

REPORT  
OF  
COLUMBIA RIVER TREATY  
CANADIAN AND UNITED STATES ENTITIES

for the period  
1 October 1967  
to  
30 September 1968

January 1969

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## INTRODUCTION

This report describes the joint actions of the Canadian and United States Entities during the period 1 October 1967 to 30 September 1968, in discharging their responsibility for formulating and carrying out operating arrangements necessary to implement the Columbia River Treaty. A previous report, dated 22 April 1968, covered the period 16 September 1964 to 30 September 1967.

### The Columbia Treaty

The Columbia River Treaty was signed on 17 January 1961, providing for Canada to construct dams at Duncan, Arrow and Mica with 15,500,000 acre-feet of storage and to operate the storage in accordance with plans of operation designed to produce power and flood control benefits in accordance with principles set forth in the Treaty. Canada would receive payments from the United States in respect of flood control provided in that country and also be entitled to one-half of the downstream power benefits.

In the period 1961 to 1964, negotiations took place between representatives of Canada, the United States and British Columbia resulting in an Exchange of Notes, dated 22 January 1964, which included a Protocol which clarified the Columbia River Treaty and an agreement between Canada and the United States that Canada would sell in the United States its entitlement to downstream power benefits for 30 years under certain terms.

Following further negotiation, the Canadian Entitlement Purchase Agreement was concluded on 13 August 1964 between Columbia

Storage Power Exchange (CSPE), a non-profit corporation organized under the laws of the State of Washington and British Columbia Hydro and Power Authority, a corporation incorporated under the laws of the Province of British Columbia.

The Agreement provides that the Authority have each of Duncan, Arrow and Mica storages fully operative for power purposes by 1 April 1968, 1 April 1969 and 1 April 1973, respectively and that it sell to CSPE for a period of 30 years from the foregoing dates the Canadian entitlement to downstream power benefits resulting from operation of each storage project in accordance with the Treaty; in return for which CSPE arranged payment to Canada on 16 September 1964 a sum of \$253.9 million in U.S. funds.

Instruments of ratification covering the Columbia River Treaty and Protocol were exchanged by Canada and the United States on 16 September 1964.

#### The Columbia River Treaty Entities

In accordance with Article XIV(1) of the Columbia River Treaty, the governments of Canada and the United States of America each designated an Entity empowered and charged with the duty to formulate and carry out the operating arrangements necessary to implement the Treaty. Order-in-Council P.C. 1964-1407, dated 4 September 1964, designated the British Columbia Hydro and Power Authority as the Canadian Entity; Executive Order No. 11177, dated 16 September 1964, designated the Administrator of the Bonneville Power Administration, Department of the Interior, and the Division Engineer, North Pacific

Division, Corps of Engineers, Department of the Army, as the United States Entity, with the Administrator to serve as Chairman.

The names of the members of the two Entities and their chief representatives are shown in Appendix A. The powers and duties of the Entities are described in the Treaty and related documents and Article XIV(4) provides that Canada and the United States of America may by an exchange of notes empower or charge the Entities with any other matter coming within the scope of the Treaty.

#### ORGANIZATION AND MEETINGS

During the period 1 October 1967 to 30 September 1968, the Canadian and United States Entities held four regular meetings and Entity representatives met as required.

The International Task Forces listed in Appendix C, which were established in 1965, continued their work. The five Task Forces directed and coordinated studies in their five areas with the support of the staffs of B.C. Hydro and Power Authority, Bonneville Power Administration and the U.S. Corps of Engineers, North Pacific Division.

As in previous years, the Entities received Task Force reports and recommendations on operating procedures, facilities and other matters essential to Columbia River Treaty implementation. After review, formal agreement on various items was reached by the Entities. Appendix B lists the official agreements reached and recorded during the period of this report.

By September 1968, the five Task Forces had largely completed their assignments and it was decided that the continuing work of implementing Treaty Operating arrangements agreed from time to time by the Entities should be carried out by two international committees appointed on a more permanent basis.

The Task Forces were discharged effective 19 September 1968, and the Entities expressed their appreciation of the successful work carried out since 1965. The names of the International Task Force members and the agencies represented by them are listed in Appendix C.

The two international committees established effective 19 September 1968, are:-

- (a) The Columbia River Treaty Operating Committee; and
- (b) The Columbia River Treaty Hydrometeorological Committee.

The names of committee members appointed by the Entities are listed in Appendix D. Terms of reference, dated 20 May 1968, for each Committee were made effective 19 September 1968.

### TREATY STORAGE OPERATION

#### Operating Arrangements

The twelve months ended 30 September 1968, included most of one operating year, 1 July 1967 to 30 June 1968, and the start of another, 1 July 1968 to 30 June 1969.

During the period, the Entities made special operating arrangements covering the operation of Duncan for power and flood control in 1967-68 and Duncan and Arrow for power in 1968-69. On 19 September 1968, a draft Flood Control Operating Plan was reviewed by the Entities and accepted as

an approved basis for operating the Duncan and Arrow projects through the next flood season unless superseded prior to that time by a finally agreed plan. Every effort would be made to clarify certain points in question to permit Entity approval prior to 1 December 1968 of a plan covering Duncan and Arrow operation.

The power operating arrangements based on the standing procedures which were agreed by the Entities and adopted in August 1967<sup>(1)</sup> were implemented by the International Task Force on Power Operating Plans until 19 September 1968, when that committee was succeeded by the Columbia River Treaty Operating Committee.

In accordance with the standing procedures, weekly storage operation requests were made by the United States Entity to the Canadian Entity, starting on 22 September 1967. These requests were directed to the whole of the Canadian Treaty storage consistent with the Operating Rule Curve and other operating criteria designed to provide optimum generation downstream in the United States, as required by Annex A, Para. 6 of the Treaty. Until 31 July 1968, Duncan reservoir storage was in fact the whole of the Canadian Treaty storage operative for power purposes. From 1 August 1968, both Duncan and Arrow storages were available for operation by the Canadian Entity for power purposes.

The flood control operating arrangements for Duncan during the 1967-68 operating year were established by an Interim Flood Control Operating Plan<sup>(2)</sup> agreed by the Entities in February 1968 and implemented

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(1) "Principles and Procedures for the Preparation and Use of Hydroelectric Operating Plans for Canadian Storage", 25 July 1967.

(2) See Appendix B, Item 3

had been evacuated by 2 March 1968, and a total of 1.35 million acre-feet by mid-April 1968.

From 1 April 1968, Duncan reservoir was operated in accordance with the Interim Flood Control Plan and a Special Operating Program for Canadian Storage<sup>(1)</sup>, agreed by the Entities in February 1968.

Pursuant to the Interim Flood Control Operating Plan, forecasts of inflow to Duncan Project that year indicated that 1,270,000 acre-feet of storage space should be reserved for flood regulation. This reservation required that elevation 1807.45 not be exceeded until filling was required for flood regulation. The reservoir was operated at elevation 1800.0 until 11 May, at which time outflows were reduced to 1,000 cfs., and filling commenced. This filling was accomplished below elevation 1807.45 under the Power Operating Plan until 20 May, which was 15 days in advance of the time when the unregulated flow exceeded 450,000 cfs at The Dalles. After 20 May, the filling of Duncan continued by passing 1,000 cfs in accordance with the Interim Flood Control Operating Plan. On 2 June, it was agreed, on the basis of streamflow simulations, that there was no longer a threat of filling Duncan project prior to the time that flood potential could be experienced either in the United States or Canada. Accordingly, on 2 June, filling was accelerated by reducing the outflows to 100 cfs., and outflows were maintained until full supply level was reached on 20 July 1968. The reservoir was still being held full on 30 September 1968.

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(1) See Appendix B, Item 6

### Arrow Reservoir Operation

The Special Operating Program for Canadian Storage enabled the Entities to retain for later use through downstream generating stations a portion of the 1968 flows in the Columbia River which would otherwise have been wasted.

The Canadian Entity placed stoplogs in the uncompleted sluiceways of Arrow dam on 26 June and for the next five weeks controlled discharge through the structure so as to partially fill the reservoir without interrupting construction. On 31 July, Lower Arrow Lake reached on schedule an elevation of 1404 feet and on 1 August the project became partially operative for power purposes in accordance with the Special Program.

The project was declared operational by the Canadian Entity on 10 October 1968. Water level was still being held at elevation 1404 feet.

### OPERATIONAL BENEFITS

#### Flood Control Payments

Duncan storage was declared operational on 31 July 1967, and on 23 November 1967, the Canadian Government received payment of U.S. \$11.1 millions from the United States Government, the amount stipulated in Article VI(c) of the Columbia River Treaty as the flood control payment due to Canada on commencement of operation of the project for flood control. On the same day, the sum of \$11,929,031.25 in Canadian funds was paid by the Canadian Government to the Government of British Columbia and transferred to British Columbia Hydro and Power Authority.

such calculations at the present time. However, after discussions between the Entities and the Permanent Engineering Board, it was agreed that such calculations would be made.

### CONSTRUCTION OF THE TREATY STORAGE PROJECTS

#### Coordination of Construction Plans, etc.

Under the terms of the Columbia River Treaty, the two Entities are responsible for the coordination of plans and exchange of information relating to facilities to be used in producing and obtaining the benefits contemplated by the Treaty. Under an Exchange of Notes between Canada and the United States, dated 16 September 1964, the Canadian Entity is required to provide current reports to the United States Entity of the progress of construction of the Treaty storages. In addition, the Entities have arranged for Mr. Don Love, Chief, Construction Division, North Pacific Division, U.S. Corps of Engineers, to meet from time-to-time with Mr. J.P. Ottesen, Columbia Construction Manager, British Columbia Hydro and Power Authority, to discuss construction progress.

During the period of this report, five Columbia Construction Progress Reports<sup>(1)</sup> on Arrow and Mica projects covering the period from August 1967 to September 1968, were issued, and copies were provided by the Canadian Entity to the United States Entity and the Permanent Engineering Board.

The United States Entity provided the Canadian Entity and the

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(1) Columbia Construction Progress Reports Nos. 11, 12, 13, 14 & 15.

Permanent Engineering Board with semi-annual reports<sup>(1)</sup> by the Division Engineer, North Pacific Division, Corps of Engineers, U.S. Army, on progress of construction of the Libby dam project.

Detailed construction reports, including diagrams and photographs were contained in the reports described above. For the purposes of this report, a brief account of construction progress of Arrow, Mica and Libby projects follows.

#### Arrow Construction Progress

By October 1967, all concrete structures were complete except for the unfinished control building and the rollways. The cofferdam had been re-watered and the upstream portion of the concrete cut-off wall had been fractured as scheduled. The sand and gravel fill in the earth dam was about 75 per cent complete.

On 29 January 1968, the earth dam was closed and the Columbia River diverted through the concrete structures. By March 1968, the upstream and downstream cofferdams had been removed and construction of the rollways commenced.

By the end of June 1968, the main earth dam was completed to within 5 feet of crest elevation with rip-rap complete on the downstream face and 90 per cent complete on the upstream face. The low level port gates were ready for service and the navigation lock was in service.

Partial storage of Columbia River flows began on 26 June 1968, when stoplogs were placed in the sluiceways. Lower Arrow Lake reached

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(1) (a) Letter dated 13 March 1968, from Division Engineer, North Pacific Division, Corps of Engineers to Chairman, United States Entity.  
(b) Libby Dam Project Construction Progress Report No.1, October 1968.

elevation 1404 feet by 31 July and this level was maintained by controlling discharge through the low level ports and one sluiceway. By the end of September, stoplogs had been removed and sluiceway gates installed.

Operation of the navigation lock was taken over by B.C. Hydro Generation and Supply Division in early September. All earth work was completed except for some fill in the north bulkhead area scheduled to be done after removal of the concrete plant.

Work force at the project was steadily reduced from 854 in October 1967 to 600 in June 1968, and to about 400 in September 1968.

#### Mica Construction Progress

The diversion tunnels and intake gates were completed by the end of October 1967. The Mica dam contract, awarded on 6 September 1967, was formally signed on 16 October 1967, by British Columbia Hydro and Power Authority and Mica Dam Contractors, a consortium of five firms headed by Guy F. Atkinson Co., of San Francisco.

Construction of the initial closure dykes commenced on 15 October 1967 and dyke No.4 was completed on 6 November, diverting the Columbia River through the diversion tunnels. Dykes Nos. 3, 2 and 1 were extended across the river in November, and upstream and downstream cofferdams were under construction.

Work continued until adverse weather caused a halt on 1 February 1968. Foundation excavation was resumed on 7 March and fill placing on 11 March. By the end of March, upstream and downstream instrument wells were completed and cofferdam instrumentation was 80 per cent complete.

Fill placement on both cofferdams was completed in May. Instruments were installed in both cofferdams and in the dam foundation outside the core.

Limited fill material to form part of the main dam was placed on the upstream slope of the upstream cofferdam and the downstream slope of the downstream cofferdam. By the end of June, about 50 per cent of the common excavation in the river bed had been completed.

Core trench excavation to bedrock between the cofferdams was completed by mid-August and excavation was continued in the abutments, the spillway approach channel and the low level access tunnel.

Placement of sand and gravel in the upstream portion of the main dam was begun on 23 September 1968.

The number of men at the project was 684 at the end of October 1967. After dropping to 580 in December, the work force increased to 684 in March, 1049 in June and 1120 at the end of September 1968.

#### Libby Construction Progress

At the end of September 1967, all Libby construction items were generally on schedule, the dam being about 9 per cent completed.

The Libby Dam contract was awarded on 10 March 1967 to Libby Dam Builders; a joint venture of five firms headed by Morrison-Knudson Co., Inc. The first stage cofferdam was completed and the Kootenai River diverted in January 1968. De-watering proceeded without difficulty and the dam was about 18 per cent complete by the end of March.

Erection of the 220-ft high construction trestle was completed during the period and four whirley cranes were operative to lower the four yard concrete buckets. Concrete placement began on 1 June 1968, and a daily rate of about 4,200 c.y. was maintained.

By the end of September 1968, the dam was about 32 per cent complete and concrete placement totalled approx. 380,000 c.y. Concrete has been placed in the right and left training walls, in the stilling basin and in the monoliths 28 through 37. Construction of the temporary tunnel through monolith 37 of the dam and the shoofly track was progressing on schedule for the Great Northern Railway to be operating on the shoofly by 1 November 1968.

Penstock subsections were delivered to the American Bridge fabrication yard at the project and welding of sections together is in progress. The contractor's work force at the site totalled 853 at the end of September 1968.

Relocation of the Great Northern Railroad proceeded on schedule and the 7-mile tunnel was holed through on 21 June 1968. Grading for the relocation was completed from Jennings on Kootenai River to Ariana, 11 miles up Fisher River. The remaining grading work was about 64 per cent completed by the end of September 1968.

Relocation of the Forest Development road progressed on schedule during the period. One 12.5-mile section was completed. A second section above the dam was placed under contract in September 1968. The reservoir bridge and approach roads were about 55 per cent completed by the end of September 1968.

The overall project is on schedule at about one-third completion.

HYDROMETEOROLOGICAL SYSTEM

Annex A of the Columbia River Treaty directs the Entities to establish and operate a hydrometeorological system, including snow courses, precipitation stations and streamflow gauges, for use in establishing data for detailed programming of flood control and power operations. Since Annex A also directs that hydrometeorological information is to be made available to the Entities in both countries for immediate and continuing use in flood control and power operations, a communication system is also part of the Columbia River Treaty Hydrometeorological System. It is specified in the Treaty that the System has to be mutually agreed by the Entities in consultation with the Permanent Engineering Board.

A previous report<sup>(1)</sup> described the hydrometeorological facilities established up to the end of September 1967. In October 1967, the Entities and the Permanent Engineering Board agreed officially on a definition of the Columbia River Treaty Hydrometeorological System<sup>(2)</sup>. Under the agreed definition, the System includes hydrometeorological stations which provide operations and forecasting data relevant to the flow of the Columbia River at Birchbank, B.C., and in addition certain key streamflow and reservoir gauges on the Columbia River downstream from Birchbank and on the Clark Fork - Pend Oreille tributary. The System also includes a plan for methods and frequency of reporting and a

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(1) Report of Columbia River Treaty Canadian and United States Entities for the Period 16 September 1964 to 30 September 1967.

(2) See Appendix B, Item 1

communication system to provide information for the operation of Duncan, Arrow, Mica and Libby reservoirs. All the elements of the System thus defined are described as Treaty Facilities.

The Entities agreed also to identify and maintain a list of other hydrometeorological stations and communications, not considered as elements of the System, which provide information for operational forecasting for the Columbia River. These stations and communications are described as Supporting Facilities.

In February 1968, agreement was reached on meteorological stations to be included in the System; 19 in Canada and 5 in the United States(1). These were existing stations, except for new stations at each of the four projects. Of the new stations, "Duncan Lake" and "Mica Creek" were in operation in 1967, "Arrow Dam" was expected to be in operation before the end of 1968 and "Libby Dam" was not yet scheduled.

In the summer of 1968, eight new snow courses were installed in the Canadian portion of the Kootenay River basin and it was planned to take measurements at these locations during the 1968/69 winter. Six new snow courses were installed by the U.S. Soil Conservation Service in the general vicinity of Libby Dam, Montana. All fourteen courses were installed in accordance with a recommendation of the International Task Force on Hydrometeorological Network.

In July 1968, the International Task Force recommended 14 surface water gauging stations in the United States as Treaty Facilities. The recommendation, which included 12 existing stations as well as a reservoir gauge and an outflow gauge at Libby, was under study by the

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(1) See Appendix B, Item 2

Entities and the Permanent Engineering Board.

Construction of the new gauges at Nakusp on Upper Arrow Lake and Fauquier on Lower Arrow Lake proceeded during the spring and early summer of 1968. These stations, replacing the former Nakusp and Needles gauges, are bubble-type gauges covering the full range of Arrow reservoir operation.

Recording and telemetering (Telemark) equipment was installed at both locations and both gauges were expected to be in operation before the drawdown season started.

In April 1968, the Entities agreed to extend the special arrangements for hydrometeorological reporting made in early 1967. The extended arrangements covered the period 30 April 1967 through 30 June 1969, and covered the operation of Duncan and Arrow reservoirs under the Special Operating Program for Canadian Storage.

From January 1968, the Entities maintained exchange of daily hydrometeorological data by the Columbia Basin Teletype facility.

#### PROJECT DISCHARGE CAPACITIES

Annex A of the Columbia River Treaty directs that the Entities shall agree that sufficient discharge capacity is provided at each dam to afford the desired regulation for power and flood control through outlet works and turbine installations.

Formal agreement between the Entities on the discharge capacities of Duncan and Arrow had been recorded in 1966 and 1965 respectively and a report on Mica discharge capacity was submitted to the Entities by the

International Task Force on November 1967. An agreement was signed on 29 February 1968<sup>(1)</sup>.

This concluded the assignment of the Entities stated above.

#### POWER OPERATING PLANS

The Columbia River Treaty directs that the 15,500,000 acre-feet of Canadian storage is to be operated in accordance with power operating plans to be agreed in advance by the Entities. Before generating facilities are installed at Mica or at sites downstream in Canada, the objective of the plans will be to achieve optimum power generation downstream in the United States. After at-site power is developed at Mica or at downstream sites in Canada, the objective of the plans will be changed to achieve optimum power generation at-site in Canada and downstream in Canada and the United States, taking into consideration provisions in the attachments relating to terms of sale, unless otherwise agreed by the Entities.

The Treaty requires also that the Entities agree initially on a series of six assured operating plans for the next six operating years. The general criteria and form of the operating plans had been determined in August 1967<sup>(2)</sup> and it was agreed that the initial series would cover the operating years 1969-70 through 1974-75.

International Task Force on Power Operating Plans then proceeded with system regulation studies on which the six plans would be based. Basic

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(1) See Appendix B, Item 4

(2) Principles & Procedures for the Preparation and Use of Hydroelectric Operating Plans for Canadian Treaty Storage.

1. Duncan reservoir will be evacuated to provide up to 700,000 acre-feet of storage, if required, for flood control use by 1 April of each year and up to 1,270,000 acre-feet of storage, if required, for flood control use by 1 May of each year.
2. Arrow reservoir will be evacuated to provide up to 7,100,000 acre-feet of storage, if required, for flood control use by 1 May of each year.
3. Mica reservoir will be evacuated to provide up to 80,000 acre-feet of storage, if required, for flood control use by 1 May of each year.
4. The Canadian Entity may exchange flood control storage provided in Arrow reservoir for additional storage provided in Mica reservoir if the Entities agree that the exchange would provide the same effectiveness for control of floods in the Columbia River at The Dalles, Oregon.

The Protocol to the Treaty, dated 22 January 1964, directs that in preparing flood control operating plans every effort will be made to minimize flood damage in both Canada and the United States.

During the 12 months ended 30 September 1968, the International Task Force on Flood Control Operating Plans continued with flood routing studies for the 1975 level of development of power and flood control in the Columbia River Basin. These studies included allowance for irrigation depletions and were based on streamflow and reservoir operation simulations executed by the U.S. Corps of Engineers. The simulations generally covered the April through July period of the years of record 1928 through 1958.

In August 1968, the Entities received from the Task Force a draft of a Flood Control Operating Plan for Columbia River Treaty Storage which was under study on 30 September 1968.

In December 1967, the Task Force prepared an interim flood control

operating plan for Duncan<sup>(1)</sup> which was agreed by the Entities in February and implemented by the Task Force during the 1968 freshet.

#### COOPERATION WITH PERMANENT ENGINEERING BOARD

The duties of the Canadian and United States Entities include assisting and cooperating with the Permanent Engineering Board in the discharge of its functions.

Two semi-annual reports were forwarded by the Entities to the Board covering the period 1 October 1967 through 30 September 1968.

In addition, five Columbia Construction Progress Reports<sup>(2)</sup> covering the Canadian Treaty Storage projects were supplied to the Permanent Engineering Board. During the 12 months ended 30 September 1968, the Board received from the Canadian Entity weekly storage operation reports showing the daily inflow, outflow and reservoir elevation at Duncan.

The report dated 7 October 1968 included also corresponding daily information for Arrow reservoir, starting on 28 September 1968.

Joint meetings of the Permanent Engineering Board and the Entities were held on 23 October 1967, 30 April 1968 and 19 September 1968.

In December 1967, representatives of the Entities met with a committee of the Permanent Engineering Board for explanation and discussion of various technical matters involved in the work of the Entities.

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(1) See Appendix B, Item 3

(2) Columbia Construction Progress Reports Nos. 11, 12, 13, 14 & 15

APPENDIX A

COLUMBIA RIVER TREATY ENTITIES

Canada

DR. H.L. KEENLEYSIDE  
CHAIRMAN

Chairman  
British Columbia Hydro and  
Power Authority  
Vancouver, B.C.

Canadian Entity Representatives

MR. W.D. KENNEDY

Manager  
Canadian Entity Services  
British Columbia Hydro and  
Power Authority  
Vancouver, B.C.

MR. G.J.A. KIDD

Manager  
Strategic Planning and  
Development Department  
Corporate Planning Division  
British Columbia Hydro and  
Power Authority  
Vancouver, B.C.

United States of America

MR. HENRY R. RICHMOND  
CHAIRMAN

Administrator  
Bonneville Power Administration  
Department of the Interior  
Portland, Oregon

BRIGADIER-GENERAL  
ELMER P. YATES

Division Engineer  
North Pacific Division  
Corps of Engineers, U.S. Army  
Portland, Oregon

United States Entity Coordinators

MR. BERNARD GOLDHAMMER  
COORDINATOR

Asst. Administrator for Power  
Management  
Bonneville Power Administration  
Portland, Oregon

MR. GORDON FERNALD  
COORDINATOR

Chief, Engineering Division  
North Pacific Division  
Corps of Engineers, U.S. Army  
Portland, Oregon

MR. H. KROPITZER  
SECRETARY

Executive Assistant to the Administrator  
Bonneville Power Administration  
Portland, Oregon

APPENDIX B

COLUMBIA RIVER TREATY  
OFFICIAL AGREEMENTS OF THE ENTITIES  
OCTOBER 1967 TO SEPTEMBER 1968

| <u>Date</u>       | <u>Item No</u> | <u>Description</u>   |
|-------------------|----------------|--|
| 23 October 1967   | 1              | Definition of the Columbia River Treaty Hydrometeorological System                                 |
| 29 February 1968  | 2              | Recommendation No.3 for Hydro-meteorological Network   |
| 29 February 1968  | 3              | Interim Flood Control Operating Plan for Duncan Reservoir - 1967-68                                |
| 29 February 1968  | 4              | Mica Project Discharge Capacity  |
| 29 February 1968  | 5              | Special Operating Plan for Duncan Reservoir During the Period 1 August 1967 Through 31 July 1968   |
| 29 February 1968  | 6              | Special Operating Program for Canadian Storage During the Period 1 April 1968 Through 30 June 1969 |
| 19 September 1968 | 7              | Special Operating Plan for Canadian Storage During the Period 1 August 1968 Through 31 July 1969   |
| 19 September 1968 | 8              | Procedures for the Determination of Downstream Power Benefits Resulting from Canadian Storage      |

APPENDIX C

COLUMBIA RIVER TREATY  
INTERNATIONAL TASK FORCES

The official membership of the five International Task Forces was as follows:

| <u>TASK FORCE</u>             | <u>CANADIAN SECTION</u> | <u>UNITED STATES SECTION</u>            |
|-------------------------------|-------------------------|---|
| Hydrometeorological System    | P.R. Purcell (Chairman) | F.A. Limpert (Chairman) <sup>(1)</sup>  |
|                               | J.F. Miles              | D.M. Rockwood <sup>(2)</sup>            |
|                               | U. Sporns               |   |
| Discharge Capacities of Dams  | G.J.A. Kidd (Chairman)  | C.E. Mohler (Chairman) <sup>(1)</sup>   |
|                               | W.H. Fisher             | R.G. Lambert <sup>(2)</sup>             |
| Initial Filling of Reservoirs | J.B. Hedley (Chairman)  | C.W. Blake (Chairman) <sup>(1)</sup>    |
|                               | W.H. Fisher             | C.E. Hildebrand <sup>(2)</sup>          |
| Power Operating Plans         | G.J.A. Kidd (Chairman)  | H.M. McIntyre (Chairman) <sup>(1)</sup> |
|                               | W.H. Fisher             | K.D. Earls <sup>(1)</sup>               |
|                               | J.B. Hedley             | D.J. Lewis <sup>(2)</sup>               |
|                               | N.S. Kent               | C.E. Hildebrand <sup>(2)</sup>          |
| Flood Control Operating Plans | G.J.A. Kidd (Chairman)  | M.L. Nelson (Chairman) <sup>(2)</sup>   |
|                               | W.H. Fisher             | F.A. Limpert <sup>(1)</sup>             |

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All Canadian Task Force members represented B.C. Hydro and Power Authority. United States Task Force members represented<sup>(1)</sup> Bonneville Power Administration or <sup>(2)</sup> United States Corps of Engineers.

COLUMBIA RIVER TREATY  
INTERNATIONAL COMMITTEES

The official membership of the two International Committees at 30 September 1968, was as follows:-

|   | <u>Canadian</u><br><u>Section</u>                 | <u>United States</u><br><u>Section</u>          |
|---|---|---|
| COLUMBIA RIVER TREATY<br>OPERATING COMMITTEE              | G.J.A. Kidd<br>(Chairman)                         | C.E. Hildebrand<br>(Co-Chairman) <sup>(1)</sup> |
|   | W.H. Fisher                                       | D.J. Lewis <sup>(1)</sup>                       |
|   | W.E. Kenny  | H.M. McIntyre<br>(Co-Chairman) <sup>(2)</sup>   |
|   | (a fourth<br>member may<br>be appointed<br>later) | C.W. Blake <sup>(2)</sup>                       |
| COLUMBIA RIVER TREATY<br>HYDROMETEOROLOGICAL<br>COMMITTEE | P.R. Purcell<br>(Chairman)                        | F.A. Limpert<br>(Chairman) <sup>(2)</sup>       |
|   | U. Sporns   | D.M. Rockwood <sup>(1)</sup>                    |

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All Canadian committee members represent B.C. Hydro and Power Authority. United States committee members represent<sup>(1)</sup> United States Corps of Engineers or <sup>(2)</sup> Bonneville Power Administration.

APPENDIX E

IMPLEMENTATION OF THE COLUMBIA RIVER TREATY

SELECTED CHRONOLOGY

- 17 January 1961 Columbia River Treaty signed in Washington, D.C.
- 8 July 1963 Main Canada-British Columbia Agreement signed
- 13 January 1964 Supplementary Canada-British Columbia Agreement signed.
- 22 January 1964 Notes exchanged by the Governments of Canada and the United States of America concerning the disposition of the Canadian Entitlement to downstream power benefits and the Protocol clarifying the terms of the Columbia River Treaty.
- 10 June 1964 Columbia River Treaty approved by the Senate of Canada.
- 10 June 1964 Contract let for clearing of Duncan reservoir site.
- 13 August 1964 Canadian Entitlement Purchase Agreement signed by Columbia Storage Power Exchange and British Columbia Hydro and Power Authority.
- 4 September 1964 B.C. Hydro and Power Authority designated by the Government of Canada as the Canadian Entity effective from date of ratification of Treaty.
- 16 September 1964 Instruments of Ratification of Columbia River Treaty exchanged by the Governments of Canada and the United States of America.
- 16 September 1964 The Administrator of the Bonneville Power Administration, Department of the Interior, and the Division Engineer, North Pacific Division, Corps of Engineers, Department of the Army, designated by the Government of the United States of America as the United States Entity.
- 16 September 1964 Notes exchanged by the Governments of Canada and the United States of America authorizing the Canadian Entitlement Purchase Agreement.
- 16 September 1964 \$253.9 million (U.S. funds) delivered to the Government of Canada and \$273.29 million (Canadian funds) transferred to the Government of British Columbia as payment in advance for the Canadian Entitlement to downstream power benefits.

APPENDIX E (cont'd)

|                   |  |
|-------------------|--|
| 16 September 1964 | \$273.29 million (Canadian funds) transferred to British Columbia Hydro and Power Authority.                 |
| November 1964     | Duncan project construction started.   |
| March 1965        | Arrow project construction started.  |
| 16 July 1965      | Mica diversion tunnel contract awarded.  |
| 31 January 1966   | Libby dam option taken up by U.S.A.  |
| 7 March 1966      | Duncan River diverted through Duncan outlet tunnels.   |
| 30 June 1966      | Libby dam project construction started.  |
| 29 April 1967     | Duncan reservoir filling started.  |
| 18 May 1967       | Governments of Canada and U.S.A. exchanged notes authorizing special operating program for Duncan reservoir. |
| 25 July 1967      | Duncan reservoir filled.   |
| 31 July 1967      | Duncan project declared operative.   |
| 6 September 1967  | Mica dam contract awarded  |
| 6 November 1967   | Columbia River diverted through Mica diversion tunnels.  |
| 23 November 1967  | Duncan flood control payment received.   |
| 29 January 1968   | Columbia River diverted through Arrow outlet structures.   |
| 1 April 1968      | Starting date for 30-year period of sale of Canadian Entitlement to Duncan downstream power benefits.        |
| 1 June 1968       | Libby dam first concrete placed.   |
| 31 July 1968      | Arrow reservoir elevation controlled at 1404 feet.   |
| 3 September 1968  | Arrow navigation lock operative for regular use.   |
| 10 October 1968   | Arrow project declared operative: Arrow flood control payment received.                                      |