

External Affairs
Supplementary Paper

October 19, 1960.

No. 60/11 COLUMBIA WATERS AGREEMENT

The Prime Minister, the Right Honourable John G. Diefenbaker, announced today that agreement has been reached with the United States on the basis for a treaty for the co-operative development of the Columbia River Basin.

The recommendations in the joint Progress Report submitted on September 28 by the Columbia River Negotiators will accordingly be taken as the basis for the drafting of the necessary Treaty with the United States. The Chairman of the Canadian negotiating group is the Honourable E. D. Fulton.

Confirmation that the recommendations have been accepted as the basis for the drafting of a Treaty is embodied in an Exchange of Notes dated October 19, 1960, between the United States Secretary of State and the Canadian Ambassador in Washington.

The Prime Minister stated that a term of at least 60 years had been recommended for the Treaty in order to provide for a sufficient period of certainty.

Mr. Diefenbaker explained that the Report recommends the construction of dams at or near Mica Creek on the Columbia River and at the outlet of Arrow Lakes and the outlet of Duncan Lake in the West Kootenay. These dams would create reservoirs in Canada which would provide storage of fifteen and one-half million acre feet of water. The water would be released under an agreed plan of operation designed to regulate the flow of the Columbia River for the purpose of improving hydro-electric production and flood control protection downstream. In its natural state the flow of the Columbia River at the border can vary as much as 40 to 1 because of seasonal fluctuations. Control reservoirs can, as a result, very greatly increase the amount of power that can be produced to meet industrial and domestic needs.

In return for this regulated storage Canada would receive, in kind, one-half of the increase in hydro-electric power downstream in the United States attributable to the operation of the Canadian storages during the period of the Treaty. In addition, the United States would pay to Canada an amount of money equivalent to one-half of the estimated savings from flood damage downstream in the United States attributable to Canadian storage during the same period.

The total of flood control payments to Canada under the recommendations have been tentatively estimated at about 65 million dollars with the annual investment value of these payments being some \$3,800,000.

It is estimated that, when construction of the Canadian storage is completed, about 1970, Canada's share of the downstream power benefits would be approximately one and one-quarter million kilowatts of firm capacity and over six billion kilowatt hours of annual usable hydro-electric energy.

This power would be available for distribution in Southern British Columbia at substantially less than present costs of power in that area. Over half of the storage recommended could be completed within five years. Preliminary and conservative estimates place the cost of this power to Canada at somewhat below 4 mills. It is estimated that the amount of power returned to Canada as its share of the downstream benefits in the United States would satisfy approximately one-third of the estimated total power requirements in Southern British Columbia by the year 1972.

Mr. Diefenbaker also emphasized that even during the construction period the proposed programme would be of considerable value to Canada in encouraging employment and promoting economic activity.

The capital cost to Canada for the construction of storage reservoirs and transmission facilities required to produce the downstream power benefits and deliver them to the market areas is expected to be approximately 450 million dollars. "Now that we know what might be involved the way is clear for detailed discussion of how the financing of these costs might be shared by the Provincial and Federal Governments," Mr. Diefenbaker explained. "I would not want to anticipate the outcome of these talks", the Prime Minister stated, "but the Provincial Government has already been informed that the Federal Government is prepared to make available funds for financing half the cost of the storage projects in Canada which are required to produce the downstream benefits. Any funds made available by the Federal Government should be and are expected to be recoverable since the plan of development and its individual projects would be self-liquidating and would begin to earn a return on investment before all construction is completed".

Mr. Diefenbaker noted that the Government of British Columbia would be primarily responsible for the construction and operation of the facilities in Canada while the Federal Government would be responsible for the international aspects. Close co-operation between the two governments would of course continue and it was expected that consultations between federal and provincial ministers would take place shortly on various matters arising from the implementation of the recommendations.

The Prime Minister emphasized that the power benefits referred to represented only Canada's share of downstream power benefits in the United States. The capital investment involved will also make possible substantial quantities of hydro-electric power to be produced in Canada - as and when the demand warrants - by the installation of generating facilities in Canada both at the storage reservoirs mentioned above and at other sites. These substantial additional benefits can be achieved without interference with Canada's international commitment under the proposed Treaty.

Mr. Diefenbaker noted also that under the terms of the proposed Treaty the United States would have an option for five years to create a trans-boundary reservoir on the Kootenay River by the construction of a dam, at its expense, near Libby, Montana. If this project is proceeded with, Canada would receive substantial benefits both from increased power production at existing and potential future power plants on the Kootenay River in Canada and by way of flood control. All these benefits would be retained by Canada, and in return Canada

would provide and prepare the area required in Canada for the reservoir.

The recommendations also provide for the diversion of 1.5 million acre feet of water from the Kootenay River to the headwaters of the Columbia by Canada about 1980 when this additional flow will be useful for the generation of power in Canada. It is not expected that any significant flooding will be involved by this diversion.

The Prime Minister explained that public hearings would be held in accordance with the British Columbia Water Act before the recommendations for the construction of reservoirs in Canada were implemented. These hearings will provide an opportunity for discussion of details concerning the precise location of the storages and other related matters.

The Prime Minister emphasized that the essential goal of the negotiators had been reached - that is the preparation of a mutually beneficial arrangement which would stand the test of time. "The recommended development of the Columbia River system would", Mr. Diefenbaker continued, "be further evidence of the good sense of the United States and Canada in developing their respective resources. Further the method recommended by the negotiators which provides for the payment by each country of all costs for facilities in their respective countries would permit each country to retain full control of its resources and of the construction costs".

"It is my belief", the Prime Minister concluded, "that implementation of the recommended plan of development for this great natural resource will not only be a fine example of cooperation between neighbours but will provide an important additional stimulus to the Canadian economy".

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REPORT TO THE GOVERNMENTS OF THE UNITED STATES AND CANADA

On January 25, 1960 the Governments of Canada and the United States announced the appointment of Delegations to represent their respective Government in negotiations looking toward the formulation of an agreement covering cooperative development of the water resources of the Columbia River Basin for the mutual benefit of both countries. The undersigned, members of the Delegations, now submit this Progress Report to the two Governments.

The Delegations have held 7 formal meetings. A series of discussions between technical advisers has facilitated the work of the Delegations.

Throughout the discussions the Delegations have been greatly assisted by the work of the International Joint Commission culminating in its Report on "Principles for Determining and Apportioning Benefits from Cooperative Use of Storage of Waters and Electrical Inter-connection within the Columbia River System" dated December 29, 1959.

The United States and Canadian Delegations report that agreement has been reached between them on the basic terms which in their opinion should be included in an agreement for the cooperative development of the water resources of the Columbia River Basin that will operate to the mutual advantage of both countries.

The Delegations have been conscious of the fact that in arriving at terms which will be acceptable to both countries in a development of such far-reaching significance, it was not possible for either of them to adopt a position that took no account of the interests and aims of the other. The recommendations contained in this Report accordingly represent, in a number of cases, accommodations which, in our opinion, have the result that, while there may be areas in which particular objectives on both sides have been modified, yet the interests of both countries will be advanced if these joint recommendations are accepted.

The Delegations recommend that the agreement should be in the form of a Treaty with appropriate Annexes. It is further recommended that the Governments accept and confirm that the drafting of such Treaty should proceed on the basis of the following proposals:

1. (1) Canada, at its expense, to provide and operate in Canada 15.5 million acre feet of storage usable for increasing hydroelectric power generation and improving flood control in the United States in accordance with the assured plan of operation referred to in paragraph 17.
- (2) To provide this quantity of storage, dams to be constructed at or near Mica Creek on the Columbia River, the outlet of Arrow Lakes and the outlet of Duncan Lake, construction thereof to begin as soon as possible after the date of exchange of ratifications of the Treaty.
- (3) The operation of 8.5 million acre feet of the storage referred to above to commence within five years from the date of exchange of ratifications of the Treaty and the operation of the balance of the storage within nine years of that date.

2. The Government of the United States, subject to constitutional and other limitations, to use its best endeavours to accomplish the development and operation of a hydroelectric system in the Columbia River Basin in the United States designed to make the most effective use of the improvement in stream-flow conditions brought about by the Canadian storage.

3. For the purpose of measuring the downstream benefits resulting in the United States from the operation of the Canadian storage, such storage to be considered as next added to the storage included in the United States base system set out in Annex A hereto.

4. During the term of the Treaty additional storage constructed by Canada to be operated so as not to reduce these benefits.

5. The power benefits resulting downstream in the United States from the operation of the Canadian storage to be measured by determining the increase in dependable hydroelectric capacity in kilowatts and the increase in average annual usable hydroelectric energy output in kilowatt hours, on the basis of an agreed upon period of stream-flow record, at the base system plants (including any generating capacity that is added at such plants) and at any additional plants which may be constructed on the main stem of the Columbia River in the United States. The principles and procedures to be followed in making such determination and measurement to be those set forth in Annex A.

6. The initial determination of power benefits provided for in Annex A to be based upon the stream-flows for the twenty year period beginning with the 1928-29 water year as reported in "Modified Flows at Selected Power Sites - Columbia River Basin", June 1957, by the Columbia Basin Inter-Agency Committee Water Management Sub-Committee.

7. Subject to paragraph 9, Canada to receive from the United States one-half of the power benefits referred to in paragraph 5.

8. The sharing of benefits provided for in paragraph 7, with respect to each storage provided by Canada, to begin immediately upon commencement of operation of that storage under the assured plan of operation referred to in paragraph 17.

9. (1) If it be determined by the United States with respect to any project to be located between Priest Rapids and McNary dams that the sharing of benefits in accordance with paragraph 7 would produce a result which would not justify the United States in incurring the costs of construction and operation, the two Governments, at the request of the United States, to consider the possibility of a change in apportionment of benefits resulting at that project from the operation of Canadian storage.

(2) If any change in apportionment is agreed upon, such change to be put into effect through an exchange of notes between the United States and Canada.

10. The improvement in stream-flows brought about under the provisions of the Treaty not to be used by any person or entity in either country for hydroelectric power purposes except for the month immediately preceding the date of exchange of ratifications of the Treaty, on all interests in the United States.

(a) in the United States, with the approval of that Government's operating entity designated under the provisions of paragraph 8, from the first day of the month such average annual yield to the nearest one-eighth of

(b) in Canada, with the approval of whatever authority has or may be given jurisdiction in that regard by law in Canada, to the extent that the flows of the

the approval in either case to be under such conditions as each shall determine to be consistent with the Treaty.

11. By agreement of the operating entities referred to in paragraph 8, subject to the authorization of the United States and Canada:

(a) capacity benefits may be exchanged for energy benefits, and

(b) portions of the power benefits to which Canada is entitled under the Treaty may be disposed of within the United States.

12. The United States, at its expense, to provide to Canada at a point on the Canada-United States boundary near Oliver, British Columbia, in accordance with the schedules of delivery made as contemplated by paragraph 8, the entitlement of Canada described in paragraph 7, less transmission loss.

(1) The United States, at its expense, to make available the Bonneville Power Administration's transmission grid to provide Canada with east-west standby transmission service to safeguard the transmission of Canada's share of power benefits from Oliver, British Columbia, to Vancouver, British Columbia, and to permit Canada to make use of such facilities for system stability.

(2) Subject to sub-paragraph (3) Canada to pay the United States in consideration of the service made available by the United States pursuant to sub-paragraph (1) a standby charge of 1.50 United States dollars per annum for each kilowatt of dependable capacity of Canada's entitlement described in paragraph 7.

(3) In the event that an electrical interconnection and coordination arrangement is made in accordance with paragraph 8, the obligation of Canada to make the payment referred to above to cease when such arrangement becomes operative.

14. (1) The United States to pay to Canada upon the commencement of operation, under the assured plan of operation, of each storage provided by Canada pursuant to paragraph 1 an amount equal to one-half the flood control benefit attributed to that storage, calculated in accordance with Annex B, capitalized at the interest rate described in sub-paragraph (2) over a period equal to sixty years less the time elapsed between the date of exchange of ratifications of the Treaty and the date of commencement of such operation.

(2) For the purpose of sub-paragraph (1) the interest rate shall be determined by calculating the average yield to maturity on the basis of daily closing market bid quotations during the month immediately preceding the date of exchange of ratifications of the Treaty, on all interest bearing marketable public debt obligations of the United States bearing a maturity date of fifteen or more years from the first day of the said month, and by adjusting such average annual yield to the nearest one-eighth of one per cent.

(3) After the expiration of the sixty year period referred to in paragraph 19, to the extent that the flows of the Columbia River in Canada continue to contribute to potential flood hazards in the United States, Canada to continue to provide flood control if requested by the United States for the useful life of the structures. The United States to pay to Canada the operating costs to Canada occasioned by such provision plus the economic loss to Canada directly attributable to the foregoing by Canada of the alternative uses to which the storage involved might otherwise have been put; provided Canada to have the option to require such payment, in so far as loss of power is concerned, either in cash or in kind.

15. (1) The United States, for five years from the date of exchange of ratifications of the Treaty, to have the option to commence construction, at its expense, of a dam on the Kootenay River at or near Libby, Montana, to meet flood control and other purposes of the United States, the storage reservoir of which dam would not raise the level of the Kootenay River at the boundary between Canada and the United States above an elevation consistent with a normal full pool at an elevation at the dam of 2459 feet United States Coast and Geodetic Survey datum.

(2) Canada and the United States each to retain all at-site and downstream power and flood control benefits which occur in their respective countries and which are attributable to the project which may be constructed pursuant to sub-paragraph (1).

(3) In consideration of the retention of all benefits which may accrue in Canada as referred to in sub-paragraph (2) if the United States exercises its option, Canada, at its expense, to make available and prepare the area in Canada to be flooded by such dam.

(4) All obligations of Canada under this paragraph to cease if within five years from the date of exchange of ratifications of the Treaty the United States has not commenced construction of the dam herein mentioned.

16. (1) Subject to sub-paragraph (2), Canada and the United States to refrain during the term of the Treaty from

(a) diverting from the Columbia River Basin any of the flow of the Columbia River above the point at which it crosses the boundary between Canada and the United States;

(b) diverting from the Columbia River Basin any of the flow of any tributary which has its confluence with the Columbia River in Canada; and

(c) diverting water from any drainage basin within the Columbia River Basin intersected by the boundary between Canada and the United States to any other drainage basin.

(2) Canada to have the right at any time after the expiration of twenty years from the date of exchange of ratifications of the Treaty to divert not more than 1.5 million acre feet of water per annum from the Kootenay River in the vicinity of Canal Flats to the headwaters of the Columbia River on the other side of the Treaty to continue in force until written notice is given.

(3) The diversion described in sub-paragraph (2) not to:

(a) diminish the downstream benefits in the United States resulting from the operation of the Canadian storages described in paragraph 1, or

(b) reduce the flow of the Kootenay River immediately downstream from the point of diversion to less than 200 cubic feet per second or the natural flow, whichever is the lesser, to be calculated from measurements taken at the nearest suitable stream-gaging station.

17. An assured plan of operation to be included in an Annex to the Treaty setting out the criteria and principles governing the accumulation, release and general operation of the Canadian storages referred to in paragraph 1.

18. (1) The United States and Canada each to designate an operating entity or entities which would be authorized, subject to exchange of inter-governmental notes where appropriate, to develop and carry out detailed operating arrangements to implement the terms of the Treaty and of the assured plan of operation.

(2) The authority and responsibility of the operating entities to include:

(a) the assembling of agreed data;

(b) the negotiation and conclusion of an electrical interconnection and coordination arrangement if and when it appears mutually desirable;

(c) the detailed calculation, initially and at agreed intervals, of the amount and kind of the downstream power benefits in the United States to be shared with Canada in accordance with the principles and procedures set out in paragraph 5 and Annex A:

(d) the making of appropriate arrangements with respect to delivery of the power benefits to be made available to Canada, including such matters as load factors and times and points of delivery;

(e) the periodic settlement of accounts;

(f) consultation on the operations of the Libby Project and the Kootenay Diversion as described in paragraphs 15 and 16;

(g) such other matters as are considered necessary to

enable them to discharge their responsibilities under the Treaty and any matters which the United States and Canada may from time to time commit to them.

19. The Treaty to enter into force on the date of exchange of ratifications and to continue in force for a period of not less than sixty years from said date. At any time after the Treaty has been in force for fifty years, either party to have the right to terminate it upon ten years written notice to the other party. In the event no such notice is given, the Treaty to continue in force automatically.

20. The Treaty to provide for the international legal situation which would arise upon termination or expiration of the Treaty. Such provision to include a term to the effect that nothing in this Treaty and nothing done thereunder pursuant to this Treaty shall operate after its termination or expiration, to abrogate or modify any of the provisions of the Boundary Waters Treaty of 1909. Certain other provisions would of course be included in the Treaty, e.g. provision for the settlement of disputes. However, we consider that the points of major importance are adequately covered by the foregoing proposals.

- (1) The United States and Canada each to designate an operating entity or entities which would be authorized, subject to exchange of inter-governmental notes where appropriate, to develop and carry out detailed operating arrangements to implement the terms of the Treaty and of the assured plan of operation.
- (2) The authority and responsibility of the operating entities to include:
 - (a) the assembling of agreed data;
 - (b) the negotiation and conclusion of an electrical interconnection and coordination arrangement if and when it appears mutually desirable;
 - (c) the detailed calculation, initially and at agreed intervals, of the amount and kind of the downstream power benefits in the United States to be shared with Canada in accordance with the principles and procedures set out in paragraph 5 and Annex A;
 - (d) the making of appropriate arrangements with respect to delivery of the power benefits to be made available to Canada, including such matters as load factors and times and points of delivery;
 - (e) the periodic settlement of accounts;
 - (f) consultation on the operations of the Libby Project and the Kootenay Diversion as described in paragraphs 15 and 16;
 - (g) such other matters as are considered necessary to

Signed at Ottawa this 28th day of September, 1960

E. F. Bennett,
Chairman,
United States Delegation

E. D. Fulton, M.P., P.C., Q.C.
Chairman,
Canadian Delegation

I. B. White,
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ANNEX A

DETERMINATION OF POWER BENEFITS
ATTRIBUTABLE TO CANADIAN STORAGE

5 of 2

The amount of power benefits determined to result in the United States from regulation of flow by storage provided by Canada under the Treaty will be expressed as the increase in dependable hydroelectric capacity in kilowatts under agreed upon critical stream-flow conditions, and the increase in average annual usable hydroelectric energy output in kilowatt-hours on the basis of an agreed upon period of stream-flow record. The capacity to be credited to the effects of Canadian storage will be the difference between the average rates of generation in kilowatts during the appropriate critical stream-flow periods for the United States base system of projects (a) before and (b) after the addition of the Canadian storage, divided by the estimated average critical period load factor for the period under consideration. This capacity credit shall not exceed the difference between the capability of the base system without Canadian storage and the maximum feasible capability of the base system to supply firm load during the critical stream-flow period. In the case of the average annual usable energy measurement, the operating entities will agree upon the quantity of energy which is to be regarded as marketable, (a) with, and (b) without Canadian storage. The difference in the respective quantities thus agreed shall be the increase in average annual usable energy.

An initial determination of the estimated power benefits to the United States from Canadian storage added to a United States base system consisting of the projects listed in the attached table will be made before the first Canadian storage becomes operative. This determination will include year-by-year estimates of the power benefits during the period of construction until the 15.5 million acre feet of Canadian storage becomes operative.

Subsequent determinations of estimated power benefits will be made at intervals of 5 years or more often as agreed, commencing from the date on which the full 15.5 million acre feet of Canadian storage becomes operative. Each determination will be for the ensuing five years of operation. A detailed plan of operation implementing the assured plan of operation, and the critical period and period of stream-flow record will be agreed at each determination. No retroactive adjustment in power benefits will be made at any time during the period of the Treaty. No reduction in the benefits credited to Canadian storage will be made as a result of a lower load estimate in the United States for the subsequent period than for the current period.

In computing the increase in dependable capacity and the increase in average annual usable energy, the procedure shall be in accordance with the three steps described below.

Step 1

In any determination of power benefits, the system for the period covered by the estimate will consist of the Canadian storage and the United States base system plus new hydro and thermal projects expected to be in operation at the mid-point of the period of estimate. The maximum capability of this combined system to supply the estimated firm load including Canada's share of the downstream benefits will be determined on the basis that the system will be operated in accordance with established operating procedures.

DETERMINATION OF POWER BENEFITS ATTRIBUTABLE TO CANADIAN STORAGE

Step 2

A similar determination of firm load carrying capability will be made using the same thermal component as in Step 1 but with the hydraulic resources reduced by any United States head plants on tributaries of the Columbia River added subsequently to the Canadian storage and also by any United States storage added subsequently to the Canadian storage.

Step 3

A similar determination of firm load carrying capability will be made using the same thermal component as in Step 1 but with the hydraulic resources reduced by any United States head plants on tributaries of the Columbia River added subsequently to Canadian storage, and by any United States storage added subsequently to the Canadian storage and by the carrying capability determined by Step 3 and that determined in Step 2 will be the benefit credited to the Canadian storage.

BASE SYSTEM HYDRO PROJECTS

An initial determination of the estimated power benefits to the United States from Canadian storage added to the United States base system consisting of the projects listed in the attached table will be made before the first Canadian storage becomes operative. This determination will include year-by-year estimates of the power benefits during the period of construction until the 15.5 million acre feet of Canadian storage becomes operative.

Subsequent determinations of estimated power benefits will be made at intervals of 5 years or more often as agreed, commencing from the date on which the full 15.5 million acre feet of Canadian storage becomes operative. A detailed plan of operation implementing the assured plan of operation and the critical period and period of stream-flow record will be agreed at each determination. No retrospective adjustment in power benefits will be made at any time during the period of the Treaty. No reduction in the benefits credited to Canadian storage will be made as a result of a lower load estimate in the United States for the subsequent period than for the current period.

In computing the increase in dependable capacity and the increase in average annual usable energy, the procedure shall be in accordance with the three steps described below.

Step 1

In any determination of power benefits, the system for the period covered by the estimate will consist of the Canadian storage and the United States base system plus new hydro and thermal projects expected to be in operation at the mid-point of the period of estimate. The maximum capability of this combined system to supply the estimated firm load including Canada's share of the downstream benefits will be determined on the basis that the system will be operated in accordance with established operating procedures.

BASE SYSTEM HYDRO PROJECTS

Project	Stream	Stream Mile above mouth	Usable Storage Acre-Feet	Normal Elevation		Gross Head Feet	Initial Installation		Estimated	
				Pool Feet	Tailwater Feet		No. of Units	Kilowatts	Ultimate Installation No. of Units	Plant Kilowatts
Hungry Horse	S. Fk. Flathead	5	2,982,000	3560	3083	477	4	285,000	4	285,000
Kerr	Flathead	73	1,219,000	2893	2706	187	3	168,000	3	168,000
Thompson Falls	Clark Fork	195	Pondage	2396	2336	60	6	30,000	10	150,000
Noxon Rapids	Clark Fork	170	Pondage	2331	2179	152	4	336,000	5	420,000
Cabinet Gorge	Clark Fork	150	Pondage	2175	2078	97	4	200,000	6	300,000
Albeni Falls	Pend Oreille	90	1,155,000	2062	2034	28	3	42,600	3	42,600
Box Canyon	Pend Oreille	34	Pondage	2031	1989	42	4	60,000	4	60,000
Grand Coulee	Columbia	597	5,072,000	1288	947	341	18	1,944,000	34	3,672,000
Chief Joseph	Columbia	546	Pondage	946	775	171	16	1,024,000	27	1,728,000
Wells 1/	Columbia	516	Pondage	775	707	68	6	400,000	10	666,700
Rocky Reach	Columbia	474	Pondage	707	614	93	7	711,550	11	1,118,150
Rock Island	Columbia	453	Pondage	606	570	36	10	212,100	12	265,700
Wanapum	Columbia	415	Pondage	570	490	80	10	831,250	16	1,330,000
Priest Rapids	Columbia	397	Pondage	490	406	84	10	788,500	16	1,261,600
Brownlee	Snake	285	984,500	2077	1805	272	4	360,400	6	540,600
Oxbow	Snake	273	Pondage	1805	1683	122	4	190,000	5	237,500
Ice Harbor	Snake	10	Pondage	440	340	100	3	270,000	6	540,000
McNary	Columbia	292	Pondage	340	265	75	14	980,000	20	1,400,000
John Day	Columbia	216	Pondage	265	161	104	8	1,080,000	23	3,105,000
The Dalles	Columbia	192	Pondage	160	74	86	162/	1,119,000	24	1,743,000
Bonneville	Columbia	145	Pondage	74	15	59	10	518,400	16	890,400
Kootenay Lake	Kootenay	15	673,000	1745	-	-	-	-	-	-
Chelan	Chelan	0	676,000	1100	691	409	2	48,000	2	54,000
Coeur d'Alene L. Coeur d'Alene	Coeur d'Alene	102	225,000	2128	-	-	-	-	-	-
TOTAL 24 PROJECTS			12,986,500	3143	166	3143	166	11,598,800	263	19,978,250

1/ The Wells project is not presently under construction. However, when this project or any other project on the Columbia River main stem is completed, they will become integral components of the base system.

2/ Includes two 13,500 kilowatt units for fish attraction water.

[S] Incubated two 12, 200 Kilowatt units for 1200 hours with instruction meter.
 Columns have been with 12 completed, they will become integrated components of the base system.
 The new project is not presently under consideration. However, when this project or any other project on the

Project	Quantity	Unit Price	Total Price	Material	Waste	Net Price	Quantity	Unit Price	Total Price	Material	Waste	Net Price
Project 1	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 2	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 3	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 4	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 5	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 6	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 7	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 8	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 9	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00
Project 10	1000	0.42	420.00	0.00	0.00	420.00	1000	0.42	420.00	0.00	0.00	420.00

Estimated

ANNEX B

DETERMINATION OF FLOOD CONTROL BENEFITS
ATTRIBUTABLE TO CANADIAN STORAGE

The basic analysis of flood control requirements and benefits for the Columbia River Basin in the United States is contained in the report of the Division Engineer, United States Army, Engineer Division, North Pacific, dated June 20, 1958, entitled "Water Resources Development of the Columbia River Basin".

The requirements for flood control storage will be determined for both the Kootenay River and the Columbia River in Canada. The distribution of total basin requirements will conform to the average ratio of the contribution of each tributary during the floods of 1894, 1948 and 1956 for the control period at The Dalles, Oregon, to the total runoff at The Dalles for the same period. The total amount of Canadian storage credited with flood control benefits will be determined by the requirements for controlling a flood equivalent to the 1894 flood up to an amount 22 per cent greater than the distribution of total storage requirements to each tributary.

The Canadian storage so determined will be evaluated as to its effectiveness to control a flood equivalent to the 1894 flood to 800,000 cubic feet per second (cfs) and 600,000 cfs respectively at The Dalles. This will be done by multiplying the Canadian storage in acre feet used for this purpose under an assured plan of operation for flood control by an "effectiveness factor" which is determined for each Canadian storage project by flood routing studies which have been agreed upon. The resultant figures will be the effective storage in acre feet and will be evaluated for benefits at United States \$1.38 per acre foot, per annum for control to 800,000 cfs at The Dalles. Additional effective storage credited for control down to 600,000 cfs will be evaluated at United States \$0.114 per acre foot.

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