entry into the lake of that name. In these three cases, the treaty provides that all the several passages and channels shall be free and open to the use of the citizens and subjects of both parties."

After the draft treaty, which is said in this work to be in the handwriting of Mr. Webster, and it had been transmitted by President Tyler to Congress, the word "equally" was inserted, and it is said here in the handwriting of Mr. Webster:* To make plain and clear that the usage and rights of those waters specifically mentioned in Article VII of the treaty should be equally free and equally open to the ships, vessels, and boats of both parties. Mr. Webster's interest being at Detroit rather than in the St. Lawrence, and the interest of Lord Ashburton, according to his original letter, being more particularly in regard to the St. Lawrence and St. Clair rivers.

That is so plain a declaration, in so prominent a document as an international treaty, that I do not see how any tribunal or any court could vary it or set it aside in any way; but, on the contrary, it must be bound by it and give it due effect.

Now, it was suggested in the argument of my learned friend, Mr. Koonce, that perhaps it had been superseded.

Mr. TAWNEY: Before you leave that, may I ask you a question? Do you contend that the word "equally" applies to any right other than that of the right of navigation?

Mr. GUTHRIE: It shall be "equally free and open."

Mr. POWELL: To the ships, vessels and boats?

Mr. GUTHRIE: Yes; to the ships, vessels and boats.

Mr. POWELL: That is a limitation.

Mr. GUTHRIE: For the moment I would think that navigation would be the only thing in their minds. At that time, the development of power would hardly have been present in their minds.

Mr. POWELL: The limitation to navigation means exclusion of everything else.

Mr. GUTHRIE: "Ships, vessels and boats" is as broad a term applying to navigation as I think it could well frame. It would include all the craft that were known at that time.

Mr. MIGNEAULT: It might include the right to fish in these waters?

Mr. GUTHRIE: No; I do not think the free rights to boats would include a fishing right.

*Owing to the defective acoustics of the room in which the hearing was held, this sentence was mis-reported. Mr. Guthrie's statement was about as follows:—

"Before the draft treaty, with the accompanying message—which is stated in this work to have been written by Mr. Webster—had been transmitted by President Tyler to Congress, the word 'equally' was inserted and it is stated here in plain and clear language that the usage and rights of those waters" etc. (Ed.)

Now, it has been suggested that that treaty has, in some way, been superseded by the subsequent treaty under which the International Joint Commission has been established.

Mr. MIGNEAULT: There was a treaty of Washington in, I think, 1871, which refers to the right of navigation.

Mr. GUTHRIE: There is some reference to it but not as affecting this portion of the river.

Mr. POWELL: What section of the treaty of 1871 applies to the navigation of the St. Lawrence river?

Mr. KOONCE: Article XXVI.

Mr. GUTHRIE: That applies to navigation below Cornwall. It does not affect this matter at all. Now, the treaty of 1909 was a treaty, as stated in the preamble, made between the United States of America and the King of Great Britain—"to prevent disputes regarding the use of boundary waters and to settle all questions which are now pending between the United States and the Dominion of Canada involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along their common frontier, and to make provision for the adjustment and settlement of all such questions as may hereafter arise."

Under that treaty this Commission, under Article VII, was established, and, by Article VIII, the jurisdiction of this Commission was also established. There is nothing in the treaty of 1909 to confer jurisdiction upon this body save what is set out in Article VIII. It is the only article which confers jurisdiction, Article VII being the article which constitutes the body. Article VIII says:

"This International Joint Commission shall have jurisdiction over and shall pass upon all cases involving the use or obstruction or diversion of the waters with respect to which under Articles III and IV of this treaty the approval of this Commission is required, and in passing upon such cases the Commission shall be governed by the following rules and principles * * * ."

Now, there are only two classes of cases which would come before this Commission brought here by private parties. I do not refer to those cases which may be referred to by the Governments. It is clear that this case does not come under Article IV or have any bearing upon Article IV, because that applies only to waters flowing out of national waters. So it must come under Article III if it comes at all. Article III reads as follows:

"It is agreed that, in addition to the uses, obstructions, and diversions heretofore permitted or hereafter provided for by special agreement between the Parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdictions and with the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission."

That, I take it, means—and I submit that this is a correct meaning of the sentence—that if, in any case, the United States or the Dominion of Canada seeks to make any change in its own water

or waters under its own jurisdiction, they may do so provided they obtain the approval of this Commission; but, in doing so, they must not transgress Article I. Article I says:

"The High Contracting Parties agree that the navigation of all navigable boundary waters shall for ever continue free and open for the purposes of commerce to the inhabitants and to the ships, vessels and boats of both countries equally, subject, however, to any laws and regulations of either country, within its own territory, not inconsistent with such privilege of free navigation, and applying equally and without discrimination to the inhabitants, ships, vessels and boats of both countries."

The moment there is interference with what the article calls "privilege of free navigation," then neither country has any jurisdiction in its own international waters, or its own territorial waters, to do any act. Both countries might, if they saw fit, refer such a matter to this Commission under other sections of this treaty. But, until that is done—and it would have to be done by both countries—neither one nor the other can do any act which will be inconsistent with such "privilege of free navigation." That, I submit, makes the old treaty power rights stronger than they were in the original. It does not supersede it in any way. It does not destroy or annul or alter it. But, by Article VIII, it is expressly provided that the foregoing provisions shall not apply to or disturb any existing uses of boundary waters. One of the uses of boundary waters is the use of navigation. That is a use, and it is so described in Article VIII. The three uses that are there permitted, and the priority in which they are permitted, are stated to be, first, "for domestic and sanitary purposes"; second, "uses for navigation, including the service of canals for the purposes of navigation"; and, third, "uses for power and for irrigation". Navigation is a use and there is an express limitation in Article VIII that the foregoing provision—that is the provision which confers jurisdiction on this Board—shall not apply to or disturb any existing uses; and the existing use that we rely upon in this case is the use of navigation which was conferred on us by the Ashburton Treaty, Article VII of which provides that this particular branch of this particular river shall be kept "free and open to the ships, vessels, and boats", of both countries.

Mr. TAWNEY: Do you observe in Article I that the limitation there is to navigable boundary waters?

Mr. GUTHRIE: Yes.

Mr. TAWNEY: Do you make any distinction between navigable and non-navigable boundary waters?

Mr. GUTHRIE: I do not make the distinction, but notice that the words "navigable boundary waters" are there, and I submit that any water that is capable of navigation is navigable water. The fact that ships do not ply does not affect the question of whether the water is navigable or not. We have in Canada many rivers and lakes upon which ships never ply. But there is deep water and some day they might be used. Certainly it is abundantly proved by my learned friends themselves that this stream, the South Sault, was used for commercial purposes. It was used for pleasure boat purposes. It was used for excursion boat purposes, which is a combina-

tion of business and pleasure. Until the railway came in there, it was more or less common. It was navigable and it is navigable to-day. But the evidence seems pretty clear that there was very little traffic on it; perhaps none except the motor boats and launches. There were the docks. One of the witnesses said, "There is a wharf at my place; there is another at Dodge shoal, and there is another a little higher up." He also said, "Freight used to come down, but the railways changed all that."

Mr. MAGRATH: Do you think it would be necessary to go both ways to cause it to be navigable?

Mr. GUTHRIE: We can go both ways.

We have in the South Sault an alternate route. I do not say it is the best route. Let us have an ice jam in the North Sault; let us have a gate on one of our locks thrown out of commission; we have the alternative channel, and we do not want it blocked. But there is a larger view of it even than that and the larger view is this: Some day—and I trust soon—there will be a power development and a dam across the North Sault. It has to be an international work, I assume. Then it becomes all the more important to have the South Sault as a navigable channel.

Mr. POWELL: That is an argument addressed to our discretion.

Mr. GUTHRIE: Yes; I am only pointing out the importance of it in this. I am not yielding a point in regard to our rights under the treaty. Now, my information is that the Government has in contemplation the construction of a dam across that North Branch. It will have to be undertaken internationally, I assume, with the concurrence of the United States. Probably it may be referred to your Commission for settlement. But, if such a work is undertaken, and the North channel is closed, the South channel becomes all the more important. You may say that the Richelieu and Ontario boats are too large to come down it now, but all that is required there is a lock to make navigation good. My point, however, is that the water is navigable, and that is so abundantly proved that I do not think I need labour the question.

Mr. POWELL: There is one thing that bothers me, and I think the case is stronger in your favour than you are putting it, because the two High Contracting Parties in their language in the Ashburton Treaty have recognized this very division of the water as navigable and provided for it.

Mr. GUTHRIE: I would not expect for a moment that I could put it in language as strong as the treaty. I am relying on the treaty but I am trying to point out some of the reasons for the great importance of this question to the Government of Canada. The thing that is also important and should not be lost sight of is this: That this very concern, this Aluminum Company of America, with one of its subsidiary companies, known as the Long Sault Development Company, attempted the very thing that the Government wants to do. They tried to get the right to build a dam across there and they did get the right from the State of New York, but, subsequently, that right was taken away by the State of New York and the matter got to the courts and to the Supreme Court of the United States.

When the Long Sault Development Company got its charter to construct that dam it was a very broad one. They set out that "the rights hereby granted shall never be so used as to impair or obstruct the navigation of the St. Lawrence river, but, on the contrary, that such navigation shall be preserved in as good condition as, if not better than, the same is at present, regard being always had to the amount of the natural flow of water in said river as affecting its navigability from time to time."

Now, New York State undertook to grant lands under the South Sault to this company. It was held by the United States Supreme Court that they could not do so, but, all through, the Development Company took the position that it was navigable water and they were going to actually improve it. Their charter certainly forbade them injuring the navigation, and I point out also to the Commission that in every permit issued at Washington the navigation of the river has been recognized because the clause has been put in that they must not injure navigation. The three permits contain the clause. The charter the St. Lawrence Power Company obtained from the State of New York has the same clause—they must not injure navigation. The navigation has been recognized. As I said before, though, the matter has been so clearly proven and demonstrated here that I need not argue the question any further.

Now, I go back to the treaty, and, as one of the Commissioners remarked, that is certainly our strongest ground. That is the ground that we rely on as a bar to any action by this Commission in regard to this application. I stated in the beginning that, in the opinion of the Government of Canada, the Commission had no jurisdiction. Whether I used the word "jurisdiction" correctly or not may be open to question, but certainly I am putting it on fair grounds when I say that the Commission has no right to do it. We claim a treaty right. If that Article VII of the Ashburton Treaty does not give the people of this country free and open right to those channels for the ships, vessels and boats of this country, if this Commission has power to close that channel by this dam, it can close the Detroit river; it can close the St. Lawrence river. Where is it going to stop? This Government relies on that treaty. It looks on it as sacred, and it claims its rights under it. Treaties must be respected. The whole world is convulsed with a war now because a nation in a moment of madness undertook to deny treaty rights. We want every right that is given to us under that treaty. For that reason we ask this high tribunal not to seek to vary it, not to deny our right in a single particular, but to keep open and free that channel specifically mentioned in Article VII.

Now, as I said yesterday, the Government of Canada is not disposed to play dog in the manger in this matter. We have no such desire and no such wish. I think it would perhaps have been better if my learned friend, Mr. Koonce, yesterday, had obtained a letter from the Secretary of War directed to the Government at Ottawa instead of to this Commission, asking that this matter be taken up. I can assure him it would have been taken up and would be yet, and the shortest cut to obtain the relief in this matter is for the Govern-

ment of the United States—it being the party who should negotiate proceedings—to communicate at the earliest possible moment with the Government of Canada, in order not only that the whole of the greater question may be discussed but that this particular difficulty may be discussed with a view of making it operative and satisfactory for purposes of the present war and at the earliest moment of time. My learned friend suggests that that means delay. They do not want it. The president of their company does not want it. It takes time and can never be done. If the United States wants it done I have authority to say: Let them apply to Canada and the question of delay in adjusting these matters will not be the fault of Canada.

Mr. KOONCE: Will you please state how that can be brought about?

Mr. GUTHRIE: Let the Secretary of War send a telegraphic communication to Sir Robert Borden, and two men can settle this matter in an hour. We are dealing with the Government of the United States and not with a very weighty private corporation, and that is a very grave distinction. I submit to you that, if this dam were to go in and become the property of this private company, it will never come out and that the river will be blocked. I heard it suggested by counsel, "Suppose it were put in and we rip it out at the end of the war." If it goes in it will never come out. The company is too strong. Three or four years from now they will say, "Look at the money we have spent. Leave it there." We want to be in a position of dealing fairly and squarely with the Government of the United States, because we apprehend that this is an international matter. If the two Governments should refer it to this Commission—and I think probably they would refer the greater question to this Commission—all well and good. Your jurisdiction would then be complete, but, in the meantime, my suggestion—I can only make it as a suggestion—is that my learned friend Mr. Koonce should use the telegraph wires and ask his Government to make an intimation—and I am sure that in a few hours it will receive a reply—and, if a commission will come to Canada, or we go to Washington, this particular matter will be dealt with satisfactorily to both Governments, and the lack of production needed for the war will not lie at the door of Canada. My submission, to be very brief, is that, under the language of the Ashburton treaty, Canada has treaty rights which must not be interfered with.

Mr. TAWNEY: Pardon me for asking you one question with reference to the construction of the Webster-Ashburton Treaty. It may have some bearing upon this matter. Was there any protest by Canada or by Great Britain to the diversion from the South channel of the Long Sault of the water of that channel, or any part of it, through the power canal of the St. Lawrence River Power Company at the time that diversion was authorized by the United States Government?

Mr. GUTHRIE: I am not in a position to answer that question, but I was in the House of Commons, as was also a member of your Commission, at the time this question occupied the attention of the

House of Commons. That was in the year 1910, after the construction of the canal, and I can tell you that there was a very loud and long protest on that occasion.

Mr. TAWNEY: That had relation, however, primarily, to the development of power in the Long Sault, that is the North channel of the Long Sault.

Mr. GUTHRIE: Yes, sir, it was charged that one led to the other.

Mr. TAWNEY: I wanted to know whether there was any protest, either through diplomatic channels or otherwise, by either Canada or the British Government with regard to the diversion which the Government of the United States authorized from the South channel at the time that diversion was authorized?

Mr. GUTHRIE: I am not in a position to answer the question more than to say this, that I do not think the matter was ever brought to the attention of the Dominion of Canada. That was before the treaty of 1910. It may be that we did not consider that we had any rights at that time.

Mr. TAWNEY: Well, you certainly had your rights under the Webster-Ashburton Treaty, if this was a navigable water.

Mr. GUTHRIE: But the charter of the company says that they were not to interfere with navigation. I suppose that, seeing that before us, if we did see it, we could rely on it, but the fact that they have taken half the water out of that South channel in breach of the terms of that treaty surely does not give them the right to stop it altogether.

Mr. TAWNEY: Not unless the other party acquiesces.

Mr. GUTHRIE: Well, we do not acquiesce; we protest and we protest against the original construction on the ground that they had no proper authority to make that construction. And as vigorously as I can protest I do protest against that and against any further construction.

Mr. POWELL: That word "free" is a technical term.

Mr. GUTHRIE: I find that the word "free" is about the broadest—

Mr. POWELL: It is at once the broadest and the most constricted.

Mr. GUTHRIE: It has such meaning as unfettered, uncontrolled, unhampered, uninterrupted, without let or hindrance. It is as broad a word as you can use.

Mr. POWELL: Are those dictionary meanings?

Mr. GUTHRIE: Yes, but not all of them by any means.

Mr. POWELL: But what about this legal use? By a process of evolution the original meaning of the word "free" has been departed from until it can be more fairly described by saying that it was very restricted. Take the law in respect to the use of the highway. Every individual in the United States or Canada has a right to the free and uninterrupted use of the highway. They have the free and uninterrupted use of a river. At the same time, a man using the highway can back his cart in against the sidewalk as long as he does not unreasonably interfere with the driving of others. A vessel can anchor in a stream where another vessel may be beating against the wind and have to get out of his way, and that other man has not a free and uninterrupted use.

Mr. GUTHRIE: Yes, he has.

Mr. POWELL: Not in the language of the dictionary. It is a highly technical use of the word "free."

Mr. GUTHRIE: I certainly think that "free" would not permit the building of a dam across the water.

Mr. POWELL: Is not this the case, that the free and uninterrupted navigation of a river would not prevent the owner, if the owner had such a right of soil in the bed of the river, from erecting therein the pier stretching out, so long as it did not unreasonably interfere with navigation, and that question of unreasonable right to navigation will be tried out in a suit for what? For a nuisance. And the thing would be whether it was reasonable or not.

Mr. GUTHRIE: I grant you that all things must be reasonable; otherwise they would be a farce.

Mr. POWELL: If you go back to the Ashburton Treaty, you may restrict the word "free" and adopt it as a highly technical term which does not mean free as given by lexicographers; yet you cannot restrict it to the point of absolute prohibition.

Mr. GUTHRIE: It has been argued that that word "free" means untaxed or without charge, but the word "open" was put in to extend it, and you have both words to deal with. So, if one foot is not on strong ground the other foot is.

Mr. MIGNEAULT: The word "open" with the word "free" shows that navigation should not be restricted.

Mr. POWELL: In the United States there was an island in the centre, and the railway company was building two bridges—the right of free and uninterrupted navigation was invoked, and it came before the Supreme Court of the United States in the way of getting an injunction against the railway company for putting the bridge over one branch of the stream and absolutely closing it. The Supreme Court of the United States held that, inasmuch as there was an ample and sufficiently capacious alternate route, the injunction would not lie.

Mr. GUTHRIE: They did not have a treaty with another nation that said both routes shall be open.

Mr. POWELL: If you had not the Ashburton Treaty the other principle might come in.

Mr. GUTHRIE: I am making no suggestion of that kind at all. We are relying upon the Ashburton Treaty.

APPENDIX IV

INTERNATIONAL JOINT COMMISSION

In the matter of the Application of the St. Lawrence River Power Company for the approval of the construction and maintenance of a submerged weir in the South Channel of the St. Lawrence River near the mouth of its Power Canal at Massena, New York.

INTERIM ORDER

(September 14, 1918)

Whereas, by its application dated July 25, 1918, as subsequently amended with the permission of the Commission, the St. Lawrence River Power Company, a corporation organized under the laws of the state of New York, having its principal office at Massena, New York, applied to this Commission for its approval of the construction and maintenance of a submerged weir in the St. Lawrence river extending from the existing jetty of the said company below the intake of its power canal to Long Sault island in said river and being wholly within the territory of the United States, which construction has been authorized by the United States and approved by a permit of the Secretary of War bearing number 38786/64, dated September 10, 1917, and attached to said application, which said permit contains, among others, the following provisions:—

“That, if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of War, it shall cause unreasonable obstruction to the free navigation of said water, the permittee will be required, upon due notice from the Secretary of War, to remove or alter the structural work or obstructions caused thereby without expense to the United States so as to render navigation reasonably free, easy and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation or other modification of the watercourse hereby authorized shall not be completed, the permittee, at his own expense, and to such extent and in such time and manner as the Secretary of War may require, shall remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration;” and

Whereas, said application was first presented to the Commission at its session at Atlantic City, New Jersey, on August 12, 1918,

whereupon counsel appearing for and on behalf of the United States applied for an immediate hearing on said application, representing, as was also alleged by the applicant, that the said St. Lawrence River Power Company is a subsidiary of the Aluminum Company of America; that the applicant company had for many years developed hydro-electric power in its power house at Massena, N.Y., using water for that purpose taken from the South channel of the St. Lawrence river immediately below Dodge shoal *via* its power canal and Grasse river near Cornwall island; that the hydro-electric power thus produced is used mainly in the production of aluminium by the said Aluminum Company of America; that the demand on this company to supply aluminium is most urgent and insistent, and practically their entire output is being taken by the United States and Allied Governments for military purposes in the prosecution of the present war; that, during the months of January, February, March and part of April in each year, huge ice jams in the said South channel cause practically a shutdown of the said plant and an annual reduction in the output amounting to over six million pounds, and that these serious ice difficulties can be remedied by the construction of the said submerged weir, and counsel for the United States Government therefore applied to the Commission for an order for the suspension of its Rules of Procedure so as to permit of the immediate hearing of the said application and in support of said motion submitted letters from the Chairman of the War Industries Board of the United States and the Acting Director of Aircraft Production urgently praying for favourable consideration and approval of the application herein, and

Whereas, by its order dated at Atlantic City, August 13, 1918, the Commission suspended rules 9, 10, 11, 12 and 13 of its Rules of Procedure and ordered that a hearing on said application be fixed for the 29th day of August, 1918, at 10 a.m. of that day in the city of Montreal, Que., and

Whereas, at the time and place agreed upon, the hearing having taken place, the commission at the conclusion of the evidence of the applicant, heard counsel on its behalf, as well as counsel on behalf of the United States, the Dominion of Canada, the province of Ontario and the state of New York, and also on behalf of several private and corporate interests, no testimony having been presented by either Government or by any interest in opposition to said application, and

Whereas, at the said hearing at Montreal, counsel for the United States presented to the Commission a letter from the Secretary of War of the United States to the Commission, requesting in order to meet the urgent necessity for the increased production of aluminium for the prosecution of the present war, that the permit he had granted to the applicant receive the approval of the Commission, and

Whereas, the Dominion of Canada by its Statement in Response and also at the said hearing denied the jurisdiction of the Commission to entertain and grant the said application, alleging that, under Article VII of the Webster-Ashburton Treaty of August 9, 1842, it is stipulated that the channels in the river St. Lawrence on both sides of Long Sault island and Barnhart island shall be equally free and open

to ships, vessels and boats of both parties, and also that, by the Treaty of January 11, 1909, between Great Britain and the United States, it was agreed that the navigation of all navigable boundary waters shall for ever continue free and open for the purposes of commerce to the inhabitants and to the ships, vessels and boats of both countries, and

Whereas, the Commission at Montreal, on the 31st August, having duly considered the said application and the evidence offered in support thereof, and the said exception to its jurisdiction, adjourned its sitting to the 12th day of September at the city of New York, when it continued the consideration thereof on the said and following days, and

Whereas, the Commission is of opinion that the said submerged weir would be an obstruction in a boundary water on the United States side of the boundary line which would alter the level on the Canadian side thereof, and therefore the Commission has, under Articles III and VIII of the Treaty of 1909, full jurisdiction and authority to pass upon the said application, and

Whereas, the Commission is of the opinion that, in order to arrive at a final decision further evidence should be taken and further argument submitted, especially with regard to the effect of Article VII of the Webster-Ashburton Treaty in so far as it may or may not constitute a bar to the construction of the said weir, and with regard to the question of whether said article has been superseded by the Treaty of January 11, 1909, and

Whereas, the war necessities of the Allied Governments imperatively demand that the production of aluminium at the applicant's plant at Massena be increased as much as possible during the winter months, and

Whereas, it further appears that the construction of the said submerged weir must be immediately commenced and be completed by the 15th day of December next in order that the production of aluminium for the present year may be increased;

Therefore, without at the present time finally deciding the question whether the Commission should approve the construction and permanent maintenance of the said weir, and without prejudice in any way to its right to decide such question hereafter, and in view of the pressing necessity for the immediate increase for war purposes of the available supply of aluminium, and at the urgent request of the United States,

It is hereby ordered, as an interim measure, that the construction of the said weir and its maintenance until the expiration of the term of five years from the date hereof, or until the termination of the present war, is hereby approved upon the following conditions:—

(1) That, at the expiration of said period of five years, or upon the termination of the present war, whichever shall last occur, said weir shall be removed by the applicant; reserving, however, to the applicant or any other interested party the right to apply to the Commission at least one year before the expiration of the said period for a further continuance of the said weir, and on such application the Commission may approve of such continuance on such terms and

conditions as it may deem appropriate and equitable for the protection of the rights and interests of the people on either side of the line in accordance with Article VIII of the Treaty of 1909.

(2) That the said weir shall be constructed and maintained in accordance with the plans mentioned and under all the terms and conditions set forth in the paragraphs numbered from 1 to 11, both inclusive, in the permit therefor granted by the Secretary of War, dated September 10, 1917, so far as same are applicable.

(3) That for the purpose of protecting the rights, property and interests on either side of the boundary from any injurious effect resulting from the construction and maintenance of said weir the Commission will, during the term of its approval herein, retain jurisdiction over the subject matter of said application, and may make such further order or orders in the premises as may be necessary.

Provided, that in making the foregoing order the Commission shall not be deemed to have considered nor passed upon any question pertaining to the right of the applicant to divert water from the St. Lawrence river.

Dated at New York, N.Y., September 14, 1918.

C. A. MAGRATH
O. GARDNER
HENRY A. POWELL
JAMES A. TAWNEY
P. B. MIGNEAULT
R. B. GLENN

APPENDIX V

Order in Council, October 12, 1918, *re* St. Lawrence River Power Company

P. C. 2509—Certified copy of a Report of the Committee of the Privy Council, approved by His Excellency the Governor General on the 12th October, 1918.

The Committee of the Privy Council have had before them a Report, dated 19th September, 1918, from the Acting Secretary of State for External Affairs, submitting as follows:—

As the result of an application recently made to the International Joint Commission by the St. Lawrence River Power Company, a corporation of the State of New York, for the approval of a project to construct certain works in the South Sault channel of the St. Lawrence river, an International navigable boundary water, a situation arose which gravely concerned Canadian interests; for in the view of this Government, already expressed at length in the order in council of the 2nd September, 1918, (P. C. 2144),* not only was it clear that, since the proposed works would wholly prevent navigation through the South Sault channel, the International Joint Commission was, by reason of existing treaties between His Majesty the King and the United States, without power to sanction the project, but it was further apparent that the project itself was inconsistent with and would seriously impede the best development of the St. Lawrence river for navigation and power purposes in the interest of both countries. It was also the view of this Government that the construction of such works was in no wise necessary for the attainment of the end desired by the St. Lawrence River Power Company, as expressed in their application, but that other effective and wholly unobjectionable means were available for that purpose. Accordingly, it became the duty of the Government to appear formally before the International Joint Commission and to enter its strong objection to any consideration of the application by that tribunal. At the same time it appeared that the Government of the United States has come forward in support of the application and was urging its immediate approval as an urgent war measure.

In those circumstances this Government, with every desire to promote the most effective co-operation in the prosecution of the war, proposed, as will appear from the said order in council of the 2nd September, 1918, that the matter should be withdrawn from the International Joint Commission and discussed directly between the two Governments with a view to securing the immediate accomplishment of the desire and purpose of the United States Government and, at the same time, preserving the position of this country in respect of its treaty rights and its interest in the sound development of the St. Lawrence river for navigation and power purposes. The proposal was indeed calculated to secure this purpose of the United States Government more expeditiously than was possible through the medium of the Commission, even if the Commission had had power to entertain the case.

*See Appendix II, p. 65.

In pursuance of this proposal two members of the Government proceeded to Washington and presented the position in greater detail to the Secretary of State of the United States. It may be added here that the proposal was not at that time accepted, nor has it since been accepted; in fact, no reply thereto has yet been received from the United States Government.

Subsequently, on the 14th September, 1918, the International Joint Commission reached a decision on the application and delivered an order, copy of which is appended hereto, [Appendix IV], approving the construction of the proposed works on certain conditions therein set forth. At the same time, the order reserves for further consideration the question whether under the terms of existing treaties, the Commission has power to approve the proposed structure. It should be added that the Canadian Government, through its counsel, had already, before the issuance of the order, acquainted the Commission with the terms of the order in council of the 2nd September, 1918, setting forth its view that the Commission was without power to make such an order.

It is worthy of note that the Commission, in issuing the order, expressly declines to decide whether it actually has power to do so. In exercising authority it leaves for future determination the controlling question as to whether it possesses any such authority. However, it cannot be doubted that the issuance of the order is in itself an assumption of such authority.

Thus confronted with an assumption of power on the part of the International Joint Commission, which, in the opinion of the law officers of the Crown, was entirely unwarranted, it is necessary to determine at once the course of the Government. A conclusion as to the course to be pursued under such conditions is not without difficulty. It is pertinent, however, to recall that, in a former case, presenting a similar situation, the Government of the United States refused to recognize the jurisdiction of the International Joint Commission. In the matter of the division of the waters of the St. Mary and Milk rivers, then pending before the Commission, it appears, from a despatch from His Majesty's Ambassador at Washington, dated November 13th, 1917, that the United States Secretary of State, by letter dated November 8th, 1917, informed the Ambassador that, since the Commission had under consideration the question of its authority to interpret or construe Article VI of the Treaty of January 11th, 1909, and since, in the view of his Government, the Commission had no such authority in the then state of the case, he had deemed it proper to inform the Commission that whatever conclusion was reached by the Commission could not be regarded as binding upon his Government in so far as it undertook to construe the Article in question.

In view of the foregoing, the Minister recommends that the Government of the United States be informed that this Government feels bound to repeat its view that, for the reasons already indicated, the International Joint Commission was without authority to approve the application of the St. Lawrence River Power Company, and that

the order of the Commission assuming to grant such approval cannot be regarded by the Government of Canada as binding upon this Dominion.

The Government of the United States will readily understand that, in taking this course, the Canadian Government is actuated only by its concern for those treaties and conventions that have so happily promoted the friendly relations between the two countries, and by the belief that it is through a jealous regard for the integrity of such understandings that these fortunate relations may best be maintained.

It is with this purpose also that the Canadian Government deems it appropriate to refer here to the proposal made in the order in council of the 2nd September, 1918, that the two Governments should take immediate steps jointly to prepare and carry out a scheme looking to the most economical and comprehensive development of the waters of the St. Lawrence river in the interests of the people of both countries. Even though the utilization of only a portion of the whole capacity of the river can be immediately contemplated, yet the endeavour should be to design at the outset a complete scheme into which successive developments might be fitted from time to time as and when the occasion might demand. Without some such scheme there is always present the great danger that the ultimate possibilities of St. Lawrence navigation may be neglected or even irreparably injured; for it must be borne in mind, not only that navigation is the paramount national and international use of this great highway of commerce, but that the possibilities of the stream in this respect have been as yet by no means fully developed. On the other hand, it is certain that the subordinate and incidental but important use of these international boundary waters for power purposes can never be rendered as efficient and productive through a policy of simply permitting a haphazard series of unrelated private enterprises as through a carefully considered and comprehensive scheme of development carried out under public auspices by the two countries; and obviously it is only by agreement and concerted action between the two countries that such a development can be undertaken.

But, as already intimated, this is not all; there is, in addition to the economic advantages, the much more important consideration affecting the status of the treaties and conventions between the two countries. For the adoption of the proposed joint project as an international policy would, it is conceived, be calculated to obviate many occasions for public dissatisfaction and misunderstandings that on the one side or the other might otherwise arise from time to time in respect of private exploitations of the uses of these waters. Unquestionably, these uses are becoming more and more regarded as public uses, and it follows that the responsibility for their development should be undertaken, and the benefits of such development enjoyed, by the public. Indeed, for this reason and in view of the other considerations here adduced the Canadian Government is strongly convinced that nothing should be allowed to prejudice the chance of such a comprehensive power development of the St. Lawrence waters, and, so far as its consent may be necessary, it will, therefore, be unable to sanction further private enterprise of this nature.

The Committee concur in the foregoing report and the recommendations therein made, and recommend that Your Excellency may be pleased to transmit a copy hereof immediately to His Majesty's Ambassador at Washington for communication to the Government of the United States, and also that a copy be transmitted to the International Joint Commission.

All which is respectfully submitted for Your Excellency's approval.

RODOLPHE BOUDREAU

Clerk of the Privy Council