ANNUAL REPORT
to the
GOVERNMENTS
of
THE UNITED STATES and CANADA

COLUMBIA RIVER TREATY

PERMANENT ENGINEERING BOARD

Washington, D.C. Ottawa, Ontario

30 SEPTEMBER 1995

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

C A N A D A • U N I T E D S T A T E S

CANADIAN SECTION
J. D. OULTON, Chairman
J. Allan, Member

UNITED STATES SECTION
J. P. ELMORE, Chairman
R. H. Wilkerson, Member

February 29, 1996

The Honorable Warren Christopher
The Secretary of State
Washington, DC

The Honourable A. Anne McLellan
Minister of Natural Resources
Ottawa, Ontario

Dear Secretary of State Christopher and Minister McLellan:

Reference is made to the Treaty between the United States of America and Canada relating to co-operative development of the water resources of the Columbia River basin, signed at Washington, DC, on 17 January 1961.

In accordance with the provisions of Article XV paragraph 2(e), there is submitted herewith the thirty-first Annual Report, dated 30 September 1995, of the Permanent Engineering Board.

The report sets forth results achieved under the Treaty for the period from 1 October 1994 to 30 September 1995. The report concludes that the requirements of the Treaty were not fully met during the report year.

Respectfully submitted:

For the United States

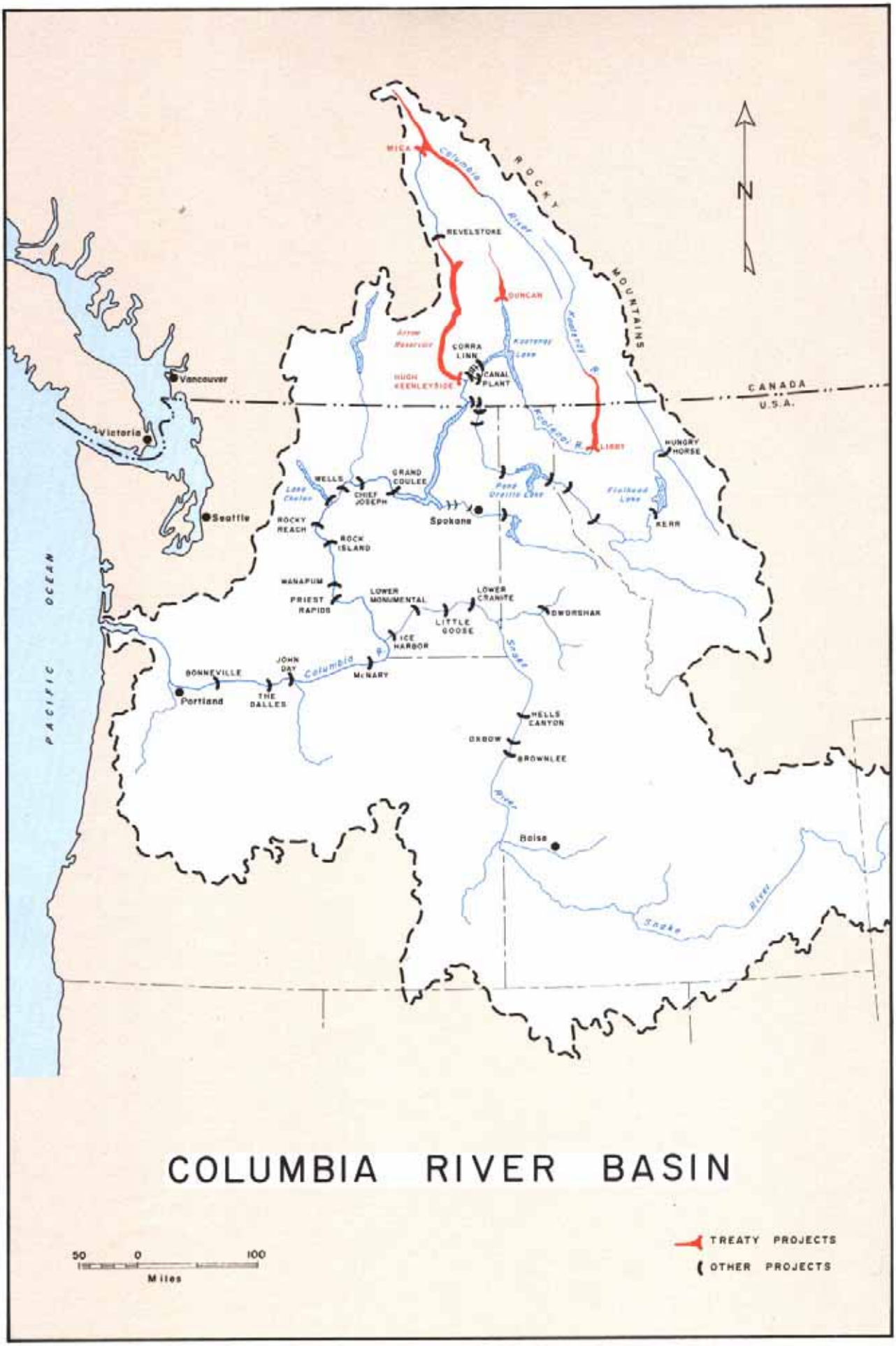
John P. Elmore, Chairman

Ronald H. Wilkerson

For Canada

John Allan, Chairman

David Burpee



COLUMBIA RIVER BASIN

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COLUMBIA RIVER TREATY

PERMANENT ENGINEERING BOARD

Washington, D.C. **Ottawa, Ontario**

30 September 1995

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SUMMARY

The thirty-first Annual Report of the Permanent Engineering Board is submitted to the governments of the United States and Canada in compliance with Article XV of the Columbia River Treaty of 17 January 1961. The status of projects, progress of Entity studies, operation of the Duncan, Arrow, Mica and Libby reservoirs, and the resulting benefits are described.

The Duncan, Arrow and Mica storage projects were operated throughout the year in accordance with the objectives of the Treaty and the terms of operating plans developed by the Entities. With regard to the operation of the Libby project, the Canadian Entity protested the U.S. Entity's (North Pacific Division, Army Corps of Engineers) unilateral action to modify the project operation during a portion of the year in order to comply with the U.S. Fish and Wildlife Service's Biological Opinion on measures to protect and enhance Kootenay River white sturgeon under the *Endangered Species Act*. The Canadian Entity protested that this unilateral change is inconsistent with the Treaty. The two governments have initiated discussions.

Operations under the 1990 and subsequent agreements between the Entities relating to the use of non-Treaty storage, refill enhancement for the Mica and Arrow reservoirs, and initial filling of non-Treaty reservoirs did not conflict with Treaty operations. Flood control operations on a daily basis were not required this year.

The Board was called upon to assist the Entities in resolving their differences on five issues related to the calculation of the Treaty downstream power benefits and the transmission aspects of the delivery to Canada of these benefits. With regard to the calculation of the downstream power benefits issues, the Board made recommendations to the Entities on the appropriate application of the critical stream flow period definition and on their prerogatives in establishing operating procedures for the U.S. base hydro system. Concerning the transmission questions, the Board concluded that some of these matters extended beyond its mandate. However, the Board offered to mediate these issues if requested to do so by the Entities and governments.

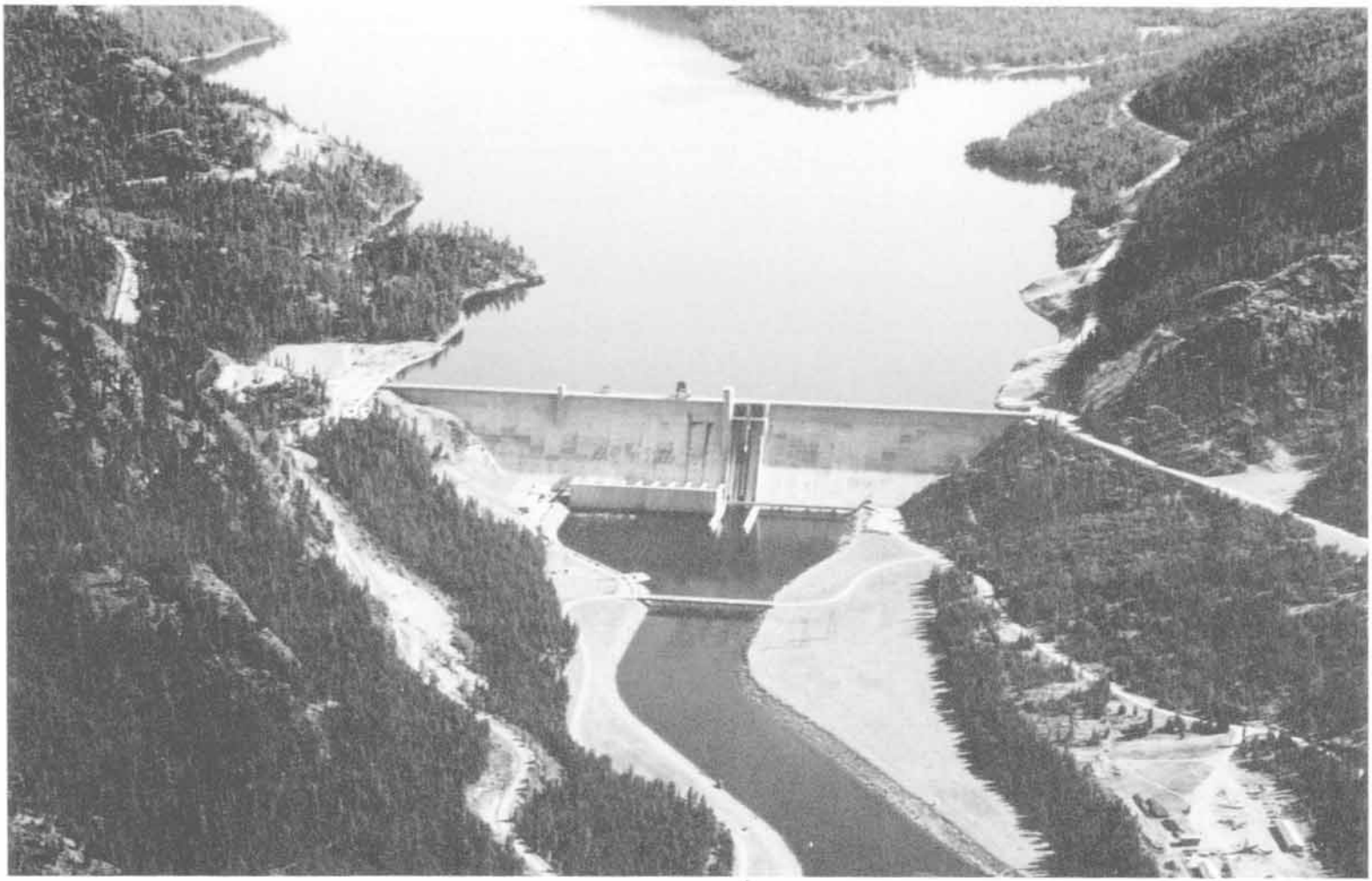
Because the Entities have not yet resolved the issues (critical streamflow period definition and established operating procedures) affecting the determination of downstream power benefits, and because the governments have not solved the Libby operation issue, the Entities have been unable to submit their report, *Assured Operating Plan (AOP) and Determination of Downstream Power Benefits (DDPB) for Operating Year 2000-01,* in accordance with the requirements of the Treaty. Likewise, because of the unresolved downstream power benefits issues, the Board maintains its positions that the AOP and DDPB reports for the operating years 1998-99 and 1999-2000 are inconsistent with the Treaty.

For the reasons noted in the previous paragraph, the Board concludes that the requirements of the Treaty are not being fully met.

INTRODUCTION

The Columbia River Treaty provides for the cooperative development of the water resources of the Columbia River basin. Article XV of the Treaty established a Permanent Engineering Board and specified that one of its duties is to "make reports to Canada and the United States of America at least once a year of the results being achieved under the Treaty."

This Annual Report, which covers the period 1 October 1994 through 30 September 1995, describes activities of the Board, progress being achieved by both countries under the terms of the Treaty, operation of the Treaty projects, and the resulting benefits. Summaries of the essential features of the Treaty and of the responsibilities of the Board and of the Entities are included. The report refers to items currently under review by the Entities, provides discussion regarding the operations of the Treaty reservoirs and of the resulting power and flood control benefits, and presents the conclusions of the Board.



Libby Dam - Kootenai River, Montana
The dam and reservoir, Lake Koocanusa. The powerhouse is at the left of the spillway.

THE COLUMBIA RIVER TREATY

General

The Columbia River Treaty was signed in Washington, D.C. on 17 January 1961 and was ratified by the United States Senate in March of that year. In Canada ratification was delayed. Further negotiations between the two countries resulted in a formal agreement by an exchange of notes on 22 January 1964 to a Protocol to the Treaty and to an Attachment Relating to Terms of Sale. The Treaty and related documents were approved by the Canadian Parliament in June 1964.

The Canadian Entitlement Purchase Agreement was signed on 13 August 1964. Under the terms of this agreement, Canada's share of downstream power benefits resulting from the first thirty years of scheduled operation of each of the storage projects was sold to a group of electric utilities in the United States known as the Columbia Storage Power Exchange.

On 16 September 1964, the Treaty and Protocol were formally ratified by an exchange of notes between the two governments. The sum of $253.9 million (U.S. funds) was delivered to the Canadian representatives as payment in advance for the Canadian entitlement to downstream power benefits during the period of the Purchase Agreement. On the same date, at a ceremony at the Peace Arch Park on the International Boundary, the Treaty and its Protocol were proclaimed by President Johnson of the United States, Prime Minister Pearson of Canada, and Premier Bennett of British Columbia.

Features of the Treaty and Related Documents

The essential undertakings of the Treaty are as follows:

(a) Canada will provide 15.5 million acre-feet of usable storage by constructing dams near Mica Creek, the outlet of Arrow Lakes, and Duncan Lake in British Columbia.

(b) The United States will maintain and operate hydroelectric power facilities included in the base system and any new main-stem projects to make the most effective use of improved stream flow resulting from operation of the Canadian storage. Canada will operate the storage in accordance with procedures and operating plans specified in the Treaty.

(c) The United States and Canada will share equally the additional power benefit available in the United States as a result of river regulation by upstream storage in Canada.

(d) On commencement of the respective storage operations, the United States will make payments to Canada totalling $64.4 million (U.S. funds) for flood control provided by Canada.

(e) The United States has the option of constructing a dam on the Kootenai River near Libby, Montana. The Libby reservoir would extend some 42 miles into Canada, and Canada would make the necessary Canadian land available for flooding.

(f) Both Canada and the United States have the right to make diversions of water for consumptive uses and, in addition, after September 1984 Canada has the option of making for power purposes specific diversions of the Kootenay River into the headwaters of the Columbia River.

(g) Differences arising under the Treaty which cannot be resolved by the two countries may be referred by either country to the International Joint Commission or to arbitration by an appropriate tribunal as specified by the Treaty.

(h) The Treaty shall remain in force for at least 60 years from its date of ratification, 16 September 1964.

The Protocol of January 1964 amplified and clarified certain terms of the Columbia River Treaty. The Attachment Relating to Terms of Sale signed on the same date established agreement that under certain terms Canada would sell in the United States its entitlement to downstream power benefits for a 30-year period. The Exchange of Notes and Attachment Relating to Terms of Sale of January 1964 and the Canadian Entitlement Purchase Agreement of 13 August 1964 (the Sales Agreement) provided that the Treaty storage would be operative for power purposes on the following dates: Duncan storage on 1 April 1968; Arrow storage on 1 April 1969; and Mica storage on 1 April 1973.

PERMANENT ENGINEERING BOARD

General

Article XV of the Columbia River Treaty established a Permanent Engineering Board consisting of two members to be appointed by Canada and two members by the United States. Appointments to the Board were to be made within three months of the date of ratification. The duties and responsibilities of the Board were also stipulated in the Treaty and related documents.

Establishment of the Board

Pursuant to Executive Order No. 11177 dated 16 September 1964, the Secretary of the Army and the Secretary of the Interior, on 7 December 1964, appointed two members and two alternate members to form the United States Section of the Permanent Engineering Board. Pursuant to the Department of Energy Organization Act of 4 August 1977, the appointments to the United States Section of the Board are now made by the Secretary of the Army and the Secretary of Energy. The members of the Canadian Section of the Board were appointed by Order in Council P.C. 1964-1671 dated 29 October 1964. Each Canadian member was authorized to appoint an alternate member. On 11 December 1964, the two governments announced the composition of the Board.

The names of Board members, alternate members, and secretaries are shown in Appendix A. On 9 August 1995, Mr. Richard DiBuono succeeded Mr. Shapur Zanganeh as Secretary of the U.S. Section of the Board and Chairman of the U.S. Section of the Board's Engineering Committee. Mr. Daniel Burns was appointed to replace Mr. Paul Barber as Alternate for the United States on 31 March 1995. The names of the current members of the Board's Engineering Committee are also shown in Appendix A.

Duties and Responsibilities

The general duties and responsibilities of the Board to the governments, as set forth in the Treaty and related documents, include:

(a) assembling records of the flows of the Columbia River and the Kootenay River at the Canada-United States of America boundary;

(b) reporting to Canada and the United States of America whenever there is substantial deviation from the hydroelectric and flood control operating plans and if appropriate including in the report recommendations for remedial action and compensatory adjustments;

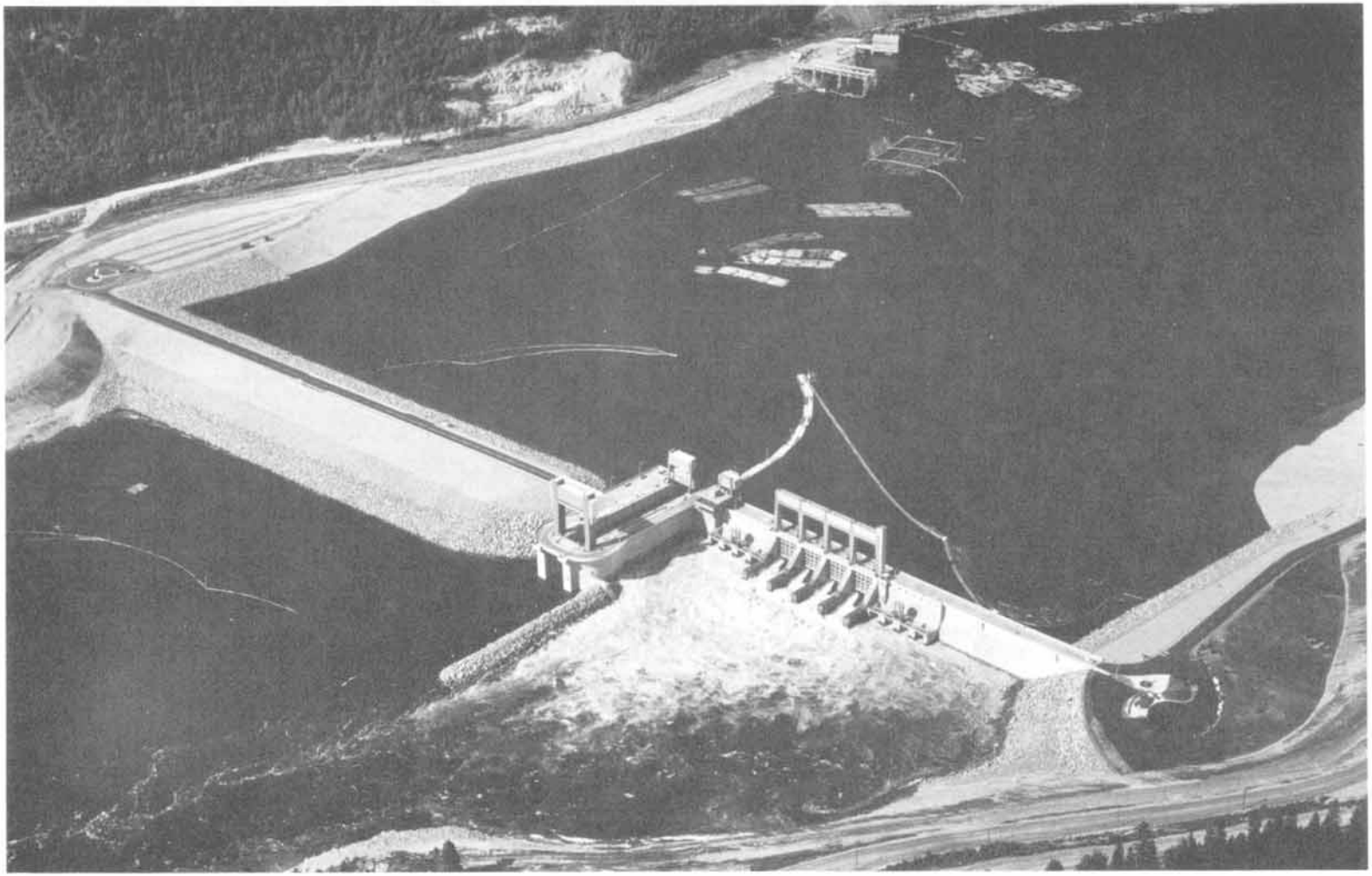
(c) assisting in reconciling differences concerning technical or operational matters that may arise between the Entities;

(d) making periodic inspections and requiring reports as necessary from the Entities and with a view to ensuring that the objectives of the Treaty are being met;

(e) making reports to Canada and the United States of America at least once a year of the results being achieved under the Treaty and making special reports concerning any matter which it considers should be brought to their attention;

(f) investigating and reporting with respect to any other matter coming within the scope of the Treaty at the request of either Canada or the United States of America;

(g) consulting with the Entities in the establishment and operation of a hydrometeorological system as required by Annex A of the Treaty.



Hugh Keenleyside Dam - Columbia River, British Columbia

Concrete spillway and discharge works with navigation lock and earth dam.

ENTITIES

General

Article XIV(1) of the Treaty provides that Canada and the United States shall each designate one or more Entities to formulate and execute the operating arrangements necessary to implement the Treaty. The powers and duties of the Entities are specified in the Treaty and its related documents.

Establishment of the Entities

Executive Order No. 11177, previously referred to, designated the Administrator of the Bonneville Power Administration, the 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. Pursuant to the Department of Energy Organization Act of 4 August 1977, the Bonneville Power Administration was transferred to the Department of Energy. Order In Council P.C. 1964-1407 dated 4 September 1964 designated the British Columbia Hydro and Power Authority as the Canadian Entity.

The names of the members of the two Entities are shown in Appendix B.

Powers and Duties of the Entities

In addition to the powers and duties specified elsewhere in the Treaty and related documents, Article XIV(2) of the Treaty requires that the Entities be responsible for the following:

(a) coordination of plans and exchange of information relating to facilities to be used in producing and obtaining the benefits contemplated by the Treaty;

(b) calculation of and arrangements for delivery of hydroelectric power to which Canada is entitled for providing flood control;

(c) calculation of the amounts payable to the United States for standby transmission services;

(d) consultation on requests for variations made pursuant to Articles XII(5) and XIII(6);

(e) the establishment and operation of a hydrometeorological system as required by Annex A;

(f) assisting and cooperating with the Permanent Engineering Board in the discharge of its functions;

(g) periodic calculation of accounts;

(h) preparation of the hydroelectric operating plans and the flood control operating plans for the Canadian storage together with determination of the downstream power benefits to which Canada is entitled;

(i) preparation of proposals to implement Article VIII and carrying out any disposal authorized or exchange provided for therein;

(j) making appropriate arrangements for delivery to Canada of the downstream power benefits to which Canada is entitled including such matters as load factors for delivery, times and points of delivery, and calculation of transmission loss;

(k) preparation and implementation of detailed operating plans that may produce results more advantageous to both countries than those that would arise from operation under the plans referred to in Annexes A and B.

Article XIV(4) of the Treaty provides that the two governments may, by an exchange of notes, empower or charge the Entities with any other matter coming within the scope of the Treaty.

ACTIVITIES OF THE BOARD

Meetings

During this report year, the Board played an active role in assisting the Entities to resolve issues arising between them. Five meetings were held at which the Board reviewed technical and operational issues with the Entities. The Board concluded that two issues (critical streamflow period definition and established operating procedures) were within its mandate to address and provided recommendations on these matters. It also concluded that three issues (alternative delivery points, backup transmission, and east-west standby transmission) extended beyond its mandate as they required legal interpretations as opposed to technical and operational advice. All these decisions by the Board were unanimous. The Board provided its conclusions and recommendations to the Entities through a series of letters, copies of which are included herein as Appendices E through H.

The Board notes that these meetings would not have been informative and successful without the excellent support of the Board's Engineering Committee and the Entities' Operating Committee. The continued support of these committees is essential.

The Board met on 1 and 2 February 1995 in Victoria, British Columbia, to review progress under the Treaty and to finalize the Annual Report for the year ending 30 September 1994. On 1 February 1995, the Board met with the Entities to assess operations under the Treaty and to discuss the Entities' progress towards resolving issues related to the determination of the critical stream flow period, the established operating procedures for the U.S. base hydro system, and the use of time periods of less than a full month in developing operating plans.

At that time, the first two issues had delayed the completion of the Entities' reports: *Assured Operating Plan and Determination of Downstream Power Benefits for Operating Years 1998-99 and 1999-2000.* The Entities did report an agreement on use of half months for the months of April and August in developing these two operating plans. The Entities also reported their progress under the September 1994 Memorandum of Negotiators' Agreement (MONA), which was discussed in the Board's Annual Report for the operating year ending 30 September 1994. The MONA process was expected to resolve operating problems resulting from the above-noted issues. The Board and the Entities agreed to convene a special meeting to review the status of activities under MONA.

On 21 March 1995, the Board met with the Entities in Portland, Oregon to review the draft detailed agreements pursuant to the MONA and the draft Exchange of Notes between the two governments required to implement the proposed agreements. The reviewed documents were related to the delivery of the downstream power benefits entitled to Canada (Canadian Entitlement). These agreements would have rendered moot the issues regarding the critical stream flow period definition and the established operating procedures for the U.S. base hydro system issues, along with other issues concerning transmission of the Canadian Entitlement. At the meeting, the Entities explained the nature and scope of each of several necessary documents and received the Board's views and suggestions.

Subsequently, on 15 May 1995, the U.S. Entity notified the Canadian Entity that it would discontinue the negotiations to finalise the detailed agreements pursuant to the MONA. As a result, on 21 July 1995, the Canadian Entity requested that the Board commence a process to assist the Entities in resolving outstanding issues that would have been rendered moot by the MONA. In response to this request and with the Entities' accord, the Board held a meeting on 9 August 1995 in Ottawa, Ontario, to assess the role it could play in helping the Entities to reconcile their differences with respect to the following issues:

i. definition of the critical streamflow period, which affects the magnitude of computed downstream power benefits;

ii. determination of "established operating procedures" for the U.S. base hydro system, which affects the length of the critical streamflow period and thus the magnitude of the downstream power benefits;

iii. rights and obligations of the Entities regarding delivery of the Canadian Entitlement to points on the U.S.-Canada border other than Oliver, British Columbia, as specified in the Treaty;

iv. rights and obligations of the Entities regarding backup service for the delivery of the Canadian Entitlement to Canada at Oliver B.C.; and,

v. rights and obligations of the Entities regarding the Treaty-specified standby service for the east-west Canadian transmission service.

The last three items deal with transmission questions, an area in which the Board heretofore had not been actively involved.

During the August meeting, the Entities provided their views on the potential role of the Board. The Board developed a process to assist the Entities in resolving their differences on the above five issues. On 7 September 1995, the Board provided a letter to the Entities describing this process (Appendix E).

With the assistance of the Entities, the Board held two additional meetings consistent with its adopted issue resolution process. The purpose of the first, which was held in Portland, Oregon, on 26 and 27 September 1995, was to assess the critical streamflow period definition and established operating procedures issues (items i and ii above), and to examine whether the alternative delivery points issue (item iii above) was an appropriate matter for the Board to address. The second meeting was held on 8 and 9 November 1995 in Vancouver, British Columbia (subsequent to the end of this report year but reported here for continuity), at which time the transmission-related issues (items iv and v above) were reviewed. On both occasions, the Entities presented to the Board their respective positions, and the Board deliberated the matters and arrived at its conclusions unanimously.

The Board's recommendations regarding the resolution of issues discussed at the September meeting were reflected in two letters to the Entities, dated 18 October 1995

(Appendices F and G). In the first, the Board recommended to the Entities that its views on the appropriate definition and application of the critical streamflow period definition and the established operating procedures be implemented in the AOP and DDPB reports for the operating years 1998-1999 and beyond. In the opinion of the Board, the critical stream flow period begins when releases from storage are required to augment the natural stream flow to meet system load requirements. Thus, the release of water from storage for purposes other than power generation and flood control (to meet the needs of fisheries, for example), should not affect the start of the critical stream flow period if releases from storage are necessary to supplement the natural stream flow in meeting system load requirements. In addition, the Board held that any modifications of the established operating procedures accepted by both countries at the time the Treaty was ratified should be made by mutual agreement of the Entities.

In the second letter, the Board concluded that the alternative delivery points issue was outside its mandate since it believed that the issue was largely a question of Treaty interpretation.

With regard to the transmission reliability issues discussed at the November meeting (items iv and v above), the Board found that, while there were some disagreements between the Entities regarding the technical aspects of these issues, the major disagreements were either commercial in nature or related to interpretations of the rights and obligations of the Entities under the Treaty. The Board, therefore, concluded that these issues lay outside its mandate. Furthermore, the Board found that the two issues are inextricably linked to the alternate delivery points question. It concluded, therefore, that the current transmission reliability issues extended beyond its mandate.

Though the Board refrained from offering advice on these issues, it did offer to mediate the resolution of the transmission issues, including the alternate delivery points issue. As this would involve the Board working outside its Treaty mandate, the Entities would need to obtain the approval of both governments if the Entities desire the Board to pursue this course of action. A letter explaining the Board's findings and recommendations on the transmission reliability issues was forwarded to the Entities on 21 December 1995 (Appendix H). As of 21 February 1996, the Entities have not responded to the Board's letters, which are given in Appendices F through H.

Reports Received

Throughout the report year, the Entities maintained contact with the Board and the Board's Engineering Committee. Operating data concerning the Treaty storage projects were made available to the Board.

In addition, the Entities provided the following documents to the Board:

- Annual Report of the Columbia River Treaty, Canadian and United States Entities for the period 1 October 1993 through 30 September 1994, dated November 1994;

- Columbia River Treaty Assured Operating Plan and Determination of Downstream Power Benefits for Operating Year 1998-99, dated October 1994, plus a copy of the Entities' Agreement, dated 5 April 1995;

- Columbia River Treaty Assured Operating Plan and Determination of Downstream Power Benefits for Operating Year 1999-2000, dated November 1994, plus a copy of the Entities' Agreement, dated 5 April 1995;

- Entity Agreement on the Resolution of AOP and DDPB Issues for the 1998/99, 1999/2000 and 2000/2001 Assured Operating Plan and Determination of Downstream Power Benefit Studies, dated 5 April 1995;

- Columbia River Treaty Entity Agreement on Operation of Treaty Storage for Non-power Uses for January 1 through July 31, 1995, dated 13 June 1995;

- Letter Agreement between Bonneville Power Administration and B.C. Hydro and Power Corporation, assigned BPA Contract Number 95MS-99004, Regarding Expected Storage and Release Transactions for the period 24 April through 31 August 1995, dated 3 May 1995;

- Letter Agreement between Bonneville Power Administration and B.C. Hydro and Power Corporation, assigned BPA Contract Number 95MS-99004, Regarding Expected Storage and Release Transactions for the period 8 July through 31 August 1995, dated 20 July 1995;

- Letter Agreement between Bonneville Power Administration and B.C. Hydro and Power Corporation Providing for the Storage and Return of Energy to Enable Optimal Balance of System Reservoirs Considering Trade-offs Between Power and Non-power Requirements for the period 15 July through 31 December 1995, dated 20 July 1995;

- Draft detailed agreements pursuant to the 8 September 1994 Memorandum of Negotiators' Agreement on the Delivery and Disposition of the Canadian Entitlement under the Columbia River Treaty (MONA) between the Administrator of the Bonneville Power Administration, Department of Energy, and the Division Engineer, North Pacific Division, Corps of Engineers, Department of Army and the Province of British Columbia and British Columbia Hydro and Power Authority, dated 8 March 1995; and,

- Draft Exchange of Notes between the Governments of Canada and the United States of America concerning the 8 March 1995 draft detailed agreements pursuant to MONA, dated 9 March 1995.

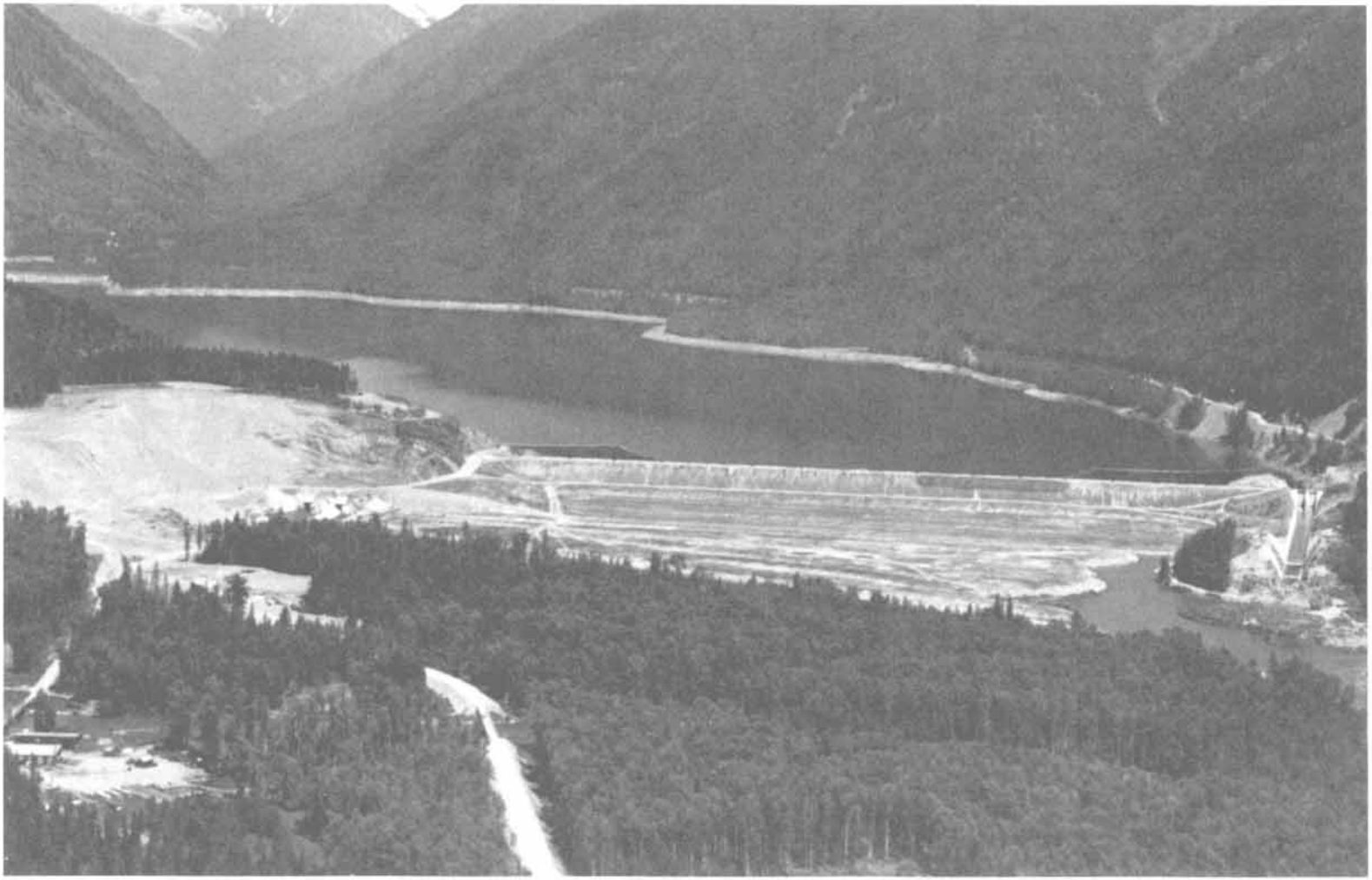
Subsequent to the end of this report year, the Board received the following from the Entities:

- Annual Report of the Columbia River Treaty, Canada and United States Entities for the period 1 October 1994 - 30 September 1995, dated November 1995; and,

- Detailed Operating Plan for Columbia River Treaty Storage, 1 August 1995 through 31 July 1996, dated august 1995, plus a copy of the Entities' Agreement dated 31 January 1996;

Report to Government

The thirtieth Annual Report of the Board was submitted to the governments of Canada and the United States of America on 28 February 1995.



Duncan Dam - Duncan River, British Columbia

The earth dam with discharge tunnels to the left and spillway to the right.

PROGRESS

General

The results achieved under the terms of the Treaty include construction of the Treaty projects, development of the hydrometeorological network, annual preparation of power and flood control operating plans, and the annual calculation of downstream power benefits. The three Treaty storage projects in British Columbia—the Duncan, Arrow and Mica projects—produce power and flood control benefits in Canada and the United States. The Libby storage project also provides power and flood control benefits in both countries. In the United States, increased flow regulation provided by Treaty projects facilitated the installation of additional generating capacity at existing plants on the Columbia River. In Canada, completion of the Canal Plant on the Kootenay River in 1976, installation of generators at Mica Dam in 1976-77, and the completion of the Revelstoke project in 1984 have caused power benefits to increase substantially. This amounts to some 4,000 megawatts of generation in Canada that may not have been installed without the Treaty. In addition, the installation of generating capacity at Hugh Keenleyside Dam and at the Murphy Creek Site near Trail, British Columbia is planned for the future.

The Treaty provides Canada with an option, which commenced in 1984, of diverting the Kootenay River at Canal Flats into the headwaters of the Columbia River. The British Columbia Hydro and Power Authority completed engineering feasibility and detailed environmental studies of the potential diversion. No further activities are planned at this time.

The locations of the above projects are shown on Plate 1 in Appendix D.

Status of the Treaty Projects

Duncan Project

Duncan Dam, the smallest Treaty project, was scheduled in the Sales Agreement for operation by 1 April 1968 and was the first of the Treaty projects to be completed. It became fully operational on 31 July 1967, well in advance of Treaty requirements.

The earthfill dam is about 130 feet high and extends 2,600 feet across the Duncan River valley, approximately six miles north of Kootenay Lake. The reservoir behind the dam extends for about 27 miles and provides 1,400,000 acre-feet of usable storage, which is committed under the Treaty. There are no power facilities included in this project.

The project is shown in the picture on page 12, and project data are provided in Table 1 of Appendix D.

Arrow Project

The Hugh Keenleyside Dam, at the outlet of the Arrow Lake, was the second Treaty project to be completed. It became operational on 10 October 1968, well ahead of the date of 1

April 1969 scheduled by the Sales Agreement. The project at present has no associated power facilities; however, installation of generators is planned for the future.

The dam consists of two main components: a concrete gravity structure which extends 1,200 feet from the north bank of the river and includes the spillway, low-level outlets, and navigation lock; and an earthfill section which rises 170 feet above the river bed and which extends 1,650 feet from the navigation lock to the south bank of the river. The reservoir, about 145 miles long, includes both the Upper and Lower Arrow Lakes, and provides 7,100,000 acre-feet of Treaty storage.

The project is shown in the picture on page 7, and project data are provided in Table 2 of Appendix D.

Mica Project

Mica Dam, the largest of the Treaty projects, was scheduled by the Sales Agreement for initial operation on 1 April 1973. The project was declared operational and commenced storing on 29 March 1973.

Mica Dam is located on the Columbia River about 85 miles north of Revelstoke, British Columbia. The earthfill dam rises more than 800 feet above its foundation and extends 2,600 feet across the Columbia River valley. It creates a reservoir 135 miles long, Kinbasket Lake, with a total storage capacity of 20,000,000 acre-feet. The project utilizes 12,000,000 acre-feet of live storage of which 7,000,000 acre-feet are committed under the Treaty.

Although not required by the Treaty, a powerhouse was added to the project by B.C. Hydro and Power Authority. The underground powerhouse has space for a total of six 434-megawatt units, with a total capacity of 2,604 megawatts. At present, four generators are in operation for a total of 1,736 megawatts.

The project is shown in the picture on page 19, and project data are provided in Table 3 of Appendix D.

Libby Project in the United States

Libby Dam is located on the Kootenai River, 17 miles northeast of the town of Libby, Montana. Construction began in the spring of 1966; storage has been fully operational since 17 April 1973. Commercial generation of power began on 24 August 1975, which coincided with the formal dedication of the project. The concrete gravity dam is 3,055 feet long, rises 370 feet above the river bed and creates Lake Koocanusa, which is 90 miles long and extends 42 miles into Canada. Lake Koocanusa has a gross storage of 5,869,000 acre-feet, of which 4,980,000 acre-feet are usable for flood control and power purposes. The Libby powerhouse, completed in 1976, has four units with a total installed capacity of 420 megawatts.

Construction of four additional units was initiated during fiscal year 1978, and the turbines have been installed. However, Congressional restrictions imposed in the 1982

Appropriations Act provide for completion of only one of these units. That unit became available for service late in 1987. The total installed capacity for the five units is 525 megawatts.

The Libby project is shown in the picture on page 2, and project data are provided in Table 4 of Appendix D.

Libby Project in Canada

Canada has fulfilled its obligation to prepare the land required for the 42-mile portion of Lake Koocanusa in Canada. British Columbia Hydro and Power Authority is now responsible for reservoir maintenance, debris clean-up and shoreline activities.

Hydrometeorological Network

One of the responsibilities assigned to the Entities by the Treaty is the establishment and operation, in consultation with the Permanent Engineering Board, of a hydrometeorological system to obtain data for detailed programming of flood control and power operation. This system includes snow courses, meteorological stations and stream flow gauges. The Columbia River Treaty Hydrometeorological Committee, formed by the Entities, makes recommendations on further development of the Treaty Hydrometeorological System.

In developing the hydrometeorological network, the Entities, with the concurrence of the Board, adopted a document in 1976 which defines the Columbia River Treaty Hydrometeorological System Network and sets forth a method of classifying facilities into those required as part of the Treaty System and those of value as Supporting Facilities. During the 1976-77 report year, the Entities, with the concurrence of the Board, adopted a plan for exchange of operational hydrometeorological data. That plan is still in force.

In the 1985-86 report year the Entities provided the Board with the report *Revised Hydrometeorological Committee Documents*, dated November 1985. The list of hydrometeorological facilities included in this document, which constitute the network, was updated by the Entities in 1987, 1989 and 1990.

Power Operating Plans and Calculation of Downstream Benefits

The Treaty and related documents require the Entities to agree annually on operating plans and on the resulting downstream power benefits for the sixth succeeding year of operation. These operating plans, prepared five years in advance, are called assured operating plans. They represent the basic commitment of the Canadian Entity to operate the Treaty storage in Canada (Duncan, Arrow and Mica) and provide the Entities with a basis for system planning. Canada's commitment to operate under an assured operating plan is tied directly to the benefits produced by that plan. At the beginning of each operating year, a detailed operating plan, which includes the three Treaty storage projects in Canada and the Treaty project in the United States (Libby), is prepared on the basis of current resources and loads to obtain results that may be more advantageous to both countries than those which would be obtained by operating in accordance with the assured operating plan.

Near the end of the 1987-88 report year, the Entities signed two agreements relating to changes in the principles and procedures used in preparing the assured operating plans and in calculating downstream power benefits. These agreements were based on Entity studies of the impact of several proposed changes to Treaty reservoir operating procedures and to the determination of downstream power benefits. The Entities' report, *Columbia River Treaty Principles and Procedures for Preparation and Use of Hydroelectric Operating Plans*, dated December 1991, provides guidelines for the preparation of the operating plans and incorporates the Entities' agreements.

The Entities' report, *Assured Operating Plan and Determination of Downstream Power Benefits for Operating Year 1994-95*, was submitted to the Board in 1990. The report established operating rule curves for the three Treaty storage reservoirs in Canada and calculated the downstream power benefits resulting from the operation of the reservoirs for the 1994-95 operating year.

During the report year, actual operations of the Treaty storage in Canada were regulated under the rule curves set out in the Entities' report, *Detailed Operating Plan for Columbia River Treaty Storage, 1 August 1994 through 31 July 1995*, and in associated Entities' agreements. The Entities submitted this report to the Board in September 1994. As in the previous detailed operating plan, firm energy shifting into the first year of the critical period, provisional draft operation for the U.S. Entity, and determination of the compensation to Canada for increased downstream benefits resulting from these operations were included in the detailed operating plan for 1994-95.

This detailed operating plan essentially implemented the assured operating plan for the same year, with the exception of Libby. During a portion of the year, the U.S. Entity (North Pacific Division, Army Corps of Engineers) modified the operation of the Libby project to comply with the U.S. Fish and Wildlife Service's (FWS) Biological Opinion on measures to protect and enhance the Kootenay River white sturgeon, a species listed under the *U.S. Endangered Species Act*. Those measures included changing the customary seasonal release rates from Libby Dam such that spring and summer flows would be higher, and fall and winter flows lower, than in the past. The Canadian Entity protested that this unilateral change is inconsistent with the Treaty.

At their meeting with the Board in February 1995, the Entities communicated their opinions about the nature and magnitude of impacts the modified Libby operation would have on the generation of hydropower and flood control at the project and in downstream waterways in the United States and Canada. During the meeting, the Board reached no firm conclusion regarding its role in this issue. The Board did agree that the co-chairmen should advise their respective governments regarding the potential impacts of the FWS' Biological Opinion on Libby operations, and express their views on the matter. Subsequent to this meeting, the co-chairmen advised their respective governments, and the two governments have since initiated discussions.

This issue has not been resolved, and the Entities have not been able to agree to an operating rule curve for the Libby project for the 1995-96 operating year. Notwithstanding the

protest of the Canadian Entity, the project continues to be operated according to the FWS' Biological Opinion. Having failed to reach agreement, the Entities included in their report dated August 1995, *Detailed Operating Plan for Columbia River Treaty Storage, 1 August 1995 through 31 July 1996*, two sets of operating rule curves for the project: one includes the flow regime specified in the FWS' Biological Opinion; the other reflects the earlier agreements between the Entities.

In the Board's 1994 Annual Report, it was noted that the U.S. Entity had not signed the *Assured Operating Plan and Determination of the Downstream Power Benefits for Operating Years 1998-99 and 1999-2000*, pending completion of consultations under the *U.S. Endangered Species Act* on fishery operations in the U.S. portion of the Columbia River Basin. At meetings in February and March 1995, the U.S. Entity briefed the Board about the status of the consultations. Subsequently, the U.S. Entity signed these two reports in April 1995, after the consultations were completed.

The Entities' reports on the determination of the downstream power benefits for 1998-99 and 1999-2000 present two capacity benefits resulting from the Entities' different interpretations of the critical stream flow period definition and the established operating procedures for the U.S. base hydro system. As noted in the Board's Annual Report for 1994, the Board is concerned that having two calculations of downstream power benefits is inconsistent with the Treaty. At the time the Entities agreed to these reports, it appeared that any problems resulting from two calculations of the downstream power benefits would be rendered moot with the completion of detailed agreements pursuant to the September 1994 Memorandum of Negotiators Agreement (MONA).

As reported in the previous section, **Activities of the Board**, the MONA was cancelled in May 1995, and the Board established a process beginning in September 1995 to assist the Entities in resolving several areas of disagreement that, without the MONA, would affect operations under the Treaty. It was also noted in this section that the Board reached unanimous agreement on recommendations to the Entities regarding the appropriate definition and application of the two issues affecting the calculation of the downstream power benefits — that is, the critical stream flow period and the established operating procedures for the U.S. base hydro system (Appendix F).

At its meeting with the Entities on 8 November 1995, the Board sought the Entities' views on how to implement its recommendations for the signed reports, *Assured Operating Plan and Determination of the Downstream Power Benefits for Operating Years 1998-99 and 1999-2000*. The U.S. Entity requested more time to analyse the Board's recommendations. As a result, the Board and the Entities agreed to defer a decision on this matter.

If implemented, the Board's recommendations would result in one calculation of the downstream power benefits. This would allow the *Assured Operating Plan and Determination of Downstream Power Benefits* reports for the operating years 1998-99 and 1999-2000 to be brought into compliance with the Treaty.

With regard to the *Assured Operating Plan and Determination of the Downstream Power Benefits* for the operating year 2000-01, the Entities have not yet submitted the report to the Board, as required under the Treaty, for two reasons. First, the U.S. Entity is still analysing the Board's recommendations relative to the critical stream flow period definition and established operating procedures for the U.S. base hydro system. Second, the question of the coordination of the Libby project, in light of the FWS' Biological Opinion, needs to be resolved by the governments.

Flood Control Operating Plans

The Treaty provides that Canadian storage reservoirs will be operated by the Canadian Entity in accordance with operating plans designed to minimize flood damage in the United States and Canada. The *Columbia River Treaty Flood Control Operating Plan* defines flood control operation of the Duncan, Arrow, Mica and Libby reservoirs. This plan was received from the Entities and reviewed by the Board in the 1972-73 report year and is still in effect.

Flow Records

Article XV(2)(a) of the Treaty specifies that the Permanent Engineering Board shall assemble records of flows of the Columbia and Kootenay rivers at the Canada-United States of America boundary. Flows for this report year are tabulated in Appendix C for the Kootenai River at Porthill, Idaho and for the Columbia River at Birchbank, British Columbia.

Non-Treaty Storage

Since 1984 there have also been agreements between the B.C. Hydro and Power Authority and the Bonneville Power Administration concerning non-Treaty storage. These agreements have not interfered with operations under the Treaty; rather, they extend the concepts of the Treaty and are expected to benefit both the B.C. Hydro and Power Authority and the Bonneville Power Administration.

Operations for Fish

The Northwest Power Planning Council was established by an Act of Congress in 1980 to prepare, among other things, a program for improvement of fish and wildlife in the Columbia River basin in the United States. This effort has continued to evolve and has included the Water Budget and Flow Augmentation programs. In this regard, the Board notes that the assured operating plans and the determination of downstream power benefits are to provide for optimum operation for power and flood control in accordance with the requirements of the Treaty. The Board has also noted, however, that the Entities may agree to provide water for fish migration under detailed operating arrangements providing this does not conflict with Treaty requirements.

Mica Dam - Columbia River, British Columbia
The earth dam showing the spillway at the right. The underground powerhouse is at the left.

OPERATION

General

The Columbia River Treaty Operating Committee was established by the Entities to develop operating plans for the Treaty storage and to direct operation of these storage in accordance with the terms of the Treaty and subsequent Entity agreements.

During the report year the Treaty storage in Canada was operated by the Canadian Entity in accordance with the following:

- Columbia River Treaty Flood Control Operating Plan;
- Detailed Operating Plan for Columbia River Treaty Storage, 1 August 1994 through 31 July 1995;
- Detailed Operating Plan for Columbia River Treaty Storage, 1 August 1995 through 31 July 1996; dated August 1995;
- Columbia River Treaty Hydroelectric Operating Plan, Assured Operating Plan for Operating Year 1994-95;
- Columbia River Treaty Hydroelectric Operating Plan, Assured Operating Plan for Operating Year 1995-96; and,
- Columbia River Treaty Principles and Procedures for Preparation and Use of Hydroelectric Operating Plans, December 1991.

In addition the following agreements were in effect during this period:

- An agreement between British Columbia Hydro and Power Authority and Bonneville Power Administration dated 9 April 1984 relating to the following:
  - Agreement between British Columbia Hydro and Power Authority and Bonneville Power Administration Relating to (a) Initial Filling on non-Treaty Reservoirs, (b) The Use of Columbia River non-Treaty Storage and (c) Mica and Arrow Reservoir Refill Enhancement;
  - Contract between Bonneville Power Administration and Mid-Columbia Purchasers Relating to Federal and Canadian Columbia River Storage;
  - Agreement executed by the United States of America Department of Energy acting by and through the Bonneville Power Administration and British Columbia Hydro and Power Authority relating to: (1) Use of Columbia River non-Treaty Storage, (2) Mica and Arrow Refill

Enhancement and (3) Initial Filling of non-Treaty Reservoirs, signed 9 July 1990;

- Columbia River Treaty Entity Agreement on Principles for the Preparation of the Assured Operating Plan and Determination of Downstream Power Benefits, July 1988;

- Columbia River Treaty Entity Agreement on Changes to Procedures for the Preparation of the Assured Operating Plan and Determination of Downstream Power Benefit Studies, August 1988;

- Columbia River Treaty Entity Agreement on Aspects of the Canadian Entitlement Return for April 1, 1998 through March 31, 2003, dated 28 July 1992;

- Columbia River Treaty Entity Agreement on Operation of Treaty Storage for Non-power Uses for January 1 through July 31, 1995, dated 13 June 1995;

- Letter Agreement of May 3, 1995, assigned BPA Contract Number 95MS-99004, between B.C. Hydro and Power Authority and Bonneville Power Administration, regarding storage and releases of non-Treaty storage in Canadian reservoirs during the period 24 April through 31 August 1995;

- Letter Agreement of July 20, 1995, assigned BPA Contract Number 95MS-99049, between B.C. Hydro and Power Authority and Bonneville Power Administration, regarding storage and releases of non-Treaty storage in Canadian reservoirs during the period 8 July through 31 August 1995; and,

- Letter Agreement of July 20, 1995, between B.C. Hydro and Power Authority and Bonneville Power Administration, regarding storage and return of energy to enable optimal balancing of system reservoirs considering power and non-power trade-offs during the period 15 July through 31 December 1995.

Power Operation

The three Treaty reservoirs — Duncan, Arrow and Mica — and Libby reservoir in the United States, were in full operation throughout the report year.

The summer of 1994, preceding the beginning of the report year, saw the coordinated Columbia River reservoir system filled to 74.7 percent of storage capacity. By the start of the report year, depletion of the reservoirs had begun, and the system was operating in proportional draft mode — a conservation mode — on its third-year firm energy load carrying capability; that

is, it operated as if it were in the third year of a drought period. The system remained in proportional draft mode until March 1995.

During the spring and summer of 1995, reservoir operations were controlled not only by power requirements, but also by environmental considerations to ensure adequate flows to meet fishery needs in both Canada and the United States. At Libby Dam, operations mandated by the requirements of the *U.S. Endangered Species Act* were implemented by the U.S. Army Corps of Engineers without the agreement of the Canadian Entity. The Canadian government entered into discussions with the U.S. government to resolve this issue. Normal operations at other Treaty reservoirs as formulated in the original Detailed Operating Plan, were modified through Entity agreements, and the use of non-Treaty storage was modified by corporate agreements, so as to minimize interference between fishery requirements and power operations.

During the 1995 freshet, the coordinated Columbia River system largely recovered from the low flow conditions of the previous years. The system reached 89 percent of its storage capacity by the end of July, and Treaty storage was full, allowing normal first year load carrying capability to be adopted for the 1995-96 operating year.

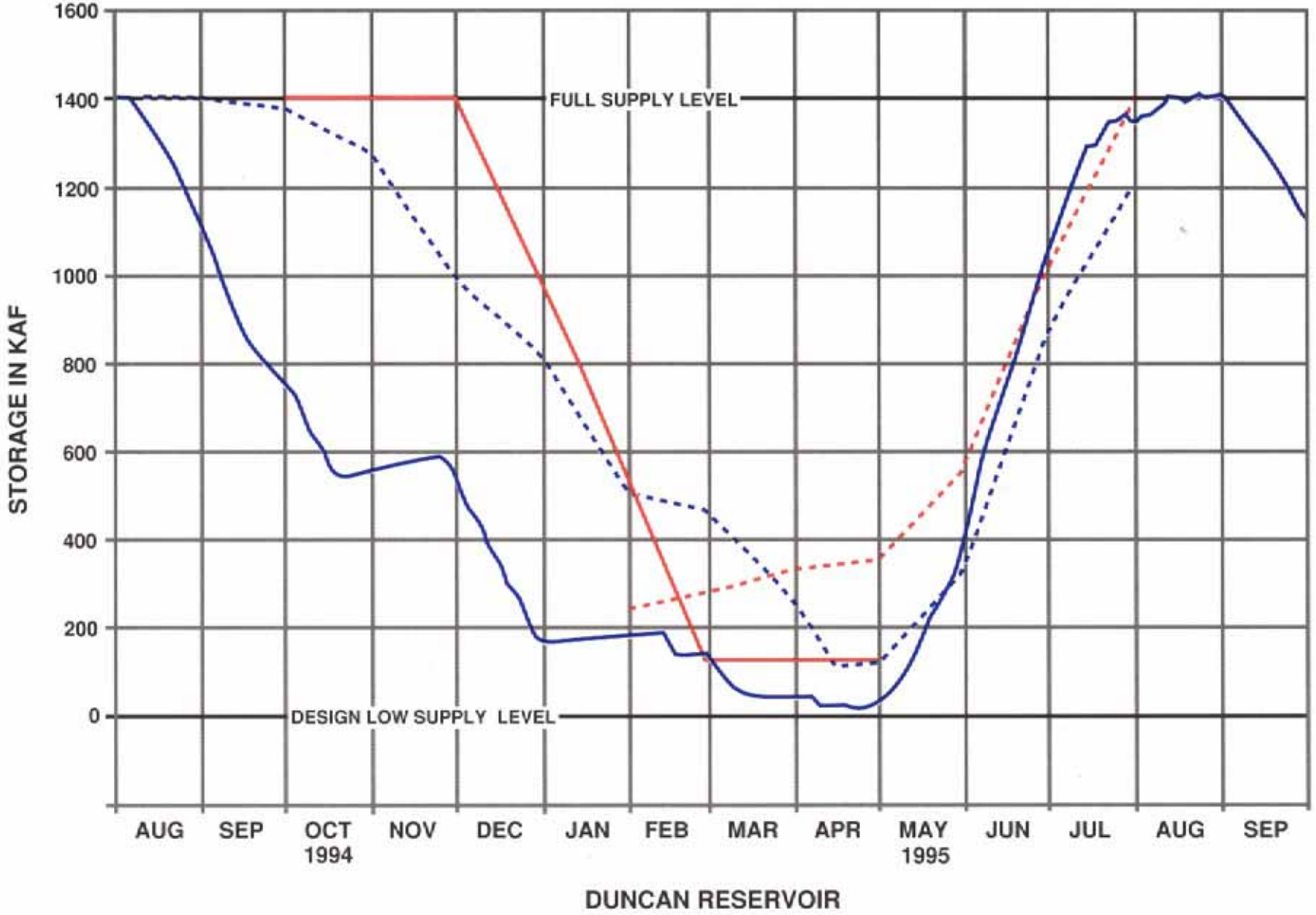
Mica reservoir began the report year at elevation 2,430.1 feet, about 45 feet below its full level, after having reached a peak of 2,437.9 feet in August 1994. Although, during the 1994 refill, the total storage in the reservoir reached only about two-thirds of the available 12 million acre-feet, the portion allocated to Treaty use reached 91 percent full at the end of August 1994.

Throughout the fall of 1994, Treaty storage in Mica reservoir was steadily drafted for power purposes. Although releases were reduced during the first two months of 1995, the Treaty storage in Mica was empty by the end of February. The reservoir continued to draft throughout March and April for both Treaty and non-Treaty uses, and reached its lowest level for the year, 2,374.8 feet, on 2 May 1995. The Treaty storage in Mica reservoir at that time was overdrawn by one million acre-feet. During the freshet the reservoir refilled to 2,470.7 feet, 4.3 feet below full, and Treaty storage filled completely by 13 September. On September 30, the reservoir was at elevation 2469.6 feet.

Arrow reservoir began the report year at elevation 1,421.0 feet, 23.0 feet below full, after a summer in which the reservoir did not fill. Reservoir releases at rates between 25 to 56 thousand cubic feet per second (kcfs) occurred throughout the fall and winter, and the reservoir reached its lowest level of the year, 1,386.6 feet, on 30 March. Note that through most of February and March outflows were augmented from B.C. Hydro non-Treaty storage to maintain a minimum flow of 25 kcfs, as required by Canadian federal fisheries regulations. Then during April, discharges were reduced under the terms of an agreement that allowed the transfer of storage between Arrow and Grand Coulee reservoirs, to aid in successful hatching of trout redds downstream of Arrow Dam.

With the spring freshet beginning in May, discharges could be reduced without damaging the trout redds because of water backing up to Arrow Dam from higher flows on the Kootenay River. Arrow reservoir refilled to elevation 1,442.8 feet, 99 percent of full Treaty storage, on

11 July. Storage withdrawals then began again, and under an Entity agreement for Libby-Arrow storage transfer, extra water was released during July and early August to compensate for extra storage at Libby reservoir, so as to reduce spilling at Kootenay River power plants in Canada while maintaining U.S. fishery requirements on the downstream Columbia River. Drafting continued through September, and by 30 September the reservoir was at elevation 1,429.0 feet, 15.0 feet below full.



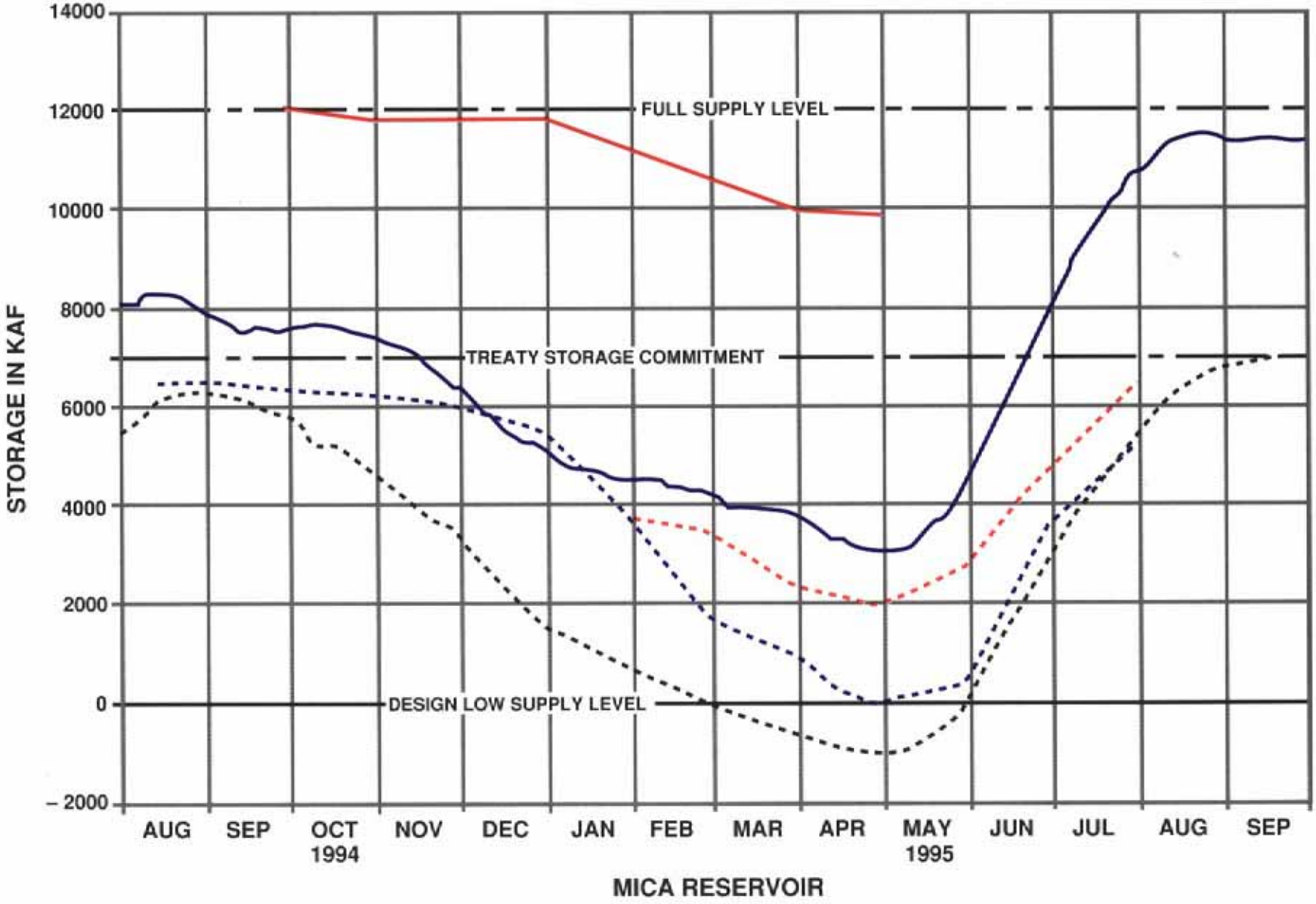
DUNCAN RESERVOIR

STORAGE

CRITICAL RULE CURVE

VARIABLE REFILL CURVE

FLOOD CONTROL RULE CURVE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STORAGE IN KAF
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DEC
JAN
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MAY
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JUN
JUL
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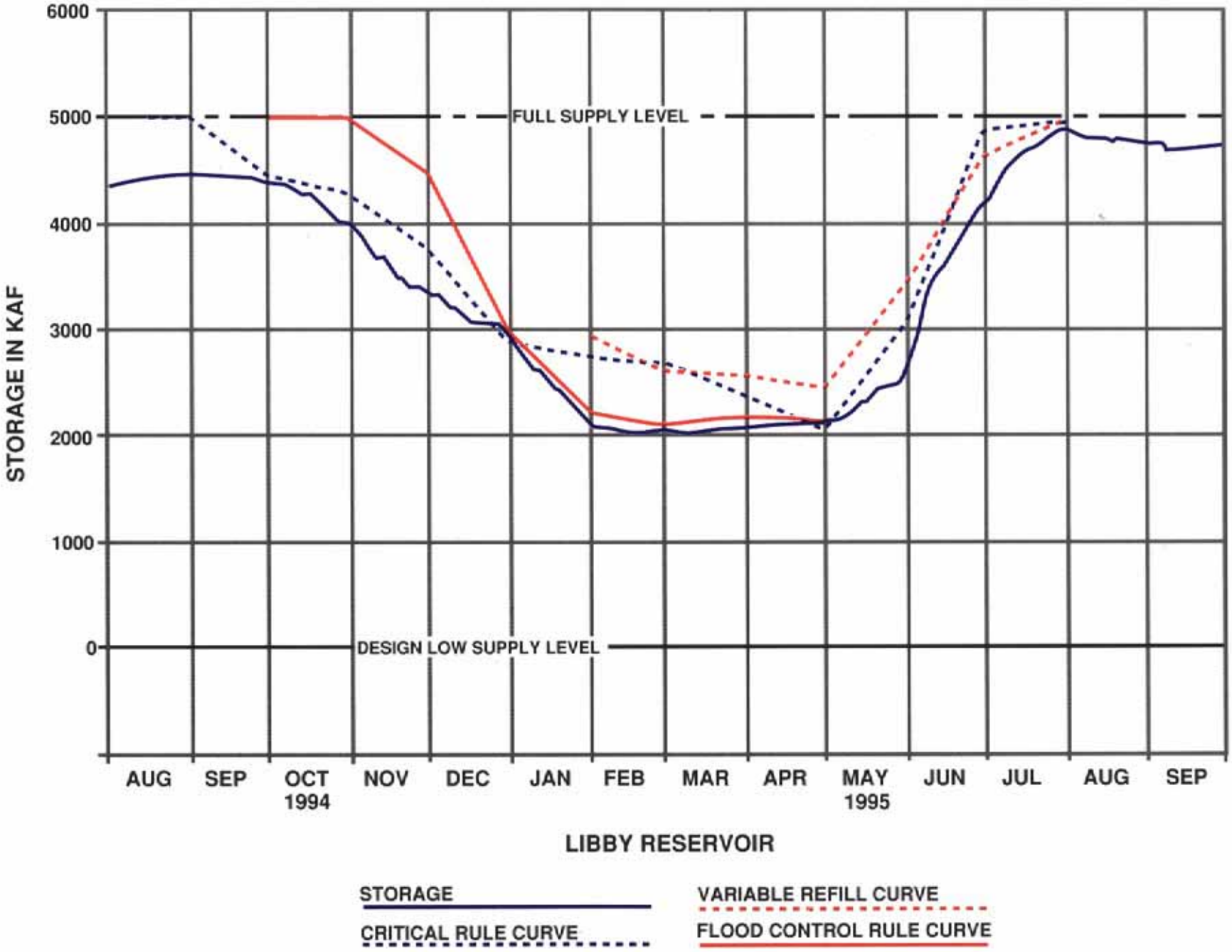
MICA RESERVOIR
STORAGE
TREATY STORAGE
CRITICAL RULE CURVE
VARIABLE REFILL CURVE
FLOOD CONTROL RULE CURVE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STORAGE IN KAF
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DESIGN LOW SUPPLY LEVEL
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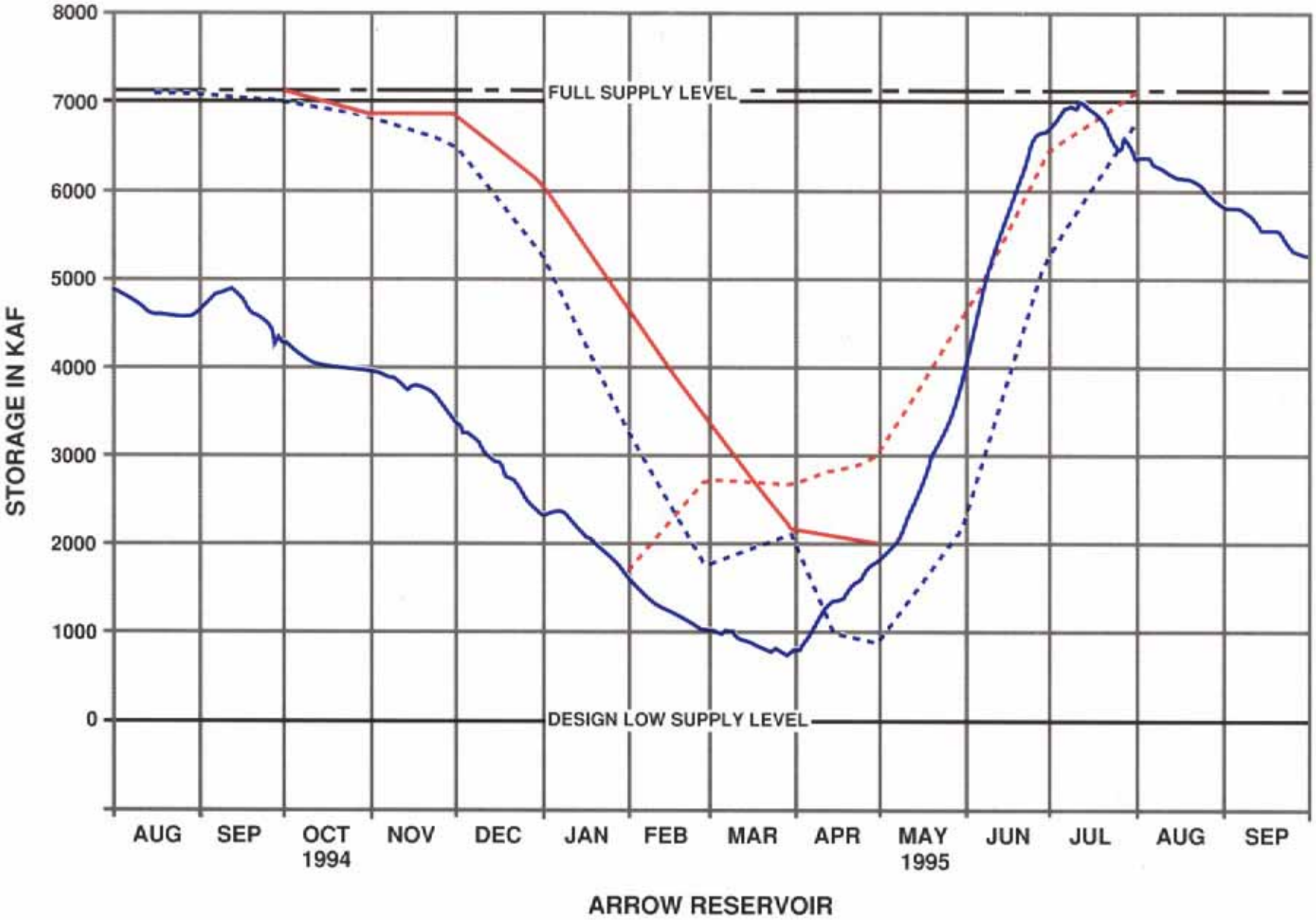
LIBBY RESERVOIR
STORAGE
CRITICAL RULE CURVE
VARIABLE REFILL CURVE
FLOOD CONTROL RULE CURVE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FULL SUPPLY LEVEL
DESIGN LOW SUPPLY LEVEL
STORAGE IN KAF
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ARROW RESERVOIR
STORAGE
CRITICAL RULE CURVE
VARIABLE REFILL CURVE
FLOOD CONTROL RULE CURVE

Duncan reservoir began the report year at 1,852.6 feet elevation, 39.4 feet below full, after having come within one-half foot of full in the summer of 1994. Throughout October and December, water was withdrawn from Duncan reservoir to support Kootenay Lake levels, while in November discharges were held to minimum. By 31 December, Duncan reservoir was only 11 percent full. Discharges were reduced to minimum during January; then the remaining storage was drafted during February through April.

Refill began on 29 April when discharges were reduced to the specified minimum of 100 cfs. Minimum discharges continued until 14 July when discharges were increased to slow the rate of refill. By 29 August, the reservoir had completely refilled. On 2 September 1995, drafting began, and by the end of the report year Duncan reservoir was at elevation 1,875.8 feet, 16.2 feet below full.

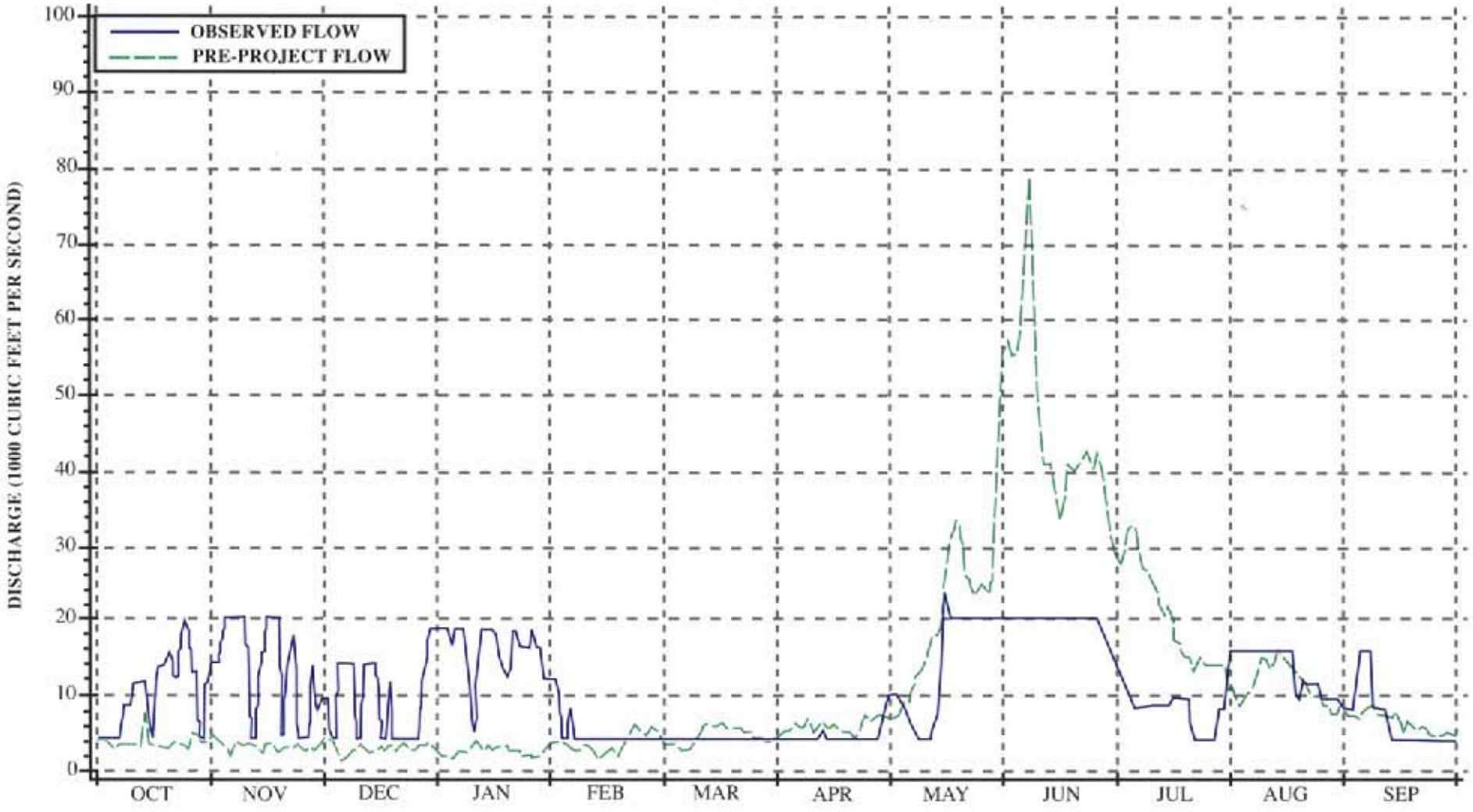
Lake Koocanusa, the Libby reservoir, did not completely refill during the summer of 1994, and the reservoir began the report year at elevation 2,445.5 feet, 13.5 feet below full. Throughout the fall and early winter, Libby was operated to meet power requirements and to bring the reservoir down to its required flood-control level by the end of January. During February through April, outflows were limited to the specified minimum of 4,000 cfs. The minimum level for the year occurred on 18 February at 2,380.8 feet, 93.8 feet above empty.

Through May and June, releases were determined by the U.S. Fish and Wildlife Service's Biological Opinion, to protect and enhance white sturgeon spawning downstream from Libby. Then in July the water budget for salmon migration in the lower Columbia River controlled releases from Libby. However, an Entity agreement for transfer of stored water between Libby and Arrow reservoirs allowed reduced releases to prevent spill in the lower Kootenay River power plants in Canada. This resulted in an additional 8.5 feet of storage in Lake Koocanusa, and the peak level for the year, 2,456.8 feet, 2.2 feet below full, was reached on 30 July.

Late August and early September saw Libby releasing inflow only. On 14 September releases were reduced to minimum to allow fisheries studies and to aid in construction work downstream on the river. On 30 September 1995, the reservoir was at elevation 2,453.8 feet, 5.2 feet below full.

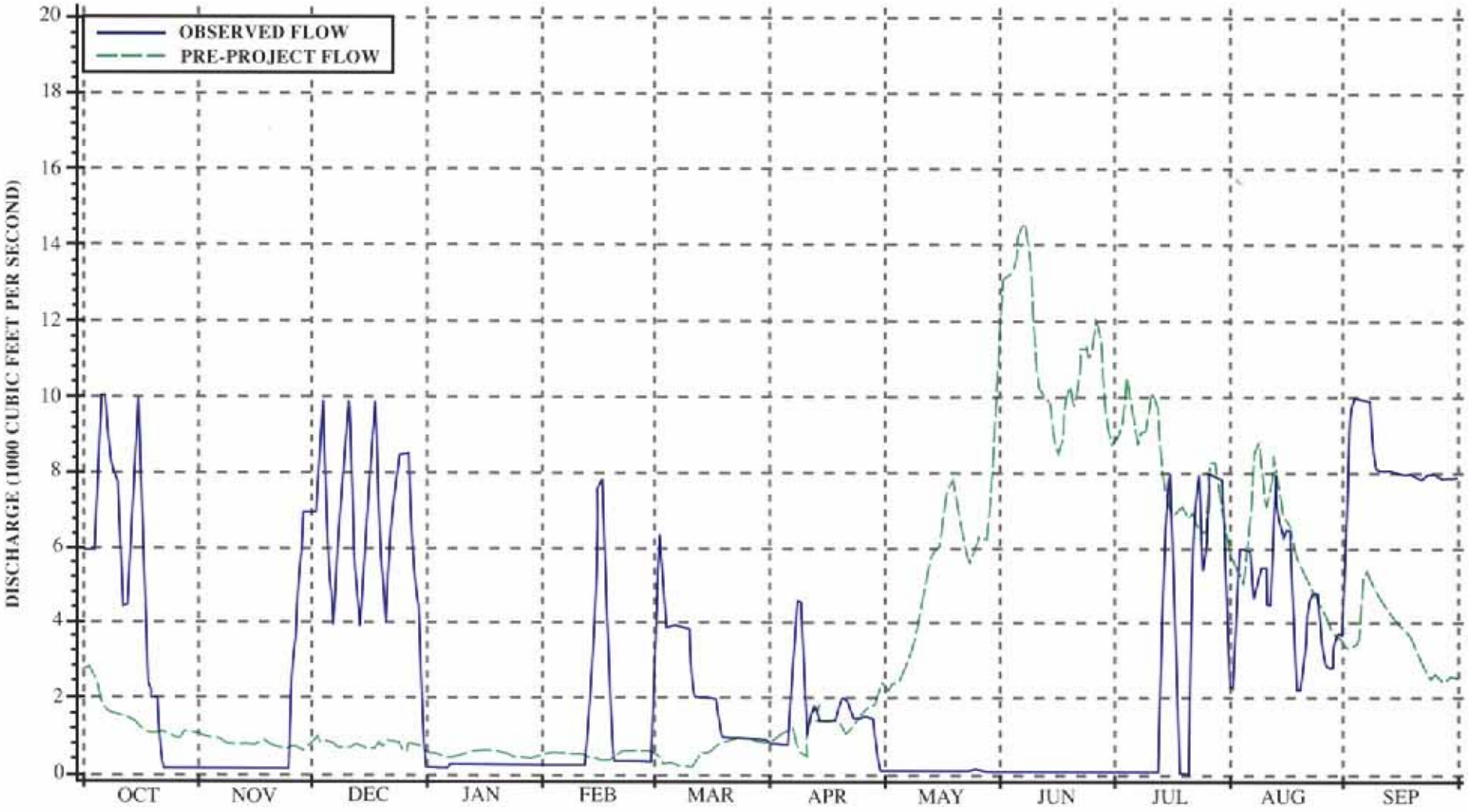
Flood Control Operation

During the 1995 freshet, flood control was provided by normal refill of Treaty projects and other storage reservoirs in the Columbia River basin. Daily operation of reservoirs was not required. The freshet was controlled to well below damaging levels.



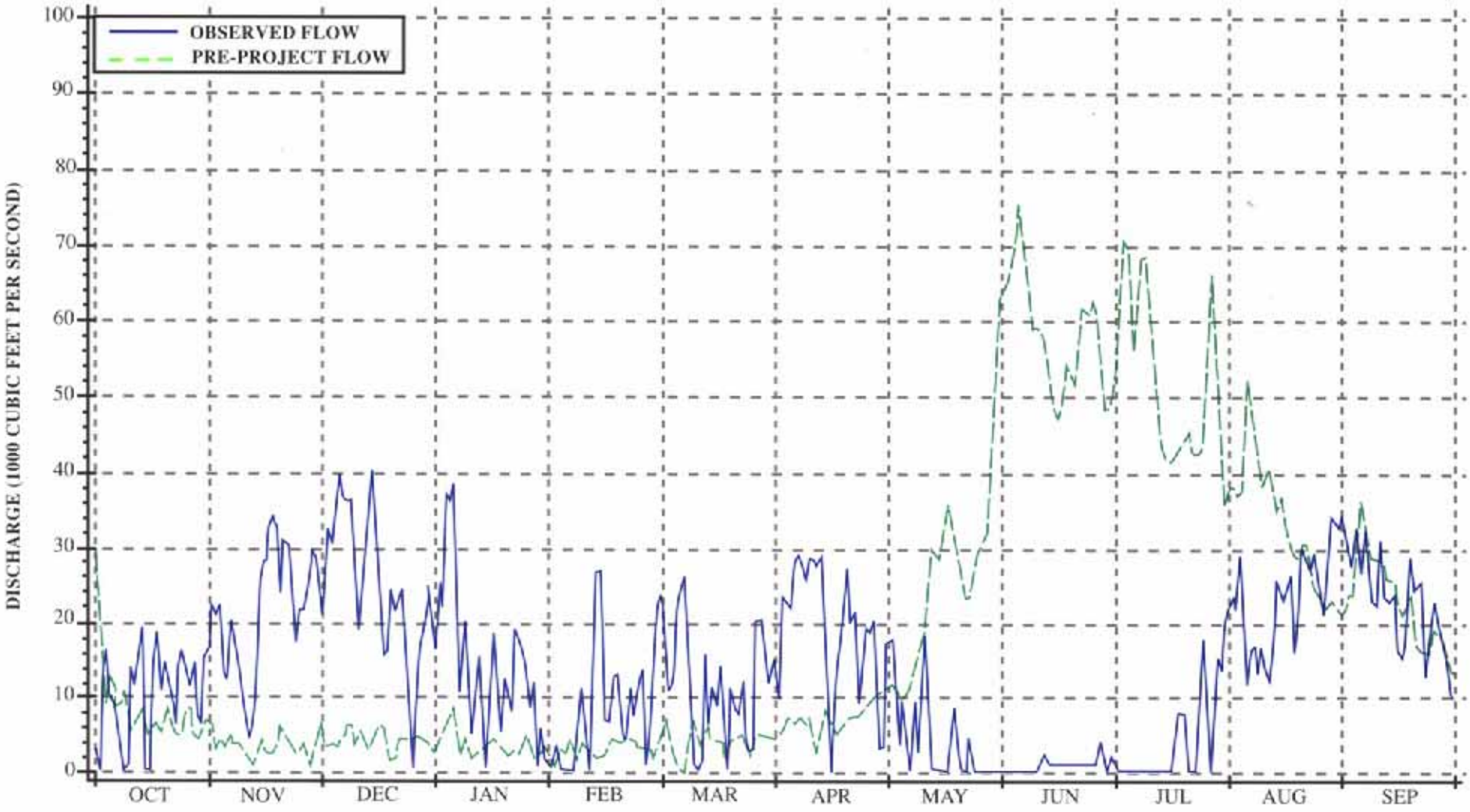
KOOTENAI RIVER AT LIBBY DAM

HYDROGRAPHS: OBSERVED AND PRE-PROJECT FLOWS FOR THE YEAR ENDING 30 SEPTEMBER 1995



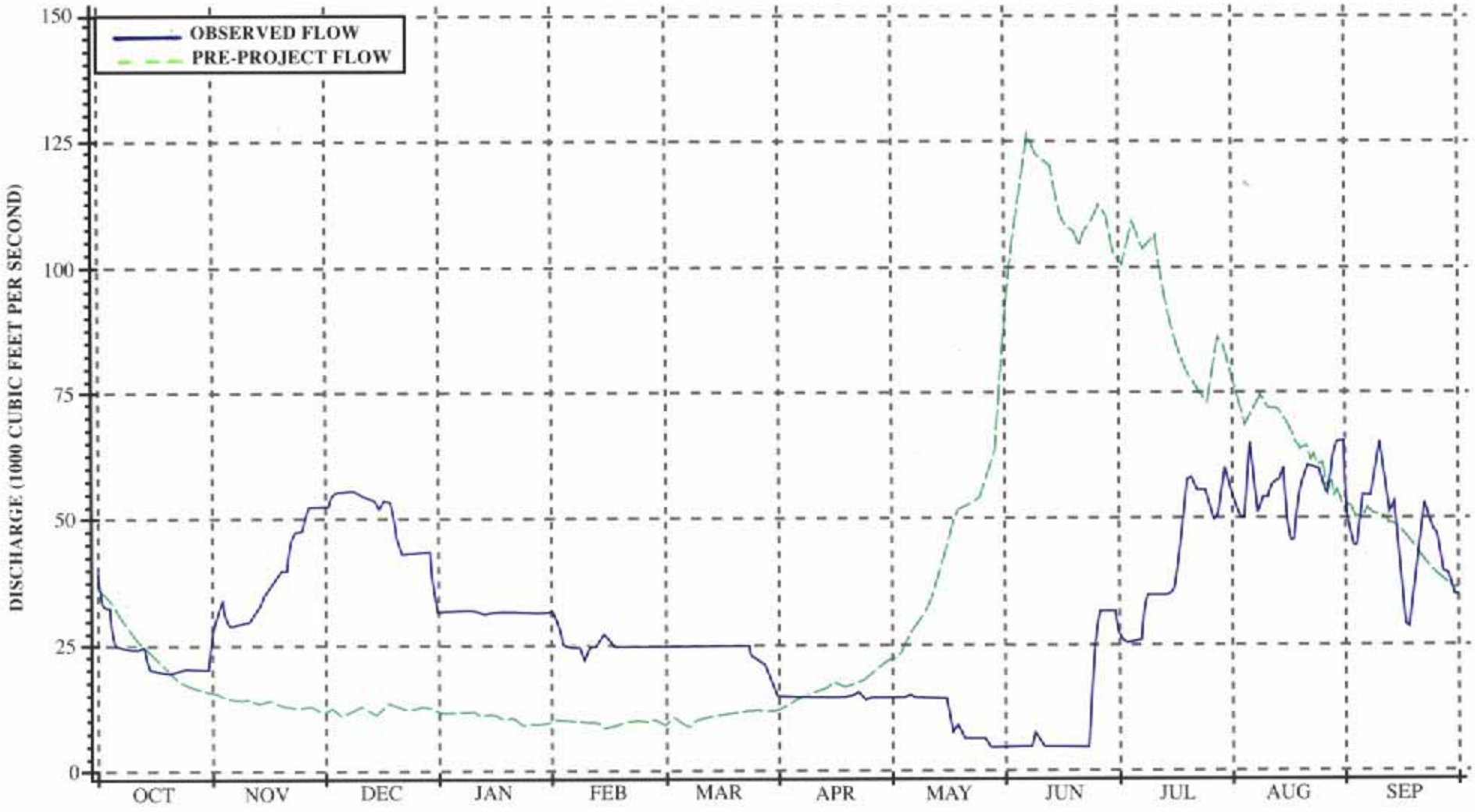
DUNCAN RIVER AT DUNCAN DAM

HYDROGRAPHS: OBSERVED AND PRE-PROJECT FLOWS FOR THE YEAR ENDING 30 SEPTEMBER 1995



COLUMBIA RIVER AT MICA DAM

HYDROGRAPHS: OBSERVED AND PRE-PROJECT FLOWS FOR THE YEAR ENDING 30 SEPTEMBER 1995



COLUMBIA RIVER AT KEENLEYSIDE DAM

HYDROGRAPHS: OBSERVED AND PRE-PROJECT FLOWS FOR THE YEAR ENDING 30 SEPTEMBER 1995

COLUMBIA RIVER AT BIRCHBANK

HYDROGRAPHS: OBSERVED AND PRE-PROJECT FLOWS FOR THE YEAR ENDING 30 SEPTEMBER 1995

BENEFITS

Flood Control Provided

Without regulation by upstream reservoirs, the 1995 freshet would have produced below average freshet levels at Trail, British Columbia and at The Dalles, Oregon, and would not have caused significant flood damage in the United States.

It is estimated that the Duncan and Libby projects reduced the peak stage on Kootenay Lake by about 4.7 feet, and that the Duncan, Arrow, Mica and Libby projects reduced the peak stage of the Columbia River at Trail, British Columbia by about 12.7 feet. The effect of storage in the Duncan, Arrow, Mica and Libby reservoirs on flows at the sites, and on flows of the Columbia River at Birchbank, is illustrated on pages 32-36 by hydrographs which show both the actual discharges and the flows that would have occurred if the dams had not been built. It is noted that the hydrograph showing pre-project conditions for Birchbank has been computed on the assumption that the effects of Duncan, Arrow, Mica and Libby regulation, and of the regulation provided by the Corra Linn development on Kootenay Lake, have been removed.

The operation of Columbia Basin reservoirs for the system as a whole reduced the natural annual peak discharge of the Columbia River near The Dalles, Oregon, from about 552,000 cfs to 296,000 cfs.

All payments required by Article VI(1) of the Treaty as compensation for flood control provided by the Canadian Treaty storage has been made by the United States to Canada; the final payment were made on 29 March 1973 when the Mica project was declared operational.

Power Benefits

Downstream power benefits in the United States, which arise from operation of the Canadian Treaty storage, were pre-determined for the first thirty years of operation of each project, and the Canadian share was sold in the United States under the terms of the Canadian Entitlement Purchase Agreement. The United States Entity delivers capacity and energy to Columbia Storage Power Exchange participants, the purchasers of the Canadian entitlement. The benefits of additional generation made possible on the Kootenay River in Canada as a result of regulation provided by Libby, as well as generation at the Mica and Revelstoke projects, are retained by Canada. The benefits from Libby regulation, which occur downstream in the United States, are not shared under the Treaty.

During the operating year, 1 August 1994 through 31 July 1995, the downstream power benefits accruing to each country from the Treaty storage were determined, according to the procedures set out in the Treaty and Protocol, to be 547 megawatts of average annual energy and 1,242 megawatts of capacity.

The Canadian Entitlement Purchase Agreement expires in stages over the period 1998 to 2003. The portion of Canada's share of downstream power benefits attributable to each of the Treaty projects is the ratio of each project's storage to the whole of the Canadian Treaty storage.

The table below summarizes Canada's share of the downstream power benefits returnable from each project:

Treaty Storage	Date Returnable	Share of Canadian Entitlement (%)
Duncan	1 April 1998	9.0
Arrow	1 April 1999	45.8
Mica	1 April 2003	45.2

After 1 April 2003, Canada's share of downstream benefits is fully returnable.

Other Benefits

By agreement between the Entities, stream flows are regulated for non-power purposes such as accommodating construction in river channels and providing water to assist the downstream migration of juvenile fish in the United States. These arrangements are implemented under the Detailed Operating Plan and provide mutual benefits.

CONCLUSIONS

1. The downstream power benefits to each country were 547 megawatts of average annual energy and 1242 megawatts of capacity for the report year.

2. The Duncan, Arrow and Mica projects were operated in conformity with the Treaty during the 1994-1995 operating year. The operation reflected detailed operating plans developed by the Entities, the flood control operating plan for Treaty reservoirs, and other agreements between the Entities.

3. During the report year, the U.S. Entity (North Pacific Division, Army Corps of Engineers) modified the operation of the Libby project to comply with the U.S. Fish and Wildlife Service's (FWS) Biological Opinion, which sets a flow regime to protect and enhance the Kootenay River white sturgeon. The Canadian Entity protested that this unilateral change is inconsistent with the Treaty. The two governments have initiated discussions to resolve the issue.

4. Subsequent to the end of this report year, the Entities prepared the *Detailed Operating Plan for Columbia River Treaty Storage* for the 1995-96 operating year. Two sets of operating rule curves for the Libby Dam are included in the report: one includes the flow regime specified in the FWS' Biological Opinion; the other reflects the earlier agreements between the Entities.

5. The Entities continued to operate the hydrometeorological network as required by the Treaty.

6. The Board offered to mediate the three transmission issues — the alternative delivery points, the backup service for delivery to Oliver, and east-west standby transmission— if requested by the Entities and the governments.

7. The U.S. Entity is analysing the Board's recommendations concerning the appropriate application of the critical streamflow period definition and the established operating procedures for the U.S. base hydro system in determining the capacity benefits. If accepted and implemented by the Entities, these recommendations would result in one calculation of the downstream power benefit. This would allow the *Assured Operating Plan and Determination of Downstream Power Benefits* reports for the operating years 1998-99 and 1999-2000 to be brought into compliance with the Treaty.

8. The Entities were unable to agree on the *Assured Operating Plan and Determination of Downstream Power Benefits for Operating Year 2000-01*. As a result, the report has not been received by the Board in conformance with the requirements of the Treaty.

9. **Based on the previous two conclusions, the requirements of the Treaty were not fully met during the report year.**

APPENDIX A

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

United States	Canada
Members	
Mr. John Elmore, Chairman Kansas City, Missouri	Mr. David Oulton, Chairman Assistant Deputy Minister Energy Sector Department of Natural Resources Ottawa, Ontario
Mr. Ronald Wilkerson Missoula, Montana	Mr. John Allan Deputy Minister Environmental Assessment Victoria, B.C.
Alternates	
Mr. Daniel Burns [1] Chief, Operation, Construction and Readiness Division Directorate of Civil Works H.Q., U.S. Army Corps of Engineers Washington, D.C.	Mr. David Burpee Director, Renewable and Electrical Energy Division Energy Sector Department of Natural Resources Ottawa, Ontario
Mr. Thomas Weaver Lakewood, Colorado	Dr. Donald Kasianchuk Comptroller of Water Rights Ministry of Environment, Lands & Parks Victoria, B.C.
Secretaries	
Mr. Richard DiBuono [2] Hydraulics and Hydrology Branch Directorate of Civil Works H.Q., U.S. Army Corps of Engineers Washington, D.C.	Mr. David Burpee Director, Renewable and Electrical Energy Division Energy Sector Department of Natural Resources Ottawa, Ontario

[1] Vice Mr. Paul Barber as of 31 March 1995.
[2] Vice Mr. Shapur Zanganeh as of 9 August 1995.

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

Record of Membership

Members

United States		Canada	
Mr. Wendell Johnson[1]	1964-1970	Mr. Gordon McNabb[1]	1964-1991
Mr. Morgan Dubrow	1964-1970	Mr. Arthur Paget	1964-1973
Mr. John Neuberger	1970-1973	Mr. Valter Raudsepp	1973-1974
Mr. Joseph Caldwell[1]	1971-1973	Mr. Ben Marr	1974-1987
Mr. Homer Willis[1]	1973-1979	Mr. Tom Johnson	1987-1988
Mr. King Mallory	1973-1975	Mr. Douglas Horswill	1989-1991
Mr. Raymond Peck, Jr.	1976-1977	Mr. John Allan	1991-
Mr. Emerson Harper	1978-1988	Mr. David Oulton[1]	1991-
Mr. Lloyd Duscha[1]	1979-1990		
Mr. Ronald Wilkerson	1988-		
Mr. Herbert Kennon[1]	1990-1994		
Mr. John Elmore[1]	1994-		

Alternates

Mr. Fred Thrall	1964-1974	Mr. Mac Clark	1964-1992
Mr. Emerson Harper	1964-1978	Mr. Jim Rothwell	1964-1965
Mr. Alex Shwaiko	1974-1987	Mr. Hugh Hunt	1966-1988
Mr. Herbert Kennon	1987-1990	Dr. Donald Kasianchuk	1988-
Mr. Thomas Weaver	1979-	Mr. Vic Niemela	1992-1994
Mr. John Elmore	1990-1994	Mr. David Burpee	1994-
Mr. Paul Barber	1994-1995		
Mr. Daniel Burns[2]	1995-		

Secretaries

Mr. John Roche	1965-1969	Mr. Mac Clark	1964-1992
Mr. Verle Farrow	1969-1972	Mr. David Burpee	1992-
Mr. Walter Duncan	1972-1978		
Mr. Shapur Zanganeh	1978-1995		
Mr. Richard DiBuono[3]	1995-		

[1] Chairman
[2] Vice Mr. Paul Barber as of 31 March 1995.
[3] Vice Mr. Shapur Zanganeh as of 9 August 1995.

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

ENGINEERING COMMITTEE

Current Membership

United States	Canada
Members	
Mr. Richard DiBuono, Chairman Hydraulic and Hydrology Branch Directorate of Civil Works H.Q., U.S. Army Corps of Engineers Washington, D.C.	Mr. Neill Lyons, Chairman Environmental Conservation Branch Environment Canada North Vancouver, B.C.
Mr. Gary Fuqua Sales and Customer Service Bonneville Power Administration Portland, Oregon	Mr. David Burpee Director, Renewable and Electrical Energy Division Department of Natural Resources Ottawa, Ontario
Mr. Earl Eiker Hydraulics and Hydrology Branch Directorate of Civil Works H.Q., U.S. Army Corps of Engineers Washington, D.C.	Mr. Roger McLaughlin Energy Resources Division Ministry of Energy, Mines and Petroleum Resources Victoria, B.C.
	Dr. Bala Balachandran Power and Special Projects Ministry of Environment, Lands & Parks Victoria, B.C.
Alternates	
Mr. Richard Mittelstadt Water Management Division U.S. Army Corps of Engineers North Pacific Division Portland, Oregon	Mr. Bruno Gobeil Renewable and Electrical Energy Division Department of Natural Resources Ottawa, Ontario
Mr. Steve Wright Bonneville Power Administration Department of Energy Washington, D.C.	

APPENDIX B

COLUMBIA RIVER TREATY ENTITIES

United States

Canada

Members

Mr. Randall Hardy, Chairman
Administrator, Bonneville Power Administration
Department of Energy
Portland, Oregon

Mr. John Laxton, Chairman
Chair, British Columbia Hydro and Power Authority
Vancouver, British Columbia

Major General Russel Fuhrman[1]
Division Engineer
U.S. Army Engineer Division, North Pacific
Portland, Oregon

[1] Vice Major General Ernest Harrell as of 19 July 1995.

APPENDIX C

RECORD OF FLOWS

AT THE

INTERNATIONAL BOUNDARY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58.4	41.6	70.5	50.3	53.5	43.3	37.4	35.1	64.4	89.0	79.9	78.1
2	50.8	45.5	70.5	50.0	62.6	43.5	35.5	35.8	66.8	83.9	78.8	69.0
3	49.6	46.4	71.2	50.1	61.0	43.5	35.8	37.2	69.1	82.5	74.9	63.5
4	49.6	49.4	72.5	50.1	50.3	43.5	34.6	38.1	71.5	80.4	74.1	63.5
5	46.3	47.9	72.6	50.1	50.1	43.4	34.5	38.7	78.0	77.6	81.2	67.7
6	42.1	44.6	72.6	50.1	50.1	43.4	35.0	40.1	87.7	75.4	85.6	72.2
7	42.0	44.8	72.5	50.1	47.4	42.7	34.5	41.3	89.4	72.2	90.0	72.1
8	42.2	44.9	72.7	50.1	43.1	43.5	34.9	42.5	88.1	73.2	81.2	72.2
9	41.7	45.7	72.8	50.1	41.0	43.7	35.1	44.2	89.5	77.9	84.4	77.1
10	42.4	47.1	72.2	50.1	42.4	43.9	35.2	46.0	87.3	79.3	87.9	82.5
11	42.4	47.0	71.6	50.1	42.6	44.1	35.2	47.8	84.4	77.0	86.3	80.6
12	42.0	47.8	71.5	50.1	42.4	44.0	34.9	48.7	85.2	76.2	88.2	76.6
13	42.4	49.1	71.3	50.1	42.7	45.9	35.5	49.4	81.8	76.1	90.2	71.4
14	42.4	50.0	70.8	49.9	43.1	52.6	34.7	50.4	78.6	75.0	91.1	71.4
15	40.3	51.8	70.9	50.1	41.9	52.9	35.1	52.8	76.2	70.2	92.3	66.5
16	37.8	53.3	70.1	50.3	41.0	53.0	34.8	56.8	72.6	70.0	87.6	56.0
17	37.8	52.8	69.8	50.4	40.4	52.8	34.9	57.9	72.8	72.8	79.9	49.0
18	37.8	51.1	70.7	50.4	40.8	51.6	34.3	56.9	72.7	79.5	79.6	48.0
19	37.8	52.3	70.7	50.2	40.6	51.4	34.1	59.2	73.4	84.4	83.7	50.8
20	37.8	53.6	69.2	50.1	40.6	51.1	33.9	60.2	76.2	86.0	86.0	57.2
21	37.8	53.7	65.1	50.2	39.6	51.5	33.2	59.6	75.6	88.1	87.1	63.9
22	38.8	56.2	61.8	49.9	38.8	50.1	33.0	60.6	73.8	85.7	85.7	70.8
23	40.3	59.6	61.8	50.0	40.4	49.8	33.1	61.5	72.8	85.2	84.6	69.4
24	40.3	59.3	61.6	50.1	41.7	50.4	33.5	61.7	80.1	84.9	84.1	67.0
25	40.3	60.7	61.6	50.1	43.4	46.8	33.8	62.9	92.9	83.8	83.3	66.7
26	40.3	66.6	61.5	50.2	43.3	46.1	34.0	63.1	98.2	81.2	80.7	63.6
27	39.9	70.3	61.7	50.2	43.3	44.4	34.0	62.4	95.8	78.2	76.3	59.3
28	39.2	70.3	61.8	50.2	43.3	43.4	34.3	62.9	93.3	78.0	74.8	58.9
29	39.2	70.3	61.8	50.3		43.8	34.7	66.4	90.9	80.0	80.2	56.7
30	39.2	70.7	61.6	50.0		41.3	34.9	71.2	89.7	86.0	83.2	53.9
31	39.1		57.3	50.4		45.7		72.4		83.2	83.0	
Mean	41.9	53.5	67.9	50.1	44.7	46.7	34.6	53.0	81.0	79.8	83.4	65.9

COLUMBIA RIVER AT BIRCHBANK, B.C.—Daily discharges in thousand cubic feet per second for the year ending 30 September 1995

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.3	12.6	12.3	19.7	15.3	11.1	9.8	15.5	38.4	20.8	13.5	10.0
2	5.5	15.2	12.6	19.6	17.8	10.1	10.3	16.9	37.3	19.5	16.6	9.1
3	5.3	15.5	11.7	19.8	17.8	9.5	10.3	18.0	37.1	18.0	16.7	9.0
4	5.2	15.1	7.3	20.0	14.7	9.3	10.3	19.1	36.6	16.8	16.5	8.9
5	5.2	19.5	7.0	19.5	9.1	8.9	10.5	18.8	36.5	15.1	16.6	9.0
6	5.1	21.6	14.7	17.8	8.6	8.6	10.7	19.0	36.7	13.7	16.7	14.7
7	5.1	21.5	15.5	19.5	11.5	8.2	11.1	19.8	38.6	12.5	17.0	16.8
8	5.2	21.4	15.4	19.8	8.1	8.0	10.8	19.4	37.8	12.2	17.3	16.7
9	8.5	21.6	15.3	19.6	7.6	8.1	10.7	19.0	35.3	12.2	17.3	15.7
10	8.7	21.5	14.6	18.0	7.4	9.6	10.6	18.9	33.5	12.1	17.4	9.6
11	8.9	19.1	6.5	13.2	7.2	12.3	10.3	19.8	33.1	12.0	17.3	9.0
12	11.6	15.3	6.6	7.5	7.0	14.5	10.3	20.0	33.5	11.7	17.2	8.9
13	11.7	6.5	14.5	15.0	6.4	14.0	10.4	20.0	32.6	11.5	17.3	8.9
14	11.8	6.0	15.2	20.5	6.3	13.2	10.8	20.9	31.5	11.3	17.2	6.9
15	12.3	14.1	15.3	21.1	6.1	13.5	10.7	24.0	30.9	11.6	17.2	5.6
16	6.2	18.3	15.3	21.0	6.2	14.1	10.4	33.0	30.4	11.8	17.2	5.7
17	5.5	21.1	11.6	20.5	6.5	13.9	10.0	41.6	30.5	11.6	17.2	5.5
18	11.6	21.3	6.2	19.9	6.9	13.3	9.9	43.8	31.0	11.6	17.4	5.5
19	13.7	21.3	6.5	16.5	8.0	12.8	9.8	42.2	30.0	11.5	16.2	5.4
20	14.0	18.8	12.8	13.8	13.3	12.5	9.6	40.0	30.7	11.3	11.4	5.4
21	14.8	7.3	6.9	14.2	16.9	12.6	9.4	38.6	32.4	11.5	10.8	5.4
22	16.4	13.9	6.4	17.0	17.4	12.6	9.3	36.7	31.9	10.4	13.1	5.5
23	13.1	18.0	6.4	19.6	15.8	12.2	9.3	35.5	31.0	6.5	12.6	5.5
24	12.8	17.0	6.3	17.7	13.8	11.7	9.6	35.0	30.3	6.2	12.4	5.5
25	18.8	6.6	6.2	17.6	13.1	11.3	10.7	35.7	29.7	6.1	12.4	5.4
26	20.8	5.9	6.3	17.2	13.7	10.9	11.5	34.6	29.1	6.1	12.0	5.4
27	18.4	5.8	6.3	17.8	13.4	10.5	11.8	33.1	28.7	6.1	10.5	5.4
28	15.9	5.9	6.8	19.2	12.1	10.1	11.9	33.2	26.9	6.0	10.3	5.5
29	15.1	13.6	12.6	17.5		9.9	11.9	35.0	24.8	6.3	10.3	5.5
30	6.9	9.6	16.4	17.1		9.7	13.3	37.5	22.8	9.3	10.7	5.4
31	6.0		20.0	13.5		9.7		39.1		10.0	10.6	
Mean	10.7	15.0	10.9	17.8	11.0	11.2	10.5	28.5	32.3	11.4	14.7	8.0

KOOTENAI RIVER AT PORTHILL, IDAHO—Daily discharges in thousand cubic feet per second for the year ending 30 September 1995

APPENDIX D

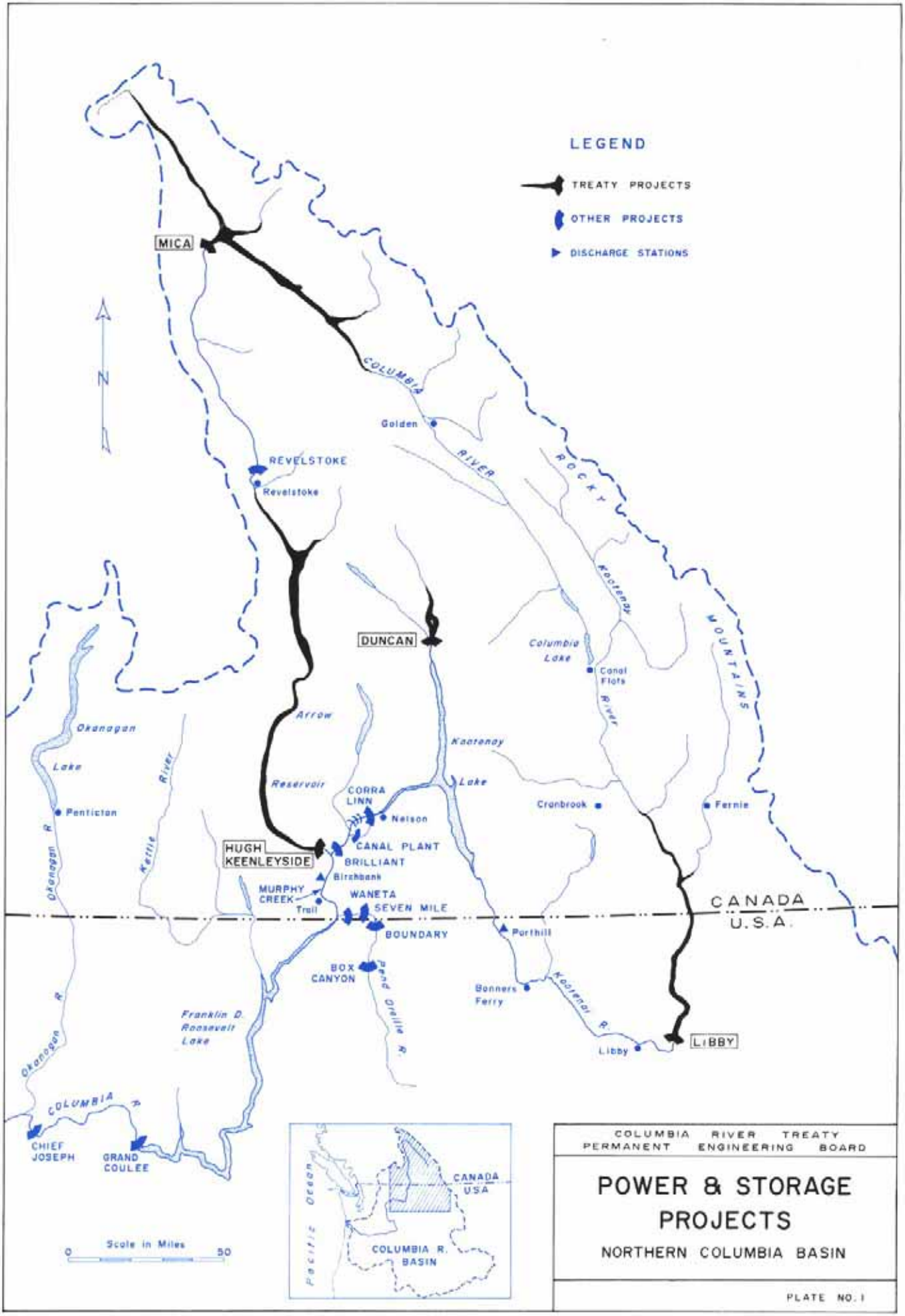
PROJECT INFORMATION

Power and Storage Projects,

Northern Columbia Basin	Plate No. 1

Project Data

Duncan Project	Table No. 1
Arrow Project	Table No. 2
Mica Project	Table No. 3
Libby Project	Table No. 4



COLUMBIA RIVER TREATY
PERMANENT ENGINEERING BOARD

POWER & STORAGE PROJECTS

NORTHERN COLUMBIA BASIN

PLATE NO. 1

TABLE 1

DUNCAN PROJECT

Duncan Dam and Duncan Lake

Storage Project

Construction began	17 September 1964
Storage became fully operational	31 July 1967

Reservoir

Normal Full Pool Elevation	1,892 feet
Normal Minimum Pool Elevation	1,794.2 feet
Surface Area at Full Pool	18,000 acres
Total Storage Capacity	1,432,400 ac-ft
Usable Storage Capacity	1,400,000 ac-ft
Treaty Storage Commitment	1,400,000 ac-ft

Dam, Earthfill

Crest Elevation	1,907 feet
Length	2,600 feet
Approximate height above riverbed	130 feet
Spillway - Maximum Capacity	47,700 cfs
Discharge tunnels - Maximum Capacity	20,000 cfs

Power Facilities

None

TABLE 2

ARROW PROJECT

Hugh Keenleyside Dam and Arrow Lakes

Storage Project

Construction began	March 1965
Storage became fully operational	10 October 1968

Reservoir

Normal Full Pool Elevation	1,444 feet
Normal Minimum Pool Elevation	1,377.9 feet
Surface Area at Full Pool	130,000 acres
Total Storage Capacity	8,337,000 ac-ft
Usable Storage Capacity	7,100,000 ac-ft
Treaty Storage Commitment	7,100,000 ac-ft

Dam, Concrete Gravity and Earthfill

Crest Elevation	1,459 feet
Length	2,850 feet
Approximate height above riverbed	170 feet
Spillway - Maximum Capacity	240,000 cfs
Low Level Outlets - Maximum Capacity	132,000 cfs

Power Facilities

None

TABLE 3

MICA PROJECT

Mica Dam and Kinbasket Lake

Storage Project	
Construction began	September 1965
Storage became fully operational	29 March 1973
Reservoir	
Normal Full Pool Elevation	2,475 feet
Normal Minimum Pool Elevation	2,320 feet
Surface Area at Full Pool	106,000 acres
Total Storage Capacity	20,000,000 ac-ft
Usable Storage Capacity	
Total	12,000,000 ac-ft
Commitment to Treaty	7,000,000 ac-ft
Dam, Earthfill	
Crest Elevation	2,500 feet
Length	2,600 feet
Approximate height above foundation	800 feet
Spillway - Maximum Capacity	150,000 cfs
Outlet Works - Maximum Capacity	37,400 cfs
Power Facilities	
Designed ultimate installation	
6 units at 434 mw	2,604 mw
Power commercially available	December 1976
Presently installed	
4 units at 434 mw	1,736 mw
Head at full pool	600 feet
Maximum Turbine Discharge	
of 4 units at full pool	38,140 cfs

TABLE 4

LIBBY PROJECT

Libby Dam and Lake Koocanusa

Storage Project	
Construction began	June 1966
Storage became fully operational	17 April 1973
Reservoir	
Normal Full Pool Elevation	2,459 feet
Normal Minimum Pool Elevation	2,287 feet
Surface Area at Full Pool	46,500 acres
Total Storage Capacity	5,869,000 ac-ft
Usable Storage Capacity	4,980,000 ac-ft
Dam, Concrete Gravity	
Deck Elevation	2,472 feet
Length	3,055 feet
Approximate height above riverbed	370 feet
Spillway - Maximum Capacity	145,000 cfs
Low Level Outlets - Maximum Capacity	61,000 cfs
Power Facilities	
Designed ultimate installation	
8 units at 105 mw	840 mw
Power commercially available	24 August 1975
Presently installed	
5 units at 105 mw	525 mw
Head at full pool	352 feet
Maximum Turbine Discharge	
of 5 units at full pool	26,500 cfs

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

C A N A D A • U N I T E D S T A T E S

CANADIAN SECTION
J. D. OULTON, Chairman
J. Allan, Member

UNITED STATES SECTION
J. P. ELMORE, Chairman
R. H. Wilkerson, Member

7 September 1995

Mr. John Laxton
Chair, Canadian Entity
Columbia River Treaty
Chair, British Columbia Hydro and Power Authority
333 Dunsmuir Street
Vancouver, B.C.
V6B 2X8

Dear Mr. Laxton:

I am writing to follow-up on the Board-Entity meeting of 9 August 1995. A similar letter is being sent to the chair of the U.S. Operating Entity. I also want to take this opportunity to thank the representatives of the Canadian Entity for coming to Ottawa and participating in a frank discussion of the differences between the Operating Entities on certain Treaty issues, and of the Board's role in addressing these differences. The views expressed by the Operating Entities have been helpful to the Board in deciding how it will proceed with regard to these differences.

The Board has decided that it would not be appropriate to consider in the same manner all of the six issues raised in the Canadian Entity's letter of 21 July 1995 to the Board Secretary. As a result, the Board has grouped the issues into the following four categories:

I) AOP-DDPB Issues - These issues are a) the appropriate application of the critical stream flow period definition in Article I of the Treaty, and b) the appropriate application of the term "established operating procedures" specified in Annex B, paragraph 7, of the Treaty.

ii) Transmission Reliability Issues - These issues are a) the Treaty requirements with regard to back up service for delivery of the Canadian entitlement to Oliver, and b) the Treaty requirements with regard to the east-west standby transmission provided for in Article X of the Treaty.

iii) Alternative Delivery Points - This issue concerns the Treaty requirements with regard to the consideration of delivery points other than Oliver for the Canadian entitlement.

iv) Entity Cooperation - This issue concerns the Treaty requirements regarding cooperation between the Operating Entities in carrying out their responsibilities under the Treaty and, more particularly, in addressing and resolving issues.

With regard to the AOP-DDPB issues, the Board believes that they are of a technical nature, and that there have been substantial efforts by the Operating Entities to resolve these issues. The Board is also of the view that the differences between the Operating Entities are well defined and understood by the Board because of the presentations and information provided by each Operating Entity. As a result, the Board concludes that it is appropriate for the Board to try to facilitate a resolution of the differences between the Operating Entities on the AOP-DDPB issues. The Operating Committees of both Entities have agreed to meet with the Board on 26 September 1995 to address the AOP-DDPB issues. The Board-Entities meeting will be held in Portland at 10:30 a.m. in the offices of the Bonneville Power Administration. In preparation for the meeting, the PEBCOM will meet with the Entities' Operating Committees in Portland on 7 September 1995 to develop background material for the Board.

The Board proposes that the following format be used for the Board-Entities' meeting. Each Operating Entity will provide the Board, and the other Operating Entity, with a paper setting out its position and the supporting arguments on each of the AOP-DDPB issues. (The Board requests that the position papers be delivered approximately one week before the 26 September meeting.) During the meeting, each Operating Entity will give an oral presentation of its position and arguments. The Board will then have an opportunity to ask for clarifications or additional information. Subsequent to both the Operating Entities' presentations and the Board's enquiries, each Operating Entity will have an opportunity to question the other's presentation. Finally, there will be an opportunity for each Operating Entity to make a summary presentation or statement. Following the meeting with the Operating Entities, Board members will reconvene to consider the issues. The Board's meeting will continue on 27 September; however, the Board does not plan to meet again with the Operating Entities at that time.

The Board's deliberations may result in three alternative outcomes: the Board may reach a decision on the AOP-DDPB issues which it will then ask the Operating Entities to consider; it may request further information or a meeting individually and/or collectively with the Operating Entities; or it may conclude that a decision cannot be reached, and report the issues, and the results of the Board's deliberations, to the governments.

With regard to the transmission reliability issues, the Board is of the view that these are technical issues, and that it would be appropriate for the Board to assist the Operating Entities in resolving their differences on these issues. The Board recognizes that it has had limited discussions with the Operating Entities on these issues, and that additional time is required for the Board and Operating Entities to prepare to address them. As a result, the Board would like to schedule a meeting with the Operating Entities to address these issues in early November. This meeting would follow the same format as described above for the September meeting.

Concerning the alternative delivery points issue, the Board does not have sufficient information, at present, to conclude whether this is an issue that would be appropriate for the Board to address. The Board will consider this matter further at its meeting on 27 September, and requires additional information from the Operating Entities in two areas. The first concerns the question of when decisions are required in order to meet the Treaty obligations for the delivery of the Canadian entitlement to the international boundary. The discussion of this question at the 9 August meeting left the Board unclear as to whether the Operating Entities' current negotiations and plans will assure the delivery of the Canadian entitlement in the time frame required by the Treaty. The second area concerns whether the question of alternative delivery points is an appropriate issue for the Board to address. This question turns, in part, on whether the issue is primarily a matter of the legal interpretation of the Treaty, or whether it is primarily a technical matter, recognizing that technical matters must also be based on an understanding of the requirements of the Treaty.

To assist the Board in determining when, or whether, it would be appropriate for the Board to address the alternative delivery points issue, the Board requests that each Operating Entity provide a paper on the schedule, tasks, and critical deadlines required to negotiate the delivery arrangements, and to plan, obtain the necessary regulatory authorizations, design, and construct the transmission facilities for the delivery of the Canadian entitlement. The paper from the U.S. Operating Entity should include a description of the environmental review process, including a discussion of how alternatives are handled under the National Environmental Policy Act. It should also provide an assessment of the implications for the schedule of a possible Entity agreement on any alternative route not explicitly covered in the current environmental review. In addition, the Board requests a paper setting out each Operating Entity's position and supporting arguments on whether it is appropriate for the Board to try to facilitate a resolution of the differences between the Operating Entities on the alternative delivery points issue. The Board asks that these papers be provided to the Board at the Board-Entity meeting on 26 September.

The Board does not intend to consider the differences between the Operating Entities concerning the alternative delivery points issue in the 26 and 27 September meetings. Rather, its consideration will be limited to the questions of whether it is appropriate for the Board to address these differences, and, if so, when the Board should become involved.

Finally, with regard to the Entity cooperation issue, the Board concurs with the views expressed by the Operating Entities on 9 August that consideration of this issue be deferred while the other issues are addressed. Successful resolution of the other issues may, in itself, enhance cooperation. In deferring consideration of this issue, however, the Board does not want to convey the impression that it does not consider this to be an important matter. To the contrary, cooperation between the Operating Entities is absolutely essential for the operation of the Treaty. Further, the Board is strongly of the view that responsibility for addressing and finding solutions to differences that arise between Canada and the United States, particularly at this point of transition in Treaty operations, rests primarily with the Operating Entities. The Board will return

to this issue, and will be seeking the Operating Entities' views, once the process outlined above for the other issues has been completed.

Please let me know if you, or your staff, have questions or suggestions regarding the arrangements set out above. I look forward to meeting with the Operating Entities and trust we will be able to work toward a resolution of the outstanding issues.

Yours sincerely,

David Oulton
Chair, Canadian Section

c.c.: PEB members
PEBCOM members

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

C A N A D A • U N I T E D S T A T E S

CANADIAN SECTION
J. D. OULTON, Chairman
J. Allan, Member

UNITED STATES SECTION
J. P. ELMORE, Chairman
R. H. Wilkerson, Member

7 September 1995

Mr. Randall W. Hardy
Chair, United States Entity
Columbia River Treaty
Bonneville Power Administration
Department of Energy
P. O. Box 3621
Portland, Oregon 97208

Dear Mr. Hardy:

I am writing to follow-up on the Board-Entity meeting of 9 August 1995. A similar letter is being sent to the chair of the Canadian Operating Entity. I also want to take this opportunity to thank the representatives of the U.S. Entity for coming to Ottawa and participating in a frank discussion of the differences between the Operating Entities on certain Treaty issues, and of the Board's role in addressing these differences. The views expressed by the Operating Entities have been helpful to the Board in deciding how it will proceed with regard to these differences.

The Board has decided that it would not be appropriate to consider in the same manner all of the six issues raised in the Canadian Entity's letter of 21 July 1995 to the Board Secretary. As a result, the Board has grouped the issues into the following four categories:

I) AOP-DDPB Issues - These issues are a) the appropriate application of the critical stream flow period definition in Article I of the Treaty, and b) the appropriate application of the term "established operating procedures" specified in Annex B, paragraph 7, of the Treaty.

ii) Transmission Reliability Issues - These issues are a) the Treaty requirements with regard to back up service for delivery of the Canadian entitlement to Oliver, and b) the Treaty requirements with regard to the east-west standby transmission provided for in Article X of the Treaty.

iii) Alternative Delivery Points - This issue concerns the Treaty requirements with regard to the consideration of delivery points other than Oliver for the Canadian entitlement.

iv) Entity Cooperation - This issue concerns the Treaty requirements regarding cooperation between the Operating Entities in carrying out their responsibilities under the Treaty and, more particularly, in addressing and resolving issues.

With regard to the AOP-DDPB issues, the Board believes that they are of a technical nature, and that there have been substantial efforts by the Operating Entities to resolve these issues. The Board is also of the view that the differences between the Operating Entities are well defined and understood by the Board because of the presentations and information provided by each Operating Entity. As a result, the Board concludes that it is appropriate for the Board to try to facilitate a resolution of the differences between the Operating Entities on the AOP-DDPB issues. The Operating Entities have agreed to meet with the Board on 26 September 1995 to address the AOP-DDPB issues. The Board-Entities meeting will be held in Portland at 10:30 a.m. in the offices of the Bonneville Power Administration. In preparation for the meeting, the PEBCOM will meet with the Entities' Operating Committees in Portland on 7 September 1995 to develop background material for the Board.

The Board proposes that the following format be used for the Board-Entities' meeting. Each Operating Entity will provide the Board, and the other Operating Entity, with a paper setting out its position and the supporting arguments on each of the AOP-DDPB issues. (The Board requests that the position papers be delivered approximately one week before the 26 September meeting.) During the meeting, each Operating Entity will give an oral presentation of its position and arguments. The Board will then have an opportunity to ask for clarifications or additional information. Subsequent to both the Operating Entities' presentations and the Board's inquiries, each Operating Entity will have an opportunity to ask questions concerning the other's presentation. Finally, there will be an opportunity for each Operating Entity to make a summary presentation or statement. Following the meeting with the Operating Entities, Board members will reconvene to consider the issues. The Board's meeting will continue on 27 September; however, the Board does not plan to meet again with the Operating Entities at that time.

The Board's deliberations may result in three alternative outcomes: the Board may reach a decision on the AOP-DDPB issues which it will then ask the Operating Entities to consider; it may request further information or a meeting individually and/or collectively with the Operating Entities; or it may conclude that a decision cannot be reached, and report the issues, and the results of the Board's deliberations, to the Governments.

With regard to the transmission reliability issues, the Board is of the view that these are technical issues, and that it would be appropriate for the Board to assist the Operating Entities in resolving their differences on these issues. The Board recognizes that it has had limited discussions with the Operating Entities on these issues, and that additional time is required for the Board and Operating Entities to prepare to address them. As a result, the Board would like to schedule a meeting with the Operating Entities to address these issues in early November. This meeting would follow the same format as described above for the September meeting.

Concerning the alternative delivery points issue, the Board does not have sufficient information, at present, to conclude whether this is an issue that would be appropriate for the Board to address. The Board will consider this matter further at its meeting on 27 September, and requires additional information from the Operating Entities in two areas. The first concerns the question of when decisions are required in order to meet the Treaty obligations for the delivery of the Canadian entitlement to the international boundary. The discussion of this question at the 9 August meeting left the Board unclear as to whether the Operating Entities' current negotiations and plans will assure the delivery of the Canadian entitlement in the time frame required by the Treaty. The second area concerns whether the question of alternative delivery points is an appropriate issue for the Board to address. This question turns, in part, on whether the issue is primarily a matter of the legal interpretation of the Treaty, or whether it is primarily a technical matter, recognizing that technical matters must also be based on an understanding of the requirements of the Treaty.

To assist the Board in determining when, or whether, it would be appropriate for the Board to address the alternative delivery points issue, the Board requests that each Operating Entity provide a paper on the schedule, tasks, and critical deadlines required to negotiate the delivery arrangements, and to plan, obtain the necessary regulatory authorizations, design, and construct the transmission facilities for the delivery of the Canadian entitlement. The paper from the U.S. Operating Entity should include a description of the environmental review process, including a discussion of how alternatives are handled under the National Environmental Policy Act. It should also provide an assessment of the implications for the schedule of a possible Entity agreement on any alternative route not explicitly covered in the current environmental review. In addition, the Board requests a paper setting out each Operating Entity's position and supporting arguments on whether it is appropriate for the Board to try to facilitate a resolution of the differences between the Operating Entities on the alternative delivery points issue. The Board asks that these papers be provided to the Board at the Board-Entity meeting on 26 September.

The Board does not intend to consider the differences between the Operating Entities concerning the alternative delivery points issue in the 26 and 27 September meetings. Rather, its consideration will be limited to the questions of whether it is appropriate for the Board to address these differences, and, if so, when the Board should become involved.

Finally, with regard to the Entity cooperation issue, the Board concurs with the views expressed by the Operating Entities on 9 August that consideration of this issue be deferred while the other issues are addressed. Successful resolution of the other issues may, in itself, enhance cooperation. In deferring consideration of this issue, however, the Board does not want to convey the impression that it does not consider this to be an important matter. To the contrary, cooperation between the Operating Entities is absolutely essential for the operation of the Treaty. Further, the Board is strongly of the view that responsibility for addressing and finding solutions to differences that arise between Canada and the United States, particularly at this point of transition in Treaty operations, rests primarily with the Operating Entities. The Board will return

to this issue, and will be seeking the Operating Entities' views, once the process outlined above for the other issues has been completed.

Please let me know if you, or your staff, have questions or suggestions regarding the arrangements set out above. I look forward to meeting with the Operating Entities and trust we will be able to work toward a resolution of the outstanding issues.

Yours sincerely,

John P. Elmore
Chair, United States Section

CF: MG Russell Fuhrman
PEB members
PEBCOM members

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

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R. H. Wilkerson, Member

October 18, 1995

Mr. Randall W. Hardy
Chair, United States Entity
Columbia River Treaty
Administrator, Bonneville
Power Administration
P.O. Box 3621
Portland, Oregon, 97208

Mr. John Laxton
Chair, Canadian Entity
Columbia River Treaty
Chair, BC Hydro and Power Authority
Vancouver, British Columbia
V6B 2X8

Dear Sirs:

We are writing to advise you of the Board's deliberations on the differences between the Operating Entities concerning the critical stream flow period and the established operating procedures as they apply to the development of the assured operating plan (AOP) and determination of downstream power benefits (DDPB). The Board would like to thank the Entities for their cooperation and for their presentations on these differences to the Board at our meeting in Portland on September 26, 1995.

Regarding the critical stream flow period definition, the Board has, with the Entities' assistance, developed a good appreciation of the respective positions of the Entities. The Board has reached a consensus on the appropriate application of the critical stream flow period in the AOP-DDPB studies and reports. The Board based its conclusions, in part, on the arguments presented by the Entities, and on its knowledge of the planning and operation of hydroelectric systems. However, the Board did not restrict its consideration of this issue to the positions, alternative solutions, or compromises proposed by the Entities. The Board's objective was to reach a consensus on the critical stream flow period, based on the Treaty, with a resultant long term solution to the issue. The Board's understanding of the Treaty documents and, in particular, of the definition of the critical stream flow period set out in Article I of the Treaty, weighed significantly in the Board's consideration of this issue.

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The Board reached the following conclusion regarding the appropriate application of the critical stream flow period in the AOP-DDPB studies and reports. In the opinion of the Board, the critical stream flow period, begins when releases from storage are required to augment the natural stream flow to meet system load requirements. Thus, the release of water from storage for purposes other than power generation and flood control, such as those for fishery purposes, should not affect the start of the critical stream flow period if releases from storage are necessary to supplement the natural stream flow in meeting system load requirements. For greater clarity, the application of the above conclusion would result in the Step III critical stream flow period for the 1997-98 operating year—the year used by both Entities to illustrate their respective position on this issue—beginning October 1997.

With regard to the established operating criteria referred to in Annex B, paragraph 7 of the Treaty, the Board has been advised that the Entities agree on the established operating procedures in the AOP-DDPB studies and reports for the operating years 1998-99 to 2000-2001. Further, it is the Board's understanding that the Entities agree that requirements placed on hydro projects related to power and flood control are established operating procedures. However, the Entities do not have a long term agreement on the principles, or a process, for considering whether new requirements on hydro projects, other than those related to power generation and flood control, should be included in the AOP-DDPB studies and reports.

The Board has reached the following conclusions on the question of established operating procedures. First, in the Board's view, the requirements on the hydro system used in the White Book studies, were accepted by the negotiators for both countries at the time the Treaty was ratified and, therefore, should be considered as established operating procedures. Second, any additional requirements not related to power generation or flood control (referred to here as non power requirements) may be considered as established operating procedures by mutual agreement of the Entities. In this regard, the Entities should be guided by the requirements of the Treaty documents, and previous conclusions of the Board. The Entities may also agree to remove a non power requirement from accepted established operating procedures if it is no longer relevant, or if it is determined that continued use of the non power requirement would not be consistent with the Treaty documents or previous Board conclusions. Third, the Entities should provide in the annual AOP-DDPB reports, beginning with the 2000-2001 report, a summary description of each change in established operating procedures, and the impact of that change on the operating plan and the downstream power benefits. If two or more requirements are added or deleted in a given year, then the incremental impact of each change should be described in the AOP-DDPB report. Finally, the Board may, as a result of its annual review of the AOP-DDPB reports, recommend to the Entities that a given change in the established

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operating procedures be discontinued in future assured operating plans and in the calculation of the downstream power benefits if its inclusion is, in the Board's view, inconsistent with the Treaty.

The Board recommends to the Entities that the conclusions regarding the critical stream flow period and established operating procedures summarized above be adopted in the preparation of the 2000-2001 and subsequent AOP-DDPB studies and reports. The Board would like to discuss with the Entities at our November meeting whether or how the Board's recommendation could be implemented in the AOP-DDPB reports for the operating years 1998-1999 and 1999-2000. We are also prepared to address any questions you may have on the Board's position on these issues.

Yours sincerely,

John Elmore
Chair, United States Section

David Oulton
Chair, Canadian Section

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

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CANADIAN SECTION
J. D. OULTON, Chairman
J. Allan, Member

UNITED STATES SECTION
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R. H. Wilkerson, Member

18 October 1995

Mr. Randall W. Hardy
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Mr. John Laxton
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Columbia River Treaty
Chair, BC Hydro and Power Authority
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Vancouver, B.C.
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Dear Sirs:

The purpose of this letter is to communicate to you the findings and conclusions of the Permanent Engineering Board (the Board) relative to the issue of the consideration of alternate delivery points.

By letter of 21 July 1995, the Canadian Entity asked the Board to address differences of opinion between the Entities on the issue of consideration of alternate (to Oliver) delivery points for the return of the downstream power benefits to which Canada is entitled. The Board took up the issue at its 9 August 1995 meeting in Ottawa, Ontario, at which time it decided to seek more information from the Entities. Subsequently, on 7 September 1995, the Board wrote to the Entities and, among other matters, requested that each prepare a paper explaining its view of the Board's role on the issue and to present the paper at the Board-Entities meeting in Portland, Oregon on 26 September 1995. With this completed, we wish to take this opportunity to thank the Entities and their Operating Committee for the preparations, clear oral presentations, and assistance in achieving the Board's objectives at the meeting.

After careful consideration of the differing positions of the Entities, the Board reached the following conclusions. First, the Board considers this matter, relating to Treaty interpretation of the rights and obligations of the Entities, to be outside its mandate. Thus, the Board decided that the question of whether the United States Entity is required to study alternate delivery points to be a matter outside its purview. We will so advise the Governments. Second, the Board does consider that the responsibilities assigned to it by the Treaty require the Board to engage in the broader technical and operational issues associated with the return of the Canadian entitlement.

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Accordingly, the Board considers assuring that the return of the entitlement be achieved by the Treaty-required date (2003) to be of paramount importance. As such, it will monitor the actions of the Entities to assure that necessary, appropriate, and timely steps are being taken to achieve compliance with the provisions of the Treaty.

In this regard, you were informed by the Board in its letter of 7 September 1995 that it has agreed to review the differences between the Entities with respect to the two issues associated with transmission reliability, namely, i) backup service for delivery to Oliver, and ii) east-west standby service. The Board has scheduled a meeting to deal with these issues on 8 November 1995 in Vancouver, British Columbia. An invitation for the Entities to meet with the Board at that time is forthcoming.

Yours sincerely,

John P. Elmore
Chair, United States Section

David Oulton
Chair, Canadian Section

COLUMBIA RIVER TREATY PERMANENT ENGINEERING BOARD

C A N A D A • U N I T E D S T A T E S

CANADIAN SECTION
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J. Allan, Member

UNITED STATES SECTION
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December 21, 1995

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Mr. John Laxton
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Chair, B.C. Hydro and Power Authority
333 Dunsmuir Street
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Dear Sirs:

On November 8, 1995, the Permanent Engineering Board (the Board) met with your representatives to consider the differences between the Entities on two transmission reliability issues: back up service for delivery of the Canadian entitlement at Oliver, and east-west standby transmission. We are writing to advise you of the Board's deliberations on these issues.

Based on the presentations and discussion provided by the Entities, the Board has formed the impression that the Entities agree on a number of the technical matters associated with the transmission reliability issues noted above. However, there remain some differences on technical matters, and more substantial differences concerning Treaty rights and obligations. Questions relating primarily to interpretation of the Treaty, and to commercial considerations, lie beyond the Board's mandate. Further, the Board has concluded that resolution of the two transmission reliability issues is inextricably linked to resolution of the difference between the Entities concerning delivery of the Canadian entitlement at Oliver or alternative delivery points. On this latter point, you will recall from our letter of October 18, 1995, that the Board concluded this matter is largely a question of Treaty interpretation and, therefore, beyond the Board's mandate. As a result, the Board has been frustrated in its efforts to deal with the two transmission reliability issues presented by the Entities at our November 8 meeting. It is our view that the issues, as they were presented by the Entities, go beyond the mandate of the Board.

The Board considers that there are three options for moving toward a resolution of the set of transmission issues, including the east-west standby, the back up for delivery at Oliver, and primary delivery at Oliver or other agreed upon delivery points. One option would be for the Entities to resume negotiations in the near future to find a mutually acceptable solution to all transmission issues. The second option would be for the Entities to ask the governments to initiate the dispute resolution procedures provided in Article XVI of the Treaty. The third option

would be for the Board, with the concurrence of the Entities and the governments, to step beyond the mandate provided to it in the Treaty and work with the Entities in an effort to mediate a resolution of the set of transmission issues. The above are presented as options for reaching a resolution of the transmission issues. They should not be interpreted as a reconsideration of the Board's earlier conclusion that the alternative delivery points issue is beyond the Board's mandate.

In offering to mediate, the Board is cognizant of the difficulties that need to be addressed if this option is to be adopted. First, both Entities would need to be committed to the process and be prepared to make the decisions necessary to reach agreement. Second, since the Board would be undertaking activities which are, in part, beyond its mandate, it would be incumbent on the Entities to propose this process to their respective governments, and for the governments to concur. Third, the mediation process would require an intensive effort by the Entities and the Board. The Board is prepared to make the time available, and to seek the necessary resources, to resolve these issues. Finally, if the meditation process is undertaken, but not ultimately successful, the Board would reserve the right to provide its views on the issues to the governments.

Should you decide to accept the Board's offer to mediate, we would like to meet with you jointly to discuss the procedures and timing for the mediation process. The mediation process offered by the Board would not, of course, foreclose subsequent pursuit of the dispute resolution procedures provided by the Treaty, or of direct Entity negotiations.

The Board remains concerned that the transmission issues be addressed and resolved in a time frame that will allow the Treaty requirements for the delivery of the Canadian Entitlement to be met. For this reason, the Board is prepared to go beyond its mandate and attempt to assist the Entities directly in resolving these issues.

We would be pleased to discuss with you, individually or jointly, any questions you may have regarding the proposals in this letter.

Yours sincerely,

John P. Elmore
Chair, United States Section

David Oulton
Chair, Canadian Section