

REPORT  
OF  
COLUMBIA RIVER TREATY  
CANADIAN AND UNITED STATES ENTITIES  
for the period  
1 October 1968  
to  
30 September 1969

April 1970

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## INTRODUCTION

This report describes the joint actions of the Canadian and United States Entities during the period 1 October 1968 to 30 September 1969, in discharging their responsibility for formulating and carrying out operating arrangements necessary to implement the Columbia River Treaty. Previous reports, dated 22 April 1967 and January 1969, covered the periods 16 September 1964 to 30 September 1967, and 1 October 1967 to 30 September 1968.

## ORGANIZATION AND MEETINGS

During the period 1 October 1968 to 30 September 1969, the Canadian and United States Entities held a joint meeting with the Coordinators and members of the Operating Committee on 7 May 1969. Also, during this 12-month period, meetings of the Entity representatives were held as required.

With his retirement as Chairman of B.C. Hydro and Power Authority, Dr. Hugh L. Keenleyside resigned his position as Chairman of the Canadian Entity on 30 June 1969. The Honourable R.G. Williston, who is a Director of B.C. Hydro and Power Authority as well as being the Minister of Lands, Forests and Water Resources of British Columbia, was appointed the new Chairman of the Canadian Entity on 1 July 1969.

Brigadier-General Roy S. Kelley was appointed a member of the U.S. Entity in May 1969 to succeed Brigadier-General E.P. Yates.

The names of the members of the two Entities and their chief representatives are shown in Appendix A.

The two international committees, listed in Appendix B, which were established effective 19 September 1968, continued their work. These two committees directed and coordinated studies 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.

The Entities received reports and recommendations on operating procedures, facilities and other matters essential to Columbia River Treaty implementation from the international committees. After review, formal agreement on various items was reached by the Entities. Appendix C lists the official agreements reached and recorded during the period of this report.

On 9 June 1969, a dedication ceremony was held at the Arrow project. At this ceremony the Arrow Dam was named the Hugh Keenleyside Dam.

#### CONSTRUCTION OF THE TREATY STORAGE PROJECTS

In brief, most of the construction work on the Duncan and Arrow projects was completed prior to 1 October 1968 and for Mica and Libby construction proceeded on schedule during the year.

During the period of this report, three Columbia Construction Progress reports were issued by B.C. Hydro and Power Authority

on the construction of the Canadian storage projects. Reports Nos. 16 and 17 dealt with the construction of Arrow and Mica, and Report No. 18 with the construction of Mica only.

The Division Engineer, North Pacific Division, Corps of Engineers, U.S. Army, issued reports Nos. 2 and 3 on the progress of construction during this period of the Libby dam project.

Because these reports give a detailed description of the construction achieved on the projects during this period, it is not considered necessary to repeat the information in this report.

#### COLUMBIA STORAGE OPERATION - OPERATING ARRANGEMENTS

During the period covered by this report, both Duncan and Arrow reservoirs were operated for power and flood control.

The operation of the storages was generally in accordance with:

- (a) "Special Operating Plan for Canadian Storage During the Period 1 August 1968 through 31 July 1969", dated 27 August 1968.
- (b) "Hydroelectric Operating Plans for Canadian Storage During the Operating Years 1969-70 through 1974-75", dated 15 February 1969\*.
- (c) Amendment to (b) above, dated September 1969\*\*.
- (d) "Interim Flood Control Operating Plan for Duncan and Arrow Reservoirs, dated 12 November 1968\*\*\*.

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\* See Appendix C, item 1  
\*\* See Appendix C, item 2  
\*\*\* See Appendix C, item 4

Because of the special conditions pertaining during this operating year it was agreed that the operating plans referred to above, would be modified as described in a letter from the Chairman, Canadian Entity to the Chairman, United States Entity, dated 31 March 1969. A copy of this letter is included as Appendix D to this report.

The Arrow project was fully operational on 10 October 1968, with partial storage to elevation 1404 ft. in the lower lake and the Duncan reservoir was operational to the normal full pool elevation.

During this period certain reservoir preparation work in the Arrow reservoir had to be completed and construction work was undertaken on the Grand Coulee third powerhouse, and these factors were taken into account in operating the reservoirs. The operation of the Canadian reservoirs provided valuable assistance in meeting the construction requirements at Grand Coulee.

Included in this report as Appendix G is a detailed description of the operation of the Treaty storages - "Operation of Columbia River Treaty Projects - 1 April 1967 through 31 July 1969".

Appendix G, therefore, covers the first ten months of the 12-month period of this report.

Storage of water in Duncan and Arrow reservoirs continued during July. Duncan became full on 10 July 1969 and Arrow on 26 July 1969. During the late summer and early fall of 1969, below critical year run-off was experienced on the Columbia River in the United States and as a consequence storage draft commenced much

earlier than usual. Initial draft from Arrow began on 6 August 1969 and continued through the remainder of the report period. Draft from Duncan began on 31 August 1969 and was discontinued on 21 September 1969, with no further draft during the report period.

The work of the Hydrometeorological Committee during this period is described in their Annual Report which is included as Appendix E.

#### POWER BENEFITS AND FLOOD CONTROL PAYMENTS

As reported in the previous annual report, an agreement had been signed on 29 February 1968, covering the operation of the Arrow project to permit closure and operation of partial storage for power purposes in the operating year 1968-69, and on 10 October 1968, the Arrow project was declared operative. On the same day as the project came into operation, the Canadian Government received payment of \$(U.S.) 52,100,000, the amount stipulated in Article VI(c) of the Columbia River Treaty, as the flood control payment due to Canada on commencement of operation. Also on that day the sum of \$55,909,812.20 in Canadian funds was paid by the Canadian Government to the Government of British Columbia and was transferred to B.C. Hydro and Power Authority.

From 1 October 1968 through 31 March 1969, the Canadian Entity continued to receive downstream power benefits attributable to storage in Arrow reservoir to elevation 1404 feet. This was in accordance with the agreement made between the Entities on

2 February 1968 on "Special Operating Program for Canadian Storage during the period 1 April 1968 through 30 June 1969", dated 26 February 1968.

At 31 March 1969, the Canadian Entity had received 835.536 million kilowatthours at rates of delivery up to 200,000 kilowatts. Of this amount, 445.321 million kilowatthours were received before 1 October 1968, as recorded in the previous annual report. The balance of 390.212 million kilowatthours was received between 1 October 1968 and 31 March 1969. From 1 April 1969, the Canadian Entitlement to downstream power benefits from Arrow operation during the next 30 years has been purchased by Columbia Storage Power Exchange and transferred and assigned to the Bonneville Power Administrator. With effect from 1 April 1969, the United States Entity commenced delivery of capacity and energy to the C.S.P.E. participants in accordance with the Canadian Entitlement Exchange Agreement dated 13 August 1964. Under this agreement, deliveries to the C.S.P.E. participants from Duncan commenced on 1 April 1968, also for a 30-year period.

During this reporting year, the Operating Committee produced a report "Determination of Downstream Power Benefits Resulting from Canadian Storage for Operating Years 1969-70 through 1974-75", dated June 30, 1969. The Entities signed an agreement on this report on 26 & 30 September 1969\*.

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\* See Appendix C, item 3

For the six years considered in the studies, the results with respect to both energy and capacity were only slightly different from the figures used at the time of the ratification of the Treaty in 1964.

COOPERATION WITH PERMANENT ENGINEERING BOARD

The Entities continued 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 1968 to 30 September 1969.

In addition, the construction progress reports - B.C. Hydro's reports Nos. 16, 17 and 18, and the Corps of Engineers' Reports Nos. 2 and 3, were supplied to the Permanent Engineering Board.

A joint meeting of the Permanent Engineering Board and the Entities was held on 7 May 1969.

APPENDIX A

COLUMBIA RIVER TREATY ENTITIES

Canada

THE HON. R.G. WILLISTON\*  
CHAIRMAN

Director  
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  
ROY S. KELLEY\*\*

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

\* Hon. R.G. Williston succeeded Dr. H.L. Keenleyside - July 1969

\*\* Brig.-Gen. Roy S. Kelley succeeded Brig.-Gen. E.P. Yates - May 1969

APPENDIX B

COLUMBIA RIVER TREATY  
INTERNATIONAL COMMITTEES

The official membership of the two International Committees for the year 1 October 1968 to 30 September 1969, was as follows:

	<u>Canadian</u> <u>Section</u>	<u>United States</u> <u>Section</u>
COLUMBIA RIVER TREATY OPERATING COMMITTEE	G.J.A. Kidd (Chairman)	C.E. Hildebrand (Co-Chairman) <sup>(1)</sup>
	W.H. Fisher	D.J. Lewis <sup>(1)</sup>
	W.E. Kenny	H.M. McIntyre (Co-Chairman) <sup>(2)</sup>
		C.W. Blake <sup>(2)</sup>
COLUMBIA RIVER TREATY HYDROMETEOROLOGICAL COMMITTEE	P.R. Purcell (Chairman)	F.A. Limpert (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 C

COLUMBIA RIVER TREATY  
OFFICIAL AGREEMENTS OF THE ENTITIES  
1 OCTOBER 1968 - 30 SEPTEMBER 1969

<u>Item No</u>	<u>Date Agreement Signed by Entities</u>	<u>Description</u>
1	2 & 6 June 1969	Hydroelectric Operating Plans for Canadian Storage during the Operating Years 1969-70 through 1974-75, dated 15 February 1969.
2.	23 & 29 Sept. 1969	Amendment to above, dated September 1969
3.	26 & 30 Sept. 1969	Determination of Downstream Power Benefits Resulting from Canadian Storage for Operating Years 1969-70 through 1974-75, dated June 30, 1969.
4.	29 Nov. & 3 Dec. 1968	Interim Flood Control Operating Plan for Duncan and Arrow Reservoirs, dated November 12, 1968.
5.	26 & 30 Sept. 1969	Streamflow and Reservoir Gages in the United States, dated July 22, 1968.

**BRITISH COLUMBIA HYDRO AND POWER AUTHORITY**

**CANADIAN ENTITY - COLUMBIA RIVER TREATY**

VANCOUVER 1, B.C.

TELEX 04-50381

File: 1951.5

31 March 1969

Mr. Henry R. Richmond  
Chairman  
United States Entity  
Columbia River Treaty  
P.O. Box 3621  
Portland, Oregon 97208  
U.S.A.

Dear Mr. Richmond:

The Canadian and United States Entities signed an agreement on the "Interim Flood Control Plan for Duncan and Arrow Reservoirs", dated November 12, 1968. Because of particular circumstances pertaining during this present year I would like to confirm with you some minor adjustments which we have agreed.

Because of certain reservoir preparation work in the Arrow reservoir, and because of construction work for the Grand Coulee third powerhouse, we have agreed to adjust the operations of Arrow and Duncan reservoirs from that set out in the Interim Flood Control Plan and the Special Operating Plan to meet the following requirements:

The United States Entity wishes to hold as much water in the Arrow reservoir as late as possible, consistent with flood control requirements, to ensure that storage would be available if releases were needed to meet power requirements during April when Grand Coulee reservoir will be empty. The Canadian Entity wants Arrow drafted as much as possible in order to complete some reservoir preparation work, such as the dismantling of Whatshan power plant. To meet these requirements it is agreed by the Entities that Arrow reservoir will be drafted to 1390 feet, or lower, by 1 March 1969, and thereafter the reservoir may be held as high as 1390 feet until 1 April 1969, if the water is not



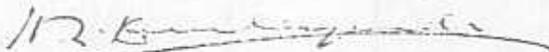
required downstream. The above elevations apply to the Lower Arrow Lake. After 1 April 1969, Arrow reservoir will be drafted as low as possible, consistent with downstream power requirements, but may not empty if inflow exceeds the outlet capacity. This differs from the Interim Flood Control Plan which required Arrow to be empty at 1 April 1969.

With regard to Duncan reservoir, it is agreed that Duncan will be drafted to elevation 1836.5 feet by the end of January 1969, but could be held at that elevation to 1 March 1969 and then drafted further to supply the 1,270,000 acre-feet of flood control storage space by 15 March 1969. This differs from the Flood Control Plan which required this amount of storage space to be available by 1 March 1969.

In addition, the two Entities are agreed that they will use their best efforts during the refill of Arrow reservoir so that the water elevations will not exceed 1390 feet prior to 1 May 1969, 1410 feet prior to 1 June and to keep below elevation 1420 feet as long as possible, subject to flood control and refill requirements as well as the construction problems at Grand Coulee.

The two Entities are also agreed that they do not consider it necessary to sign a formal agreement covering these minor adjustments but a copy of this letter will be sent for information to the Permanent Engineering Board.

Yours sincerely,



H.L. Keenleyside  
Chairman

cc. Division Engineer, Corps of Engineers  
G.M. MacNabb, PEB

## INTRODUCTION

This report describes the actions of the Columbia River Treaty Hydrometeorological Committee during the period 1 October 1968 to 30 September 1969, in accordance with paragraph 3(iii) of its Terms of Reference, dated 20 May 1968. This committee is responsible for recommending to the Entities the establishment of a Columbia River Treaty Hydrometeorological System. Previous reports dated 22 April 1968 and January 1969 covered the actions of the International Task Force on Hydrometeorological Network for the periods from 16 September 1964 to 30 September 1968. The actions of the Hydrometeorological Committee are a continuation of those conducted by the task force, in order to provide the hydrometeorological facilities required under terms of the Columbia River Treaty.

The composition of the Hydrometeorological Committee during the reporting period is:

### Canadian Section

Ralph Purcell, Chairman  
Ulrich Sporns, Member

### United States Section

Fred. A. Limpert, Chairman  
David M. Rockwood, Member

## HYDROMETEOROLOGICAL SYSTEM

The Hydrometeorological Committee held three meetings during the period as follows:

- No.1 - 23 October 1968 - Portland, Oregon
- No.2 - 24 - 25 March 1969 - Vancouver, British Columbia
- No.3 - 16 - 18 September 1969 - Inspection of Canadian Network

The minutes of these meetings have been submitted to the respective Entities, as required.

The committee published a list of Hydrometeorological Treaty Facilities and a list of Hydrometeorological Supporting Facilities dated September 1968 that had been approved by the Entities. Changes to the Treaty Facilities list will be made, as agreed by the Entities. The list of Supporting Facilities will be reviewed annually and necessary revisions or additions made. Copies of these lists were sent to Federal and State agencies in the Pacific Northwest and to Provincial and Federal agencies in the British Columbia area by letter dated 19 December 1968.

Recommendation No.5, Streamflow and Reservoir Gages included as Treaty Facilities in the United States, had been submitted to the Entities during the previous reporting period. The Entities formally approved this recommendation 30 September 1969.

An Interim Plan for Exchange of Hydrometeorological Data, Recommendation No.6, was approved by the committee 28 May 1969, submitted to the Entities 3 June 1969, and it was sent to the Permanent Engineering Board for their consideration 30 September 1969. This is an interim plan for methods and frequency of reporting from certain key hydrometeorological stations in the Canadian portion of the basin using existing communication facilities. This interim plan will be in force for the period 1 May 1969 to 31 July 1971. Times of observations, parameters collected and transmitted, and the operating periods during

the year associated with these data are established in accordance with the requirements set forth in the Operating Plans that have been approved by the Entities. The exchange of data between the Entities is accomplished by use of the Columbia Basin Teletype Network.

Two areal snow cover observations over the Canadian portion of the Columbia River basin were performed by B.C. Hydro and Power Authority during the 1969 flood season in conjunction with personnel of the Seattle District office of the Corps of Engineers. These observations were made in accordance with the arrangements agreed by the Hydrometeorological Committee.

The Hydrometeorological Committee inspected certain hydrometeorological and radio communication facilities in the Canadian portion of the Columbia Basin during the week of 15 September 1969.

The committee considered future communication requirements and proposed facilities necessary for the timely reporting of remote hydrometeorological data. Existing and proposed radio communication facilities were investigated with a view of possibly utilizing them for interrogating hydrometeorological stations remotely.

The adequacy of reporting and operational use of hydrometeorological data under the interim plan for exchange of this information was reviewed in consultation with the Operating Committee. Suggestions were made from time to time with regard to improving the exchange of data and streamflow forecasts between the Entities on a current basis.

The following new hydrometeorological reporting stations were added to the existing system during the report period in accordance with

arrangements agreed by the Hydrometeorological Committee:

Reservoir level gages were installed at Nakusp and Fauquier in the Canadian portion of the basin.

Snow courses were established in the United States as a part of the facilities required for operation of the Libby project by the Seattle District, Corps of Engineers:

Bald Eagle Peak, Montana  
Banfield Mountain, Montana  
Bear Mountain, Idaho  
Bristow Creek, Montana  
Cedar Grove, Montana  
Davis Creek, Montana  
Garver Creek, Montana  
Halvorson Creek, Idaho  
Hawkins Lake, Montana  
Keeler Creek, Montana  
Lost Soul, Montana  
Poorman Creek, Montana

APPENDIX F

IMPLEMENTATION OF THE COLUMBIA RIVER TREATY  
SELECTED CHRONOLOGY

(For the period January 1961 to 3 September 1968, see Report of Columbia River Treaty - Canadian and United States Entities for the period 1 October 1967 to 30 September 1968)

- |                 |   |
|-----------------|---|
| 10 October 1968 | Arrow project declared operative: Arrow flood control payment received. |
| 9 June 1969     | Dedication ceremony of Hugh Keenleyside Dam                             |
| 10 July 1969    | Duncan reservoir reached full elevation of 1892 ft.                     |
| 26 July 1969    | Arrow reservoir reached full elevation of 1444 ft.                      |

APPENDIX F

IMPLEMENTATION OF THE COLUMBIA RIVER TREATY  
SELECTED CHRONOLOGY

(For the period January 1961 to 3 September 1968, see Report of Columbia River Treaty - Canadian and United States Entities for the period 1 October 1967 to 30 September 1968)

- |                 |   |
|-----------------|---|
| 10 October 1968 | Arrow project declared operative: Arrow flood control payment received. |
| 9 June 1969     | Dedication ceremony of Hugh Keenleyside Dam                             |
| 10 July 1969    | Duncan reservoir reached full elevation of 1892 ft.                     |
| 26 July 1969    | Arrow reservoir reached full elevation of 1444 ft.                      |